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Examining Associations between Teacher–Student Relationships and Adolescent Well-Being: The Roles of School Belonging, Moral Disengagement, and Growth Mindset

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ABSTRACT: Backgrounds: Adolescent psychological well-being has become a pressing global concern, with rising levels of emotional distress among youth. Although prior research highlights the positive influence of teacher–student relationships, the underlying mechanisms—particularly the roles of school belonging, moral disengagement, and growth mindset—remain insufficiently understood. This study investigates the associations between teacher–student relationship quality and adolescent psychological well-being, examining school belonging and moral disengagement as potential mediators, and growth mindset as a moderator of these relationships. **Methods:** A total of 785 adolescents were recruited from six schools across Shanghai and Liaoning Province, China. Participants completed validated measures of teacher–student relationships, psychological well-being, school belonging, moral disengagement, and growth mindset. Data was analyzed using path analysis and moderation analyses with SPSS 23.0 and Mplus 8.3. **Results:** Teacher–student relationship quality demonstrated a strong positive association with psychological well-being ($\beta = 0.613, p < 0.001$). This association was mediated through three distinct pathways. School belonging served as a significant mediator (indirect effect = 0.103, 16.803% of total effect), as did moral disengagement (indirect effect = 0.134, 21.860% of total effect). Additionally, a sequential indirect pathway was identified, capturing the structural associations among the variables such that teacher–student relationship quality was related to school belonging, school belonging was related to moral disengagement, and moral disengagement was related to psychological well-being (indirect effect = 0.040, accounting for 6.525% of the total effect). However, growth mindset did not significantly moderate the relationship between the teacher–student relationship and psychological well-being (interaction $b = 0.075, p = 0.096$). **Conclusions:** Teacher–student relationships are strongly associated with adolescent psychological well-being, with this association mediated through both cognitive–moral and socio–emotional pathways. The sequential mediation pattern is consistent with a developmentally coherent process wherein relational support may establish belonging as a foundation for moral engagement. Although growth mindset did not function as a significant moderator in this study, it remains a positive predictor of psychological well-being. These findings underscore the importance of comprehensive interventions that address relational quality, school connectedness, and moral development to promote adolescent mental health.

KEYWORDS: Teacher–student relationship; school belonging; moral disengagement; growth mindset; psychological well-being

1 Introduction

Adolescent psychological well-being has garnered increasing global attention in recent years, as growing evidence highlights rising levels of emotional distress, anxiety, and subjective dissatisfaction among youth across cultural contexts [1–3]. In school-centered societies—particularly in East Asia, where academic achievement is highly prioritized—adolescents' psychological functioning is shaped not only by family dynamics and peer relationships, but also by the quality of interactions between students and teachers. As authority figures, emotional role models, and daily points of contact, teachers occupy a uniquely influential position in the adolescent developmental ecology [3]. Although peer relationships assume increasing salience during adolescence, teacher–student relationships offer distinct developmental functions—namely, relationships with knowledgeable adults who model mature emotional regulation, communicate institutional expectations, and provide authoritative moral guidance that peer interactions cannot substitute [4]. Yet despite this central role, the psychological impact of teacher–student relationships remain relatively under-theorized compared to family- and peer-based determinants of youth well-being.

A growing body of empirical research has demonstrated that high-quality teacher–student relationships are positively associated with a range of adolescent outcomes, including academic motivation [5], emotional regulation [6], and life satisfaction [7]. However, much of this literature remains correlational and surface-level, offering limited insight into the underlying psychological processes that may help interpret the observed associations between teacher interactions and student outcomes. This reflects a broader theoretical gap: without articulating the internal processes that organize relations between relational experiences and psychological well-being, it remains difficult to translate empirical patterns into precise, targeted interventions.

Two psychological constructs—school belonging and moral disengagement—provide theoretically grounded pathways for modeling the relational structure among key variables in this research area, yet they remain under-integrated in existing studies. School belonging, defined as students' sense of being accepted, respected, and valued within the school community, functions as a motivational anchor and protective factor across developmental stages [8]. In contrast, moral disengagement—a cognitive distortion process through which individuals rationalize unethical behavior and suspend self-regulation—has been shown to erode emotional stability and social connectedness [9]. While both constructs are independently relevant to adolescent adjustment, their potential sequential roles as mediators in the teacher–student relationship–well-being link remain empirically underexplored.

Furthermore, adolescents differ in how they interpret and internalize relational cues from teachers. Growth mindset—the belief that personal attributes can be developed through effort and learning [10]—has emerged as a powerful individual-difference factor shaping motivation, resilience, and self-perception [11]. Adolescents with a stronger growth mindset may be more likely to perceive positive teacher–student relationships and interpret teacher feedback as constructive rather than evaluative [12]. However, the potential moderating role of growth mindset in this relational context has received minimal empirical attention, particularly within East Asian educational systems.

To address these theoretical and empirical gaps, the present study proposes and tests an integrated model that examines the mediating roles of school belonging and moral disengagement—in a sequential pathway—and the moderating role of growth mindset in the relationship between teacher–student relationships and adolescent psychological well-being. Drawing on a large and culturally diverse sample of Chinese adolescents, this study seeks to clarify not only whether teacher–student relationships are associated with youth mental health, but also how and for whom these associations vary. In doing so,

we aim to contribute to both developmental theory and practical intervention frameworks that target the relational and cognitive dimensions of adolescent psychological well-being.

1.1 Literature Review

1.1.1 The Association between the Teacher-Student Relationship and Adolescent Psychological Well-Being

Psychological well-being in adolescence refers to a state of positive mental functioning, characterized by emotional stability, self-acceptance, purposeful engagement, and satisfying social relationships [13]. Unlike the mere absence of psychopathology, psychological well-being emphasizes the presence of growth-oriented experiences and optimal psychological functioning. Central to this eudaimonic conceptualization is the notion of psychological coherence—the experience of internal consistency between one’s values, actions, and self-perception [13]. Well-being in this framework is not merely about positive affect but about living in accordance with one’s authentic self and maintaining integrity between moral standards and behavior. As adolescents navigate increasing developmental demands and relational complexities, the school environment becomes a key context in shaping their mental health and self-perception [14].

Attachment theory provides a theoretically robust framework for understanding how teacher–student relationships contribute to adolescent psychological well-being [15]. Central to this theory is the concept of internal working models—cognitive-affective representations of self and others that emerge from relational experiences and subsequently guide emotional regulation, self-perception, and interpersonal expectations. The theory advances a specific developmental proposition: when individuals experience consistent emotional availability and responsive care from significant others, they construct positive internal working models characterized by self-worth and interpersonal trust. Although originally developed in the context of infant-caregiver relationships, attachment theory has been systematically extended to encompass secondary attachment figures, including teachers, who assume heightened developmental significance during adolescence as youth increasingly seek relational support beyond the family system [16]. This theoretical extension generates clear predictions regarding teacher influence: teachers who provide emotional warmth, availability, and responsive support can fulfill attachment functions, enabling adolescents to develop secure relational representations that facilitate adaptive coping with academic and social stressors [17]. Such relational security cultivates psychological resources essential for well-being, including enhanced emotional regulation capacity, positive self-regard, and resilience in the face of developmental challenges [18]. Thus, attachment theory provides an explicit theoretical basis for hypothesizing that high-quality teacher–student relationships—characterized by warmth, trust, and emotional responsiveness—positively predict adolescent psychological well-being through the cultivation of secure internal working models.

Empirical studies support the theoretical link between teacher–student relationship quality and adolescent psychological outcomes. Students who perceive their teachers as supportive and respectful report lower levels of stress and internalizing symptoms, as well as higher levels of life satisfaction and emotional regulation [19]. Longitudinal findings further show that the quality of early teacher–student relationships predicts later self-esteem and adaptive coping [20]. The strength and consistency of these findings suggest that positive teacher–student relationships may serve not only academic but also psychological developmental functions. Notably, this theoretical framework may carry particular significance in the Chinese educational context. In Confucian-influenced societies, teachers are traditionally regarded not merely as academic instructors but as moral exemplars whose approval carries ethical weight [21]. This cultural conception of teacher authority suggests that teacher–student relationships in Chinese schools may be especially consequential for adolescents’ moral-psychological functioning [22], providing additional rationale for examining moral disengagement as a mediating pathway. Building on this theoretical and

empirical foundation, the present study first examines this fundamental association among Chinese adolescents. Accordingly, we propose:

Hypothesis 1 (H1): *Teacher-student relationship quality is positively associated with adolescent psychological well-being.*

1.1.2 School Belonging as a Mediator between Teacher-Student Relationship and Adolescent Psychological Well-Being

School belonging refers to students' perceived sense of acceptance, respect, and emotional connection within the school environment [23]. As a core component of social connectedness, school belonging provides a psychological foundation for motivation, engagement, and resilience during adolescence—a developmental period marked by heightened social orientation and vulnerability to exclusion [24].

The theoretical foundation for school belonging as a mediating mechanism is systematically articulated within Bronfenbrenner's Ecological Systems Theory [25]. This framework conceptualizes human development as emerging from dynamic, bidirectional interactions between the individual and nested layers of environmental systems—from proximal microsystems to distal macrosystems. Crucially, the theory advances a specific proposition regarding psychological mechanisms that directly implies mediation: the developmental impact of environmental systems on individual outcomes is not direct but rather operates through the individual's subjective interpretation and cognitive-affective representation of environmental experiences [26]. This theoretical proposition generates a clear mediation hypothesis: external relational inputs within the school microsystem (i.e., teacher–student relationship quality) should influence developmental outcomes (i.e., psychological well-being) through the intervening mechanism of subjective environmental perception (i.e., school belonging). Within this framework, teacher–student relationship quality constitutes a primary relational input that shapes how adolescents cognitively and affectively construct their position within the school environment [27]. When teachers demonstrate warmth, respect, and emotional support, adolescents are more likely to develop a psychological sense of belonging—perceiving themselves as valued, accepted, and integral to the school community. This subjective belonging, rather than the objective relationship quality per se, serves as the proximate psychological determinant of well-being outcomes. Thus, ecological systems theory provides explicit theoretical grounds for hypothesizing that school belonging mediates the relationship between teacher–student relationship quality and adolescent psychological well-being.

Empirical research lends strong support to this model. First, studies consistently find that emotionally supportive, autonomy-promoting teacher behaviors enhance students' perceptions of belonging in school [28,29]. Second, school belonging has been shown to predict a wide range of psychological outcomes, including life satisfaction, positive affect, and emotional regulation [30,31]. Recent structural equation modeling studies further identify school belonging as a significant mediator between relational school factors and adolescent mental health [32,33]. Notably, these effects persist across diverse cultural and socioeconomic contexts, underscoring the generalizability of the construct.

Despite these findings, school belonging is often treated as a static outcome rather than as a dynamic psychological construct that helps organize how external relational experiences are associated with adolescents' internal emotional states. This conceptual limitation underestimates the cognitive and affective processing that adolescents undertake as they navigate social environments. To address this conceptual gap, the present study reframes school belonging as an active mediating mechanism rather than a terminal outcome. Accordingly, we propose:

Hypothesis 2 (H2): *School belonging mediates the relationship between teacher-student relationship quality and adolescent psychological well-being.*

1.1.3 Moral Disengagement as a Mediator between the Teacher-Student Relationship and Adolescent Psychological Well-Being

Moral disengagement is a self-regulatory cognitive process whereby individuals justify harmful or unethical behavior, allowing them to act in contradiction to moral standards without experiencing guilt or self-sanction [34]. These mechanisms—such as moral justification, displacement of responsibility, and dehumanization—temporarily deactivate internal moral controls [35]. During adolescence, a period marked by identity formation and increased sensitivity to social feedback, the tendency to morally disengage can undermine emotional regulation and psychological adjustment [36]. From a eudaimonic perspective, moral disengagement creates a rupture between adolescents' internalized moral standards and their cognitive justifications for behavior, generating psychological incoherence that erodes self-acceptance and authentic functioning—effects that extend beyond external behaviors to compromise the internal sense of integrity underlying well-being.

Social cognitive theory provides the theoretical architecture for understanding moral disengagement as a mediating mechanism between teacher–student relationships and psychological well-being [36]. The theory advances two propositions central to this mediation hypothesis. First, moral functioning is conceptualized not as a fixed internal disposition but as a self-regulatory capacity that develops and operates within social contexts through observational learning, modeling, and reinforcement processes [4]. Teachers, as authoritative adult figures with whom adolescents interact daily, serve as primary moral models whose behaviors communicate implicit and explicit standards of fairness, responsibility, and ethical conduct [37]. Second, social cognitive theory specifies that self-regulatory moral mechanisms—including self-sanctions such as guilt and self-censure—can be selectively activated or deactivated through cognitive restructuring processes collectively termed moral disengagement. The theory generates a clear prediction regarding relational influences: interpersonal contexts characterized by trust, fairness, and consistent moral modeling strengthen adolescents' moral self-regulation by facilitating the internalization of prosocial standards and maintaining active self-sanctions [38]. Conversely, relational contexts marked by inconsistency, unfairness, or emotional distance undermine norm internalization and increase susceptibility to disengagement mechanisms that permit harmful behavior without psychological cost [39]. Applied to the present model, social cognitive theory supports the specification of a statistical mediation model in which supportive teacher–student relationships, moral disengagement, and psychological well-being are linked through an indirect associational pathway.

Empirical research supports both links in this proposed mediating pathway. First, adolescents who experience emotionally supportive and autonomy-promoting relationships with teachers consistently exhibit lower levels of moral disengagement. Cross-sectional and longitudinal studies suggest that teacher modeling of fairness and responsibility serves as a contextual inhibitor of cognitive distortions that justify harmful behavior [40,41]. Second, moral disengagement has been identified as a robust cognitive risk factor for diminished psychological well-being. Adolescents who habitually employ disengagement strategies—such as diffusion of responsibility or minimizing consequences—report lower levels of emotional regulation, self-esteem, and life satisfaction, alongside increased psychological distress [42,43]. Although much of this research is correlational, the consistency and theoretical coherence of the findings underscore the conceptual importance of moral disengagement for understanding patterns of association in youth psychological functioning.

Despite strong empirical support for each segment of this pathway, few studies have formally tested moral disengagement as a mediating process between teacher–student relationships and adolescent psychological well-being. Most existing research examines these constructs in isolation, leaving the cognitive mechanisms linking relational experiences to mental health insufficiently integrated. A mediation model can offer a more nuanced understanding of how school-based interpersonal dynamics shape adolescents' internal psychological functioning. To fill this gap, the present study formally tests moral disengagement as a potential mediating mechanism. Accordingly, we propose:

Hypothesis 3 (H3): *Moral disengagement mediates the relationship between teacher-student relationship quality and adolescent psychological well-being.*

1.1.4 The Chain Mediating Role of School Belonging and Moral Disengagement between the Teacher-Student Relationship and Adolescent Psychological Well-Being

Self-determination theory provides a theoretical basis for understanding the sequential relationship between school belonging and moral disengagement. According to this theory, humans have three fundamental psychological needs: autonomy, competence, and relatedness [44]. Relatedness refers to the need to feel connected to others, to care for and be cared for by others, and to experience a sense of belonging within social groups [45]. Critically, self-determination theory proposes that satisfaction of the relatedness need is essential for the internalization of social norms and values. When individuals feel connected to a social group, they are more likely to accept and integrate the group's standards as their own, leading to autonomous self-regulation rather than external compliance or disengagement [46].

Applied to the school context, school belonging represents the satisfaction of adolescents' relatedness need within the educational environment. When adolescents experience a strong sense of belonging, they perceive themselves as accepted, valued, and connected to the school community [47]. This sense of connection facilitates the internalization of school norms and moral standards, reducing the need for cognitive mechanisms that justify norm violations. Research has demonstrated that relatedness need satisfaction is associated with greater internalization of rules and reduced engagement in transgressive behaviors [48].

Conversely, when adolescents' relatedness need remains unsatisfied—manifested as low school belonging—they lack the psychological foundation for internalizing institutional moral standards. Without this internalization, adolescents are more likely to adopt moral disengagement strategies to justify behaviors that violate norms they have not accepted as their own [49]. Longitudinal evidence supports this proposed sequence, indicating that positive school climate predicts subsequent reductions in moral disengagement over time [50].

Despite this emerging evidence, few studies have formally tested this sequential mechanism within an integrated model linking teacher-student relationships to adolescent psychological well-being. To address this limitation, the present study integrates these two constructs into a sequential mediation model. Accordingly, we propose:

Hypothesis 4 (H4): *School belonging and moral disengagement sequentially mediate the relationship between teacher-student relationship quality and adolescent psychological well-being.*

1.1.5 Growth Mindset as a Moderator between Teacher-Student Relationship and Adolescent Psychological Well-Being

Growth mindset refers to the belief that one's basic qualities—such as intelligence, personality, and emotional capacity—are not fixed traits but can be cultivated over time through effort, learning, and support [51]. This mindset influences how individuals interpret challenges, setbacks, and interpersonal experiences, particularly during adolescence, when cognitive beliefs are still forming, and relational sensitivity is heightened [52,53].

Theoretical support for the moderating role of growth mindset derives from the framework of implicit theories of intelligence, which examines how individuals' fundamental beliefs about the malleability of personal attributes shape their interpretation of and response to environmental experiences [54]. The theory distinguishes between entity theorists (those who view intelligence and ability as fixed traits) and incremental theorists (those who believe these attributes can be developed through effort), proposing that these implicit beliefs function as meaning-making frameworks that systematically filter and transform environmental input [55]. This theoretical framework generates a specific moderation hypothesis when applied to teacher–student relationships: adolescents' implicit theories should condition how they cognitively process and psychologically benefit from teacher interactions. Adolescents endorsing growth mindsets are theoretically predisposed to interpret teacher feedback—including criticism, correction, and high expectations—as developmental information signaling opportunities for improvement rather than fixed evaluations of immutable ability. This interpretive orientation should amplify the psychological value of teacher support, as growth-minded adolescents approach relational experiences with openness and construe teacher investment as meaningful resources for self-development [56]. Conversely, adolescents with fixed mindsets may interpret identical teacher behaviors as judgments of stable, unchangeable traits, thereby attenuating or negating the emotional and psychological benefits of otherwise supportive relationships [12]. The implicit theories framework thus generates an explicit moderation prediction: growth mindset should moderate the teacher–student relationship–psychological well-being association, with stronger positive effects among adolescents who endorse malleable self-beliefs.

Empirical research supports this theoretical proposition. Studies have shown that a growth mindset strengthens the positive impact of teacher support on a range of student outcomes, including academic persistence, emotional resilience, and self-esteem [57,58]. Adolescents who endorse malleable self-beliefs tend to derive greater psychological benefit from relational warmth and autonomy support [59]. Moreover, a growth mindset has been associated with stronger stress recovery and more adaptive coping under conditions of interpersonal strain [53]. However, most prior studies have examined this moderating role primarily in the context of academic achievement, leaving its influence on psychological well-being underexplored. Few investigations have situated growth mindset within relational models of adolescent mental health, particularly those emphasizing the quality of teacher–student interactions. To extend this line of research, the present study examines whether a growth mindset serves as a moderator of this association. Accordingly, we propose:

Hypothesis 5 (H5): *Growth mindset moderates the relationship between teacher-student relationship quality and adolescent psychological well-being, such that the association is stronger for adolescents with higher levels of growth mindset.*

1.2 The Present Study

Amid growing global concern about adolescent mental health, teacher–student relationships have received increasing empirical attention as an important relational context within schools. However, much of the existing literature has emphasized direct associations between teacher–student relationships and adolescent well-being, with comparatively less attention to the psychological mechanisms and individual conditions that may account for variability in these associations. The present study seeks to address this limitation by advancing an integrated, theory-informed model that delineates how and under what conditions teacher–student relationships are associated with adolescent psychological well-being.

Drawing on attachment theory, teacher–student relationships are conceptualized as emotionally meaningful bonds that may function as secondary attachment relationships during adolescence. From this perspective, perceived teacher support represents a salient relational input linked to adolescents' emotional security and self-evaluative processes, which are closely related to psychological well-being.

To move beyond direct associations, the present study focuses on two theoretically grounded mediating processes. First, informed by ecological systems theory, school belonging is conceptualized as adolescents' subjective appraisal of their connection, value, and inclusion within the school microsystem. This perspective highlights school belonging as a key psychological conduit through which relational experiences with teachers are reflected in adolescents' broader adjustment. Second, drawing on social cognitive theory, moral disengagement is examined as a self-regulatory cognitive orientation that shapes how adolescents interpret and justify behavior in social contexts. Variations in relational experiences may be reflected in adolescents' endorsement of disengagement strategies, which have been consistently linked to emotional and behavioral maladjustment.

Importantly, rather than treating these mechanisms as parallel, the present study specifies a theoretically ordered configuration of associations in which school belonging and moral disengagement are positioned sequentially. This ordering is conceptually informed by self-determination theory, which emphasizes the role of relatedness satisfaction in processes of norm internalization and self-regulation. Within this framework, school belonging is viewed as a psychological manifestation of relatedness satisfaction, whereas moral disengagement reflects variability in the internalization of social and moral standards. Accordingly, self-determination theory provides a coherent rationale for examining whether school belonging and moral disengagement operate as an ordered set of psychological correlates linking teacher–student relationships with adolescent well-being.

Critically, rather than viewing attachment theory, ecological systems theory, social cognitive theory, and self-determination theory as competing or parallel explanations, the present study advances a theoretically integrated framework that synthesizes these developmental theories into a coherent multi-layered pathway model. We propose that these theories collectively outline complementary layers of a unified “relational-affective-cognitive” developmental process. At the foundational relational layer, attachment theory provides a theoretical basis for understanding how teacher–student relationships may be associated with emotional security and the formation of internal working models of self-worth and interpersonal trust [15,17]. Building upon this relational foundation, ecological systems theory offers a framework for understanding how these interpersonal experiences may be cognitively processed and reflected in subjective perceptions of environmental belonging within the school microsystem [25,26]. Self-determination theory then specifies the motivational mechanism through which belonging satisfaction is theorized to facilitate norm internalization, conceptually bridging the affective experience of connection to the cognitive domain of moral reasoning [44,46]. At the cognitive-moral layer, social cognitive theory provides the theoretical architecture for understanding how internalized moral standards may

regulate behavior through self-sanctions, and how disruptions in this process may manifest as moral disengagement [36,38]. This multi-layered integration suggests that adolescent well-being may emerge not from any single factor but from the dynamic interplay across relational, affective, motivational, and cognitive systems. The sequential mediation pathway—from teacher relationship quality through belonging to lower moral disengagement to higher well-being—is proposed to reflect a developmentally coherent configuration of associations. Although the cross-sectional design of the present study precludes causal inference, it allows for testing whether observed patterns of association are consistent with these theoretical predictions.

Beyond these mediating processes, the present study also examines individual differences in adolescents' responsiveness to relational input. Guided by implicit theories of intelligence, the growth mindset is conceptualized as a meaning-making framework that shapes how adolescents interpret teacher feedback and relational experiences. Adolescents who endorse a growth mindset may be more inclined to construe teacher support as informative and constructive, thereby strengthening the association between teacher–student relationship quality and psychological well-being. Growth mindset is therefore examined as a moderator of this association, addressing for whom teacher–student relationships may be most strongly linked to well-being.

Guided by the integrated theoretical framework and in accordance with the study's conceptual model, five hypotheses (H1–H5) are formulated and illustrated in Fig. 1.

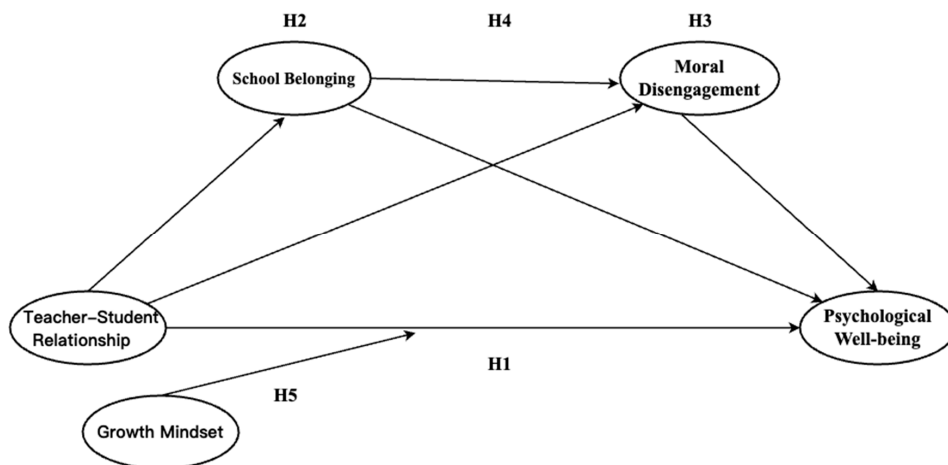


Figure 1: Research hypothesis model. **Hypothesis 1 (H1):** Teacher-student relationship is positively associated with adolescent psychological well-being. **Hypothesis 2 (H2):** School belonging mediates the relationship between teacher-student relationship and adolescent psychological well-being. **Hypothesis 3 (H3):** Moral disengagement mediates the relationship between teacher-student relationship and adolescent psychological well-being. **Hypothesis 4 (H4):** School belonging and moral disengagement sequentially mediate the relationship between teacher–student relationship and adolescent psychological well-being. **Hypothesis 5 (H5):** Growth mindset moderates the relationship between teacher-student relationship and adolescent psychological well-being.

2 Materials and Methods

2.1 Participants

The study sample comprised 785 adolescents from traditional two-parent families. Participants were recruited from three middle schools and three high schools located in Shanghai and Liaoning Province, China.

Data collection took place in October 2025, following the acquisition of necessary approvals from the participating schools and written informed consents from both the adolescents and their guardians.

Notably, the consent forms were designed to preserve participant anonymity and confidentiality, as they did not require names or signatures. Participation was voluntary, with assurances given to participants regarding their right to withdraw at any time without consequences.

To ensure the validity of the data, adolescents filled out their questionnaires independently, using pencil and paper, during school hours. Eligible participants were adolescents from two-parent families, with valid informed consent from both students and guardians. Students with diagnosed psychiatric disorders or currently receiving mental health treatment were excluded. Following a systematic screening process, 33 questionnaires containing missing pages or more than three unanswered items were identified as incomplete and excluded from subsequent analyses.

This screening procedure yielded 785 questionnaires with complete responses across all scale items, representing an effective response rate of 95.97%. The complete-case analytical approach was deemed appropriate given the high response quality achieved through standardized administration procedures—including trained research assistants providing on-site guidance, sufficient completion time, and immediate questionnaire review before collection—which minimized item-level non-response. Subsequently, the data was cleaned using the Mahalanobis distance, skewness and kurtosis values to identify multivariate outliers and abnormal values. The cleaned data set was confirmed to be symmetrical and normally distributed, ensuring its suitability for further analysis. The adolescents were aged between 13 and 18 years, with an average age of 15.592 years ($SD = 1.703$). The sample was almost equally divided between males and females, with 52.994% ($n = 416$) males and 47.006% ($n = 369$) females. Furthermore, 34.904% ($n = 274$) of the adolescents came from rural areas, while 65.096% ($n = 511$) came from urban areas. The research received approval from the Research Ethics Committee of Liaoning Normal University (IRB number: LL2025348).

2.2 Measurement

2.2.1 Psychological Well-Being

To assess multidimensional psychological well-being, the present study employed the short version of the Psychological Well-Being Scale (PWBS), originally developed by Ryff and Keyes [60]. This 18-item instrument captures six theoretically grounded dimensions: Autonomy (e.g., “I have confidence in my opinions, even when they differ from others”), Personal Growth (e.g., “I find it important to explore new experiences that challenge my thinking”), Purpose in Life (e.g., “I am not someone who wanders aimlessly through life”), Positive Relations with Others (e.g., “People would describe me as someone generous with my time”), Environmental Mastery (e.g., “I generally feel in control of my life situation”), and Self-Acceptance (e.g., “Most aspects of my personality are appealing to me”). Participants rated each item on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree), with higher scores reflecting greater psychological well-being. The scale has been extensively validated across diverse cultural contexts and demonstrates strong psychometric properties in Chinese student populations [61]. In the current sample, the PWBS exhibited excellent internal consistency (Cronbach’s $\alpha = 0.863$).

2.2.2 Teacher-Student Relationship

To assess the quality of interpersonal dynamics between students and teachers, this study employed the Teacher–Student Relationship Scale, originally formulated by Pianta [62] and later culturally adapted and validated in Chinese contexts by Zou et al. [63]. The adapted version comprises 23 items across four theoretically grounded dimensions: intimacy, conflict, support, and relationship satisfaction. This multidimensional structure captures both affective closeness and relational tension, offering a balanced framework for understanding students’ perceptions of their daily interactions with teachers. An example

item is: “The relationship between me and my teacher is close and warm”. These findings affirm the instrument’s construct validity and reliability in capturing meaningful variations in teacher–student relational quality among Chinese adolescents. Participants rated each item on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). To ensure consistent interpretation of scores, items within the conflict subscale were reverse-coded prior to computing the overall mean. Consequently, higher total scores indicate more positive and supportive teacher–student relationships. This instrument has been widely employed in contemporary Chinese educational research [64], and demonstrated strong psychometric performance in the current study. The scale also demonstrated excellent internal consistency, with a Cronbach’s alpha of 0.893, indicating high reliability across dimensions.

2.2.3 School Belonging

School belonging was evaluated using the Psychological Sense of School Membership (PSSM) Scale, originally developed by Goodenow et al. [65] and revised and translated into Chinese by Cheung et al. [66]. This instrument has been widely applied in research exploring students’ emotional and motivational experiences within educational contexts and has demonstrated robust psychometric validity in Chinese populations [67]. The scale comprises 18 items—13 positively worded statements reflecting feelings of inclusion (e.g., “I feel like a real part of this school”) and 5 negatively worded items assessing perceived rejection. Participants responded to each item on a six-point Likert scale ranging from 1 (“completely disagree”) to 6 (“completely agree”). The five negatively worded items were reverse-coded prior to analysis, ensuring that higher total scores consistently reflected a stronger perceived sense of school belonging. The scale also demonstrated excellent internal consistency in this sample, with a Cronbach’s alpha coefficient of 0.891.

2.2.4 Moral Disengagement

The Chinese version of the Moral Disengagement Scale, developed by Wang and Yang [68], was employed to assess participants’ propensity for moral disengagement. This instrument comprises 26 items distributed across eight distinct cognitive mechanisms: moral justification, euphemistic labeling, advantageous comparison, diffusion of responsibility, displacement of responsibility, distortion of consequences, dehumanization, and attribution of blame. A sample item is, “Slapping and shoving someone is just a way of joking.” Items were rated on a five-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”), with higher scores indicating greater levels of moral disengagement. The scale has demonstrated strong construct validity in Chinese student populations [69]. In the current study, the scale exhibited good psychometric performance, with a Cronbach’s alpha of 0.912.

2.2.5 Growth Mindset

To assess participants’ growth mindset, six items were adapted from Dweck’s Mindset Scale [70]. This instrument has been widely applied in educational research and has shown strong psychometric validity in Chinese student samples [71]. The scale was designed to capture individuals’ implicit theories of intelligence, with three items phrased to reflect a fixed mindset (e.g., “Intelligence is difficult to change”) and three items expressing a growth-oriented perspective (e.g., “No matter who you are, you can greatly change your intelligence”). Responses were rated on a six-point Likert scale ranging from 1 (“completely disagree”) to 6 (“completely agree”). During analysis, scores on the negatively worded items were reverse-coded, and the mean score across all six items was computed to indicate the overall level of growth mindset, with

higher values representing a stronger endorsement of growth-oriented beliefs. The internal reliability of the measure was excellent in the present sample, with a Cronbach's alpha coefficient of 0.742.

2.3 Statistical Analysis

All statistical analyses were conducted using SPSS Version 23.0 (IBM Corp., Armonk, NY, USA) and Mplus Version 8.3 (Muthén & Muthén, Los Angeles, CA, USA). Statistical significance was evaluated using p -values, which represent the probability of obtaining results at least as extreme as the observed results under the null hypothesis; effects were considered statistically significant at $p < 0.05$. To address the risk of common method variance arising from self-report measures, Harman's single-factor test was employed. Descriptive statistics and Pearson correlations were then calculated to explore the interrelations among the primary constructs. Following validation of the measurement instruments, composite scores were computed by averaging item responses for each scale. To test the hypothesized chain mediation model, a path analysis was conducted in which teacher-student relationship was specified as the exogenous variable, moral disengagement and school belonging were entered as sequential mediators, and adolescent psychological well-being was treated as the endogenous outcome. All path coefficients from the structural equation model are reported as standardized estimates (β) to facilitate comparison of relative effect sizes across different pathways. Indirect effects were considered statistically meaningful if their 95% bootstrap confidence intervals, derived from 5000 resamples, did not include zero. To further examine conditional effects, moderation analyses were carried out using the PROCESS macro (Version 4.0; Hayes, A. F., The Ohio State University, Columbus, OH, USA) in SPSS. Consistent with PROCESS output conventions, the moderation results are reported as unstandardized coefficients (b). Prior to conducting the moderation analysis, all continuous predictor variables (teacher-student relationship and growth mindset) were mean-centered to reduce potential multicollinearity between the main effects and the interaction term.

3 Results

3.1 Common Method Bias Test

Harman's single-factor test was conducted as a preliminary assessment of common method variance. The application of exploratory factor analysis resulted in the identification of 18 factors, each exhibiting an eigenvalue greater than 1. The first factor accounted for 19.972% of the total variance, which is below the commonly cited critical value of 50% [72].

3.2 Correlation Analysis of Variables

Table 1 presents the Pearson correlation coefficients for the primary variables. The analysis revealed significant correlations among all principal variables. Specifically, psychological well-being exhibited positive correlations with teacher-student relationship ($r = 0.614, p < 0.001$), school belonging ($r = 0.526, p < 0.001$), and growth mindset ($r = 0.199, p < 0.001$), but a negative correlation with moral disengagement ($r = -0.608, p < 0.001$). In contrast, the teacher-student relationship was positively correlated with school belonging ($r = 0.463, p < 0.001$) and growth mindset ($r = 0.208, p < 0.001$), and negatively correlated with moral disengagement ($r = -0.535, p < 0.001$). Furthermore, moral disengagement was negatively associated with school belonging ($r = -0.456, p < 0.001$) and growth mindset ($r = -0.322, p < 0.001$), while school belonging was positively associated with growth mindset ($r = 0.259, p < 0.001$).

Table 1: Descriptive statistics and correlation matrix analysis of all the variables.

	1	2	3	4	5
1. Teacher-student relationship	-				
2. School belonging	0.463***	-			
3. Moral disengagement	-0.535***	-0.456***	-		
4. Psychological well-being	0.614***	0.526***	-0.608***	-	
5. Growth mindset	0.208***	0.259***	-0.322***	0.199***	-
Mean	3.143	3.715	2.718	3.946	4.120
SD	0.534	0.684	0.551	0.628	0.724

Note: *** $p < 0.001$; SD: standard deviation.

3.3 Measurement Model Assessment

Prior to path analysis, a confirmatory factor analysis (CFA) was conducted to evaluate the construct validity of the measurement instruments used in this study. The hypothesized five-factor model—comprising teacher–student relationship, school belonging, moral disengagement, psychological well-being, and growth mindset—was tested, with each scale’s items specified as indicators of their respective latent factors. The model demonstrated satisfactory fit to the data, with all fit indices meeting recommended thresholds (CFI = 0.972, TLI = 0.972, RMSEA = 0.013, SRMR = 0.036). All standardized factor loadings were statistically significant ($p < 0.001$) and exceeded 0.50, indicating that the items adequately represented their intended constructs. These results provide supportive evidence for the construct validity and factorial distinctiveness of the five measures, confirming that the scales assess empirically separable constructs.

3.4 Mediation Analysis

Based on this, a chain mediation model was examined, comprising three indirect effects: (1) moral disengagement served as a mediator in the association between teacher-student relationship and psychological well-being; (2) school belonging mediated the association between teacher-student relationship and psychological well-being; and (3) teacher-student relationship was indirectly associated with psychological well-being through the sequential mediational pathway of school belonging and moral disengagement (Fig. 2).

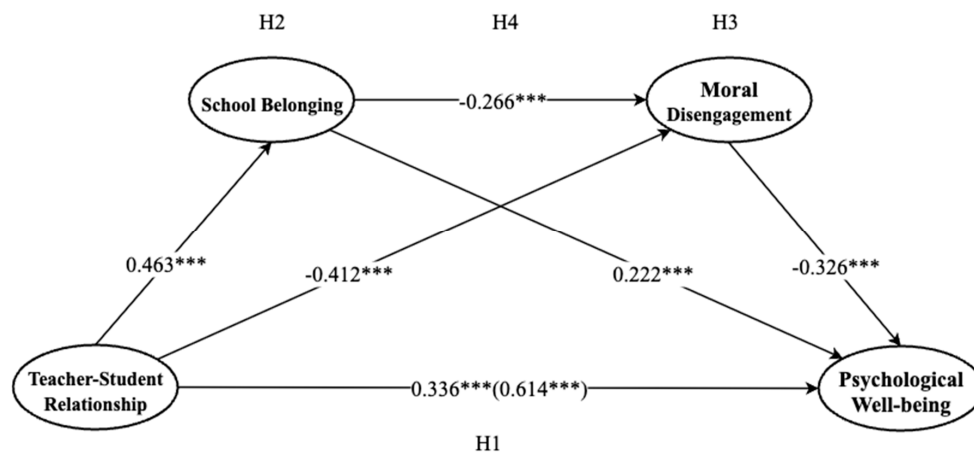


Figure 2: The mediating roles of school belonging and moral disengagement, and between the teacher-student relationship and adolescent psychological well-being. Note: *** $p < 0.001$. H1: Teacher-student relationship → Psychological well-being; H2: Teacher-student relationship → School belonging → Psychological well-being; H3: Teacher-student relationship → Moral disengagement → Psychological well-being; H4: Teacher-student relationship → School belonging → Moral disengagement → Psychological well-being.

In the path analysis model, when accounting for the mediating roles of school belonging and moral disengagement, the direct effect of teacher-student relationship on psychological well-being remained significant and positive (standardized $\beta = 0.336$, $z = 11.307$, $p < 0.001$). Additionally, a positive and significant association was observed between teacher-student relationship and school belonging ($\beta = 0.463$, $z = 17.060$, $p < 0.001$), with school belonging in turn showing a significant positive correlation with psychological well-being ($\beta = 0.222$, $z = 7.902$, $p < 0.001$). Furthermore, the teacher-student relationship was negatively and significantly correlated with moral disengagement ($\beta = -0.412$, $z = -13.683$, $p < 0.001$), which notably exhibited a significant and negative effect on psychological well-being ($\beta = -0.326$, $z = -10.378$, $p < 0.001$). Moreover, a significant and negative relationship was also found between school belonging and moral disengagement ($\beta = -0.266$, $z = -8.407$, $p < 0.001$).

Additionally, as delineated in Table 2, the total effect of teacher-student relationship on psychological well-being was measured at 0.613 (SE = 0.022, 95% CI [0.568, 0.654], $p < 0.001$), with a direct effect recorded at 0.336 (SE = 0.030, 95% CI [0.276, 0.392], $p < 0.001$). Both effects were found to be statistically significant. The pathway from teacher-student relationship via school belonging to psychological well-being showed an indirect effect of 0.103 (SE = 0.014, 95% CI [0.076, 0.132], $p < 0.001$), accounting for 16.803% of the total effect (0.613). In addition, the indirect effect through the pathway from teacher-student relationship to moral disengagement, and subsequently to psychological well-being, was 0.134 (SE = 0.016, 95% CI [0.106, 0.168], $p < 0.001$), representing 21.860% of the total effect. A further indirect effect of 0.040 (SE = 0.007, 95% CI [0.029, 0.057], $p < 0.001$) was observed in the pathway including both moral disengagement and school belonging, accounting for 6.525% of the total effect. The statistical significance of these three indirect effects was confirmed, as the bootstrapped 95% confidence intervals did not include zero. The analysis indicated that the association between teacher-student relationship and psychological well-being was significantly mediated by moral disengagement and school belonging.

Table 2: Direct, indirect, and total effects of the hypothesized model.

Model Pathways	Standardized Effect (β)	Boot SE	Proportion of Total Effect (%)	95% CI	
				Lower	Upper
Direct Effect					
Teacher-student relationship → Adolescent psychological well-being	0.336***	0.030		0.276	0.392
Indirect Effects					
Teacher-student relationship → School belonging → Adolescent psychological well-being	0.103***	0.014	16.803%	0.076	0.132
Teacher-student relationship → Moral disengagement → Adolescent psychological well-being	0.134***	0.016	21.860%	0.106	0.168
Teacher-student relationship → School belonging → Moral disengagement → Adolescent psychological well-being	0.040***	0.007	6.525%	0.029	0.057
Total effect	0.613***	0.022		0.568	0.654

Note: Teacher-student relationship as a predictor variable. *** $p < 0.001$. SE: standard error; CI: confidence interval.

3.5 Moderation Analysis

Table 3 presents the results examining the moderating effect of growth mindset on the association between teacher-student relationship and psychological well-being. The regression analysis revealed that

the unstandardized coefficient for the teacher-student relationship was 0.701, which was statistically significant ($p < 0.001$). However, the interaction term between the teacher-student relationship and growth mindset was not significant, with a coefficient of 0.075 ($p = 0.096$). This indicates that a growth mindset does not significantly moderate the relationship between the teacher-student relationship and psychological well-being.

Table 3: Moderated regression analyses predicting psychological well-being.

Variables	Psychological Well-Being
Teacher-student relationship	0.701*** (0.034)
Growth mindset	0.064* (0.025)
Teacher-student relationship \times Growth mindset	0.075 (0.045)
Sample size	785
R^2	0.384

Note: The robust standard errors are in parentheses. * $p < 0.05$, *** $p < 0.001$.

Fig. 3 presents the simple slopes for the association between the teacher-student relationship and psychological well-being at low ($-1 SD$) and high ($+1 SD$) levels of growth mindset. Although the positive association was significant at both low (unstandardized $b = 0.647$, $p < 0.001$) and high ($b = 0.755$, $p < 0.001$) levels of growth mindset, the interaction effect was not statistically significant ($b = 0.075$, $p = 0.096$). Thus, the hypothesis that a growth mindset moderates this relationship was not supported.

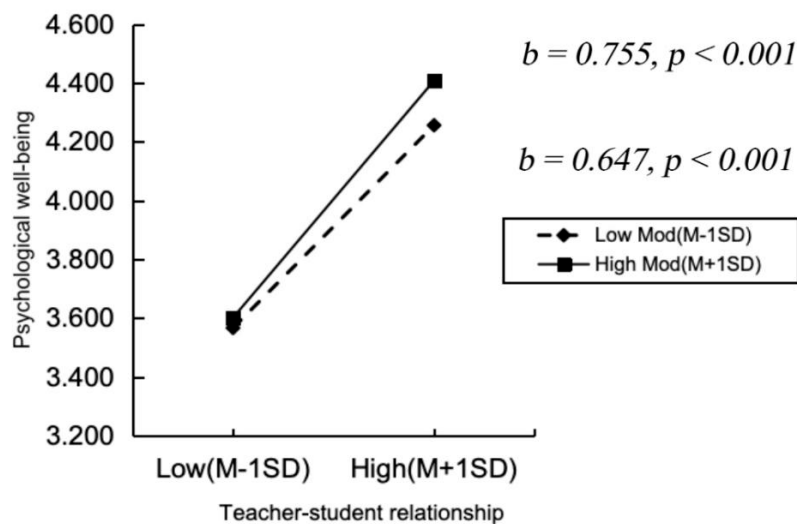


Figure 3: Analysis of simple slopes investigating the moderating influence of growth mindset. $M - 1SD$: one standard deviation below the mean; $M + 1SD$: one standard deviation above the mean.

4 Discussion

4.1 Teacher-Student Relationship Can Positively Predict Adolescent Psychological Well-Being

The results of this study provide robust support for Hypothesis 1, affirming that the quality of teacher-student relationships significantly and positively predicts adolescent psychological well-being. This

finding reinforces a growing body of empirical work demonstrating that emotionally supportive, respectful, and responsive interactions with teachers serve as a crucial developmental asset during adolescence. Adolescents who perceive their teachers as warm, fair, and trustworthy are more likely to experience emotional security, higher self-worth, and a stronger sense of belonging—factors that are central to psychological well-being [73].

High-quality teacher–student relationships have been identified as important relational contexts that are associated with lower levels of psychological stress and greater emotional resilience and identity coherence among adolescents [74]. Unlike many prior studies that have narrowly focused on academic outcomes, this research highlights the broader psychological relevance of teacher relationships—demonstrating that their influence extends well beyond the classroom’s cognitive domain.

This result is also largely consistent with existing literature. For example, previous studies have found that supportive teacher–student relationships are associated with lower levels of depression and anxiety, and higher levels of life satisfaction and self-esteem [75,76]. However, this study contributes new insight by emphasizing a eudaimonic conception of psychological well-being—one that includes not only emotional balance but also purposeful engagement and self-acceptance. Such a focus moves beyond symptom reduction to capture the developmental richness of adolescent flourishing.

Nevertheless, the findings also invite reflection on cross-cultural generalizability and theoretical consistency. While some Western-based studies suggest that the influence of teacher relationships may diminish as peer relationships grow in salience during later adolescence, our results challenge this view [77]. In the Chinese cultural context—where educational hierarchies are more formalized and teacher authority is more deeply moralized—adolescents may continue to view teacher interactions as psychologically significant [78]. This cultural nuance highlights the need to interrogate developmental theories through a culturally sensitive lens, rather than assuming universal trajectories.

Moreover, the stability of the association across subgroups suggests a consistent relational effect, yet questions remain regarding the directionality of influence. While the data support the predictive role of teacher–student relationship quality, it is also plausible that adolescents with greater psychological well-being are more inclined to perceive and engage in positive relationships with teachers. Future longitudinal or experimental research is necessary to untangle this potential bidirectionality.

4.2 The Mediating Effect of School Belonging and Moral Disengagement between the Teacher-Student Relationship and Adolescent Psychological Well-Being

The results provide strong empirical support for Hypothesis 2, confirming that school belonging plays a significant mediating role in the relationship between teacher–student relationship quality and adolescent psychological well-being. This finding highlights the importance of students’ subjective experiences of connection and acceptance in the school context and positions school belonging as a central explanatory construct within the mediational pathway linking relational experiences with psychological well-being.

This result is broadly consistent with existing literature showing that emotionally supportive teacher–student relationships are associated with greater school connectedness, which in turn predicts lower emotional distress and stronger life satisfaction [79,80]. However, the present study extends prior work by formally identifying school belonging as a mediating construct—rather than a parallel or downstream outcome—thereby clarifying its processual function in shaping well-being. It moves beyond static models of school adjustment and provides a more dynamic account of how interpersonal warmth may be cognitively and affectively internalized.

Notably, this mediation pathway contributes to a more integrated developmental model, bridging socio-relational and psychological domains. Rather than treating school belonging as a general byproduct of positive schooling experiences, the findings suggest that adolescents actively interpret relational signals from teachers as indicators of their own social value and inclusion [81]. When students feel emotionally supported and respected, they are more likely to experience school as a space of personal relevance and safety—conditions that are fundamental to psychological well-being [82]. This process also reflects an internal motivational alignment, in which external validation is translated into a stable sense of emotional security and self-worth.

The findings of this study robustly support Hypothesis 3, demonstrating that moral disengagement serves as a significant mediating mechanism in the association between teacher–student relationship quality and adolescent psychological well-being. This result advances our understanding of how relational dynamics within the school setting are associated with adolescents’ moral cognition and emotional functioning at the psychological level.

The current results expand the scope of moral disengagement research, which has traditionally focused on externalizing behaviors such as aggression or rule-breaking. The present findings indicate that moral disengagement is not limited to behavioral outcomes but also reflects a broader psychological orientation that is relevant to adolescents’ internal well-being. Prior theoretical and empirical work suggests that the tendency to suppress or distort moral accountability may be associated with diminished psychological functioning [83,84]. While the present study did not directly assess specific mechanisms such as self-acceptance or emotional coherence, the observed negative association between moral disengagement and psychological well-being is consistent with theoretical accounts proposing that cognitive distortions in moral reasoning may co-occur with lower levels of adolescent psychological adjustment.

The study also contributes to the existing literature by positioning moral disengagement as a mediating variable that helps to explain how adolescents’ relational experiences with teachers are statistically connected to their broader emotional health. While prior research has demonstrated separate links between positive teacher relationships and lower disengagement [85], and between disengagement and negative psychological outcomes [86], few studies have formally tested this cognitive mechanism within an integrated relational framework. Our findings address this gap and provide a more refined explanation for the observed associations between school-based relationships and adolescent well-being.

This finding is largely consistent with prior empirical work but also offers an important conceptual refinement. By demonstrating that moral disengagement mediates the association between teacher–student relationship quality and psychological well-being, the study underscores the importance of considering not only behavioral but also cognitive–affective pathways through which social relationships are processed. Moreover, the finding enriches relational models of schooling by suggesting that teacher support may be associated not only with emotional aspects of student experience but also with cognitive–moral orientations that, in turn, are linked to overall psychological well-being [87].

The results are consistent with Hypothesis 4, revealing a statistically significant pattern of chain mediation in which school belonging and moral disengagement sequentially mediate the association between teacher–student relationship quality and adolescent psychological well-being. However, it is important to interpret this finding with appropriate nuance regarding its actual explanatory power. The sequential mediation pathway accounted for 6.525% of the total effect, which, while statistically significant, represents a relatively modest contribution compared to the direct effect (54.8% of the total effect) and the parallel indirect effects through school belonging alone (16.803%) and moral disengagement alone (21.860%). This pattern suggests that while the sequential mechanism provides valuable theoretical insight into the

developmental coherence of belonging and moral reasoning processes, the majority of the association between teacher–student relationships and psychological well-being operates through more direct pathways or through parallel rather than sequential mediation. Notwithstanding its modest effect size, the sequential pathway remains theoretically meaningful as it illuminates a specific psychological process—wherein relational support may be associated with belonging, which in turn may be associated with reduced moral disengagement—that would be obscured by examining only aggregate indirect effects. This finding advances current understanding by highlighting not only the importance of each mediator individually, but also a theoretically specified configuration through which relational experiences may be linked to psychological outcomes.

The observed pattern—wherein supportive teacher–student relationships are associated with higher school belonging, which in turn is associated with lower moral disengagement and subsequently with higher well-being—is consistent with a psychologically coherent progression. At the interpersonal level, adolescents who feel valued and included within the school context are more likely to internalize prosocial norms and engage in self-regulated moral reasoning [47]. In contrast, prior research suggests that a weakened sense of school belonging may be linked to social alienation, which is associated with moral disengagement strategies as a way of coping with exclusion or devaluation [88]. Consistent with these prior findings, the present study observed that lower school belonging was associated with higher moral disengagement, which in turn was negatively associated with psychological well-being.

This result is partially aligned with previous research, which has separately demonstrated that both school belonging and moral disengagement are linked to adolescent adjustment [49,89]. However, few studies have integrated these constructs into a single mediational pathway, let alone tested their temporal or functional ordering. The current model addresses this gap by demonstrating that these two mechanisms may not operate in parallel, but rather interact in a developmentally meaningful sequence. This offers a more layered understanding of how school-based relational processes unfold psychologically.

Importantly, this finding also helps to clarify the cognitive-emotional architecture underlying adolescent well-being. Within the hypothesized model, school belonging is positioned as a relational anchor that may be associated with subsequent moral cognition in a theoretically coherent sequence. The observed pattern—wherein school belonging was negatively associated with moral disengagement—is consistent with theoretical propositions that adolescents who feel emotionally supported and socially included may be less inclined to adopt cognitive strategies that justify harmful behavior, although the cross-sectional design precludes definitive conclusions about this developmental sequence. Nevertheless, it is important to note that while the observed pattern of associations is consistent with our theoretically derived sequential model, the cross-sectional nature of the data precludes definitive conclusions regarding temporal ordering. The findings should therefore be understood as supporting the plausibility of the hypothesized sequence rather than establishing its causal validity.

4.3 The Non-Significant Moderating Effect of Growth Mindset between Teacher-Student Relationship and Adolescent Psychological Well-Being

Contrary to Hypothesis 5, growth mindset did not significantly moderate the association between teacher-student relationship quality and adolescent psychological well-being. Although the direction of the interaction was positive, it failed to reach statistical significance. This finding invites careful theoretical reflection.

The hypothesis was grounded in implicit theories of intelligence [90], which posits that individuals endorsing malleable self-beliefs interpret social feedback as developmental opportunities rather than

fixed judgments [54]. We anticipated that adolescents with stronger growth mindsets would derive greater psychological benefit from supportive teacher relationships. However, the data did not support this proposition.

Several explanations may account for this null finding, each with distinct theoretical implications. First, the robust direct effect of teacher-student relationship quality on well-being suggests that relational input may be sufficiently powerful to benefit adolescents regardless of their mindset orientation [91]. From the perspective of attachment theory outlined in our theoretical framework, teachers who provide consistent emotional support and responsive care fulfill fundamental attachment functions that operate relatively independently of adolescents' cognitive belief systems [15,18]. When such relational experiences satisfy basic psychological needs for security and connection, individual differences in meaning-making frameworks—such as implicit theories about ability—may have limited additional explanatory power. Notably, the positive association between teacher-student relationships and well-being was significant at both low and high levels of growth mindset, indicating that supportive relationships benefit all adolescents; however, the difference between these associations was not substantial enough to constitute a meaningful moderating effect. This pattern suggests that relational quality functions as a universal developmental resource rather than one whose effects are contingent upon students' mindset orientations.

Second, cultural context offers a compelling explanation that raises broader questions about the generalizability of the implicit theories framework [54]. In Chinese educational settings shaped by Confucian values, the belief that ability can be cultivated through sustained effort represents not merely an individual difference but a culturally shared assumption embedded in educational philosophy and socialization practices [92]. Unlike Western contexts, where fixed and growth mindsets may be more evenly distributed across the population, Chinese adolescents may exhibit relatively homogeneous endorsement of malleable self-beliefs. When growth-oriented beliefs are normative within a population, restricted variance attenuates the detection of moderating effects—not because the theoretical mechanism is absent, but because the conditions for observing differential effects are not met. This interpretation identifies potential cultural boundary conditions for implicit theories as originally articulated in Western educational contexts.

Third, the domain-specificity of growth mindset effects warrants consideration. The implicit theories framework was originally developed to explain responses to achievement challenges, academic setbacks, and performance feedback [93]. Within these contexts, beliefs about ability malleability directly shape how individuals interpret failure, respond to criticism, and persist through difficulty. However, the extension of this framework to socio-emotional relational pathways—as attempted in the present study—may require more nuanced theoretical specification. General psychological well-being encompasses life domains beyond academic achievement, including interpersonal relationships, self-acceptance, and life purpose, where beliefs about intelligence malleability may be less proximally relevant. It is plausible that a growth mindset more powerfully moderates outcomes in domains where such beliefs are directly applicable, whereas its influence on broader well-being outcomes may be more diffuse.

This finding both converges and diverges from prior work, offering opportunities for theoretical refinement. Consistent with our results, Bahník and Vranka [94] and Li and Bates [95] reported limited moderating effects of growth mindset, raising questions about the robustness of mindset effects across diverse populations and outcome domains. However, our finding contrasts with Western studies documenting significant moderating effects [90]. This divergence may reflect genuine cross-cultural variation in how implicit theories function—specifically, whether growth mindset operates as a differentiating individual characteristic in contexts where fixed beliefs are prevalent, or as a culturally shared baseline assumption in East Asian educational settings where effort-based beliefs are more universally endorsed. Alternatively, methodological

factors such as differences in sample composition, outcome measures, or statistical power across studies may contribute to these inconsistent findings. Future cross-cultural research explicitly comparing moderating effects across educational contexts would help clarify these boundary conditions.

Notably, although a growth mindset did not significantly moderate the relationship, it remained a significant independent predictor of well-being. This suggests that growth mindset and teacher-student relationship quality may operate through additive rather than synergistic mechanisms, both contributing independently to adolescent psychological well-being.

In sum, the non-significant moderation finding identifies potential boundary conditions for growth mindset theory, suggesting that in Chinese educational contexts, the benefits of positive teacher-student relationships may extend relatively uniformly across varying mindset levels.

4.4 Theoretical Contribution and Implications for the Practice

This study advances theoretical understanding by delineating the multi-layered psychological pathways through which teacher-student relationship quality is associated with adolescent psychological well-being. By integrating motivational-affiliative factors (school belonging), cognitive-moral processes (moral disengagement), and belief-based individual differences (growth mindset) into a unified empirical framework, the study moves beyond conventional direct-effect models to provide a more nuanced understanding of the mediational structure linking school-based relational dynamics with well-being outcomes.

The identification of both parallel and sequential mediation pathways refines our conceptualization of adolescent psychological processing. The findings reveal that teacher support is not only independently associated with higher school belonging and lower moral disengagement, but also shows a pattern consistent with a developmentally coherent chain mechanism: teacher support is associated with higher school belonging, which in turn is associated with lower moral disengagement and subsequently with higher psychological well-being. Notably, these pathways vary in their explanatory power, with the direct effect and parallel mediation effects accounting for the majority of the total association, while the sequential pathway represents a smaller but theoretically distinctive contribution. Despite its modest effect size, the sequential mediation finding illuminates the interdependent nature of emotional and ethical development during adolescence, suggesting that relational experiences may be linked to well-being through cascading psychological processes in addition to more direct and parallel pathways.

Beyond identifying specific mediating mechanisms, this study contributes a theoretically integrated framework that synthesizes multiple developmental theories into a coherent multi-layered pathway model. Rather than viewing attachment theory, ecological systems theory, social cognitive theory, and self-determination theory as competing or parallel explanations, our findings suggest these theories collectively outline complementary layers of a unified “relational-affective-cognitive” developmental process. At the foundational relational layer, attachment theory explains how teacher-student relationships provide emotional security and shape internal working models of self-worth and interpersonal trust. Building upon this relational foundation, ecological systems theory illuminates how these interpersonal experiences are cognitively processed and transformed into subjective perceptions of environmental belonging within the school microsystem. Self-determination theory then specifies the motivational mechanism through which belonging satisfaction facilitates norm internalization, bridging the affective experience of connection to the cognitive domain of moral reasoning. At the cognitive-moral layer, social cognitive theory explains how internalized moral standards regulate behavior through self-sanctions, and how disruptions in this process manifest as moral disengagement. This multi-layered integration reveals that adolescent well-being emerges not from any single factor but from the dynamic interplay across relational, affective, motivational, and

cognitive systems. The sequential mediation pathway—from teacher relationship quality through belonging to lower moral disengagement to higher well-being—is consistent with the temporal unfolding of this integrated process, wherein each theoretical layer may provide the foundation for subsequent developmental mechanisms. This synthesized framework moves beyond fragmented single-theory approaches to offer a more comprehensive developmental architecture that can guide both future research and multi-component intervention design.

Furthermore, the examination of growth mindset contributes to a person-centered perspective on adolescent development. Although the hypothesized moderating effect was not statistically significant, this null finding is theoretically informative. The robust direct effect of teacher-student relationships on well-being across varying mindset levels suggests that relational quality may represent a universal developmental resource that benefits adolescents regardless of their belief orientations. This highlights the fundamental importance of supportive teacher-student relationships as a protective factor that operates independently of individual cognitive differences, reinforcing attachment-based perspectives on the primacy of relational security in adolescent development.

From a practical standpoint, these findings yield several actionable implications for educational practice and intervention design. First, the centrality of teacher-student relationships in promoting psychological well-being underscores the need to prioritize relational competence in teacher professional development. Training programs should extend beyond pedagogical techniques to include emotional attunement, responsive communication, and the cultivation of classroom environments characterized by warmth, fairness, and respect. Teachers should be equipped with skills to recognize and respond to students' psychological needs, understanding their role as not merely academic instructors but as significant adult figures in adolescents' emotional development.

Second, the mediating roles of school belonging and moral disengagement suggest targeted intervention opportunities. Schools should implement programs that foster community connection through peer mentoring systems, collaborative learning structures, and community-building activities that strengthen students' sense of being valued. Simultaneously, incorporating moral reasoning discussions and ethical dilemma exercises into curricula can help students develop coherent frameworks that resist disengagement strategies. Importantly, the sequential mediation finding provides specific guidance on intervention sequencing: because school belonging appears to function as a foundational precondition that is associated with lower moral disengagement, interventions should prioritize belonging-enhancement strategies as an initial step. Practical implementation might involve establishing community through belonging-focused activities early in the school year, then introducing moral education components once students feel securely connected. Additionally, restorative justice practices that respond to infractions through dialogue and relationship repair can simultaneously maintain belonging while addressing moral reasoning. This sequenced approach recognizes that isolated moral education curricula may be less effective than comprehensive approaches that first establish belonging as a precondition for moral internalization.

Third, although growth mindset did not significantly moderate the teacher-student relationship pathway, it remained a significant independent predictor of psychological well-being. This pattern of additive rather than synergistic effects suggests the value of a dual-track intervention approach: schools should independently target both relational quality and mindset development as separate but complementary intervention goals, rather than expecting these factors to interact or amplify each other's effects. The first track involves enhancing teacher-student relationship quality through relational competence training, emotional attunement, and responsive communication practices. The second track focuses on cultivating growth mindset through process-focused feedback, normalizing productive struggle, and fostering beliefs

about the malleability of abilities. Because these factors appear to contribute independently to adolescent well-being, comprehensive school-based programs should address both dimensions without assuming that improvements in one domain will automatically enhance the effects of the other.

Fourth, these findings suggest the value of comprehensive, multi-component interventions that address relational, cognitive, and motivational dimensions simultaneously. Rather than implementing isolated programs targeting single factors, schools might develop integrated frameworks that coordinate teacher training, belonging-enhancement activities, moral education, and mindset interventions. Such holistic approaches recognize that adolescent well-being emerges from the synergistic interaction of multiple developmental systems rather than single factors operating in isolation.

Finally, the cultural context of this study—conducted in Chinese educational settings where teacher authority carries particular moral and social weight—suggests the need for culturally responsive adaptation of interventions. While the psychological mechanisms identified may operate across contexts, their specific manifestations and relative importance may vary. Educational systems should consider how local cultural values, educational traditions, and social expectations shape the meaning and impact of teacher-student relationships, tailoring interventions to align with culturally specific developmental ecologies while maintaining focus on universal psychological needs.

These theoretical and practical contributions collectively argue for a paradigm shift in how educational systems conceptualize their role in adolescent development. Schools should be understood not merely as sites of academic instruction but as relational ecosystems where psychological well-being is actively cultivated through the quality of interpersonal connections, the fostering of belonging and ethical engagement, and the promotion of adaptive belief systems. This expanded vision positions educators as key agents in supporting not just academic achievement but holistic adolescent flourishing.

4.5 Limitations

Despite its theoretical and empirical contributions, several limitations of the present study warrant careful consideration. First, the cross-sectional design fundamentally constrains causal inference. Although the study identified significant mediating and moderating effects consistent with theoretical predictions, the temporal sequencing and causal directionality of these relationships remain empirically unestablished. The observed associations between teacher-student relationship quality, school belonging, moral disengagement, growth mindset, and psychological well-being may reflect bidirectional or reciprocal influences. For instance, adolescents with higher psychological well-being may be more likely to perceive their teachers positively, experience greater school belonging, and endorse growth-oriented beliefs. Longitudinal research employing cross-lagged panel designs or experimental interventions is essential to establish temporal precedence and causal pathways among these constructs.

Second, all variables were assessed via self-report, which raises the possibility of common method variance. Given that key constructs share positive valence and reflect subjective perceptions, some covariance may be attributable to shared response tendencies. Harman's single-factor test provided preliminary evidence against a dominant method factor, though this procedure is not definitive. Future research incorporating multi-informant or observational measures would further strengthen confidence in the observed associations.

Third, the sample's geographic concentration in Shanghai and Liaoning Province limits generalizability across China's diverse educational landscape. Regional variations in educational resources, teaching philosophies, academic pressure, and cultural values may substantially influence how teacher-student relationships are experienced and their impact on well-being. Urban-rural disparities, socioeconomic

gradients, and local educational policies create distinct developmental contexts that may moderate the observed psychological pathways. Additionally, the study's focus on traditional two-parent families excludes increasingly prevalent family structures, potentially overlooking how family composition interacts with school relationships to shape adolescent well-being. Future research should employ nationally representative sampling strategies that capture China's demographic, geographic, and socioeconomic diversity.

Fourth, several theoretically relevant variables were not assessed, potentially confounding the observed relationships. Peer relationships, which assume increasing developmental salience during adolescence, may independently influence both school belonging and psychological well-being while also shaping how teacher relationships are perceived. Family dynamics, including parenting styles, parent-child relationship quality, and home academic support, likely interact with school-based relationships in complex ways. Individual differences in temperament, academic achievement, and mental health history may predispose certain adolescents toward positive teacher relationships and psychological well-being. School-level factors such as class size, academic tracking, school climate, and institutional support for teacher-student relationships were not examined but may substantially moderate the observed associations. Future studies should adopt multilevel modeling approaches that simultaneously account for individual, relational, classroom, and school-level influences.

Fifth, the cultural specificity of the findings requires careful consideration when extrapolating to other educational contexts. Chinese educational culture, characterized by high academic expectations, hierarchical teacher-student relationships, collectivist values, and intense competition for educational advancement, creates a unique developmental ecology. The psychological significance of teacher approval, the moral dimension of educational achievement, and the collective orientation toward school belonging may be particularly salient in this context. The non-significant moderating role of growth mindset may reflect the cultural normalization of growth-oriented beliefs in Chinese educational contexts, where effort and self-cultivation are deeply rooted in Confucian educational philosophy, potentially resulting in restricted variance that attenuates moderating effects. Cross-cultural comparative research is needed to determine whether the identified psychological pathways represent universal developmental processes or culturally specific patterns of relating and well-being.

Sixth, while our sequential mediation model specifies that school belonging precedes moral disengagement, this ordering—though theoretically grounded in self-determination theory's emphasis on the primacy of relatedness satisfaction for norm internalization—cannot be empirically verified with cross-sectional data. Alternative causal sequences remain plausible: moral disengagement may influence subsequent feelings of belonging, or these constructs may develop through reciprocal reinforcement over time. Future longitudinal research employing cross-lagged panel designs or latent growth curve modeling should explicitly test and compare competing sequential configurations to determine whether the theoretically specified ordering is empirically supported.

Additionally, the present study examined growth mindset only as a moderator of the direct relationship between teacher-student relationship quality and psychological well-being. A more comprehensive moderated mediation analysis examining whether growth mindset also conditions the indirect pathways (e.g., teacher-student relationship → school belonging; school belonging → moral disengagement) was beyond the scope of the current investigation. Future research with larger samples should explore whether the mediating mechanisms themselves operate differently across varying levels of growth mindset.

Finally, the study's focus on general teacher-student relationship quality obscures potential variations across different teachers, subjects, and classroom contexts. Adolescents typically interact with multiple teachers who vary in their relational styles, subject expertise, and classroom management approaches. The

psychological impact of these relationships may differ based on subject matter, with relationships in certain domains (e.g., homeroom teachers in Chinese schools who assume pastoral responsibilities) carrying greater developmental significance. Furthermore, the study did not examine how relationship quality changes over time or how relationship disruptions (e.g., teacher turnover) affect the identified pathways. Future research should adopt person-centered approaches that capture relationship profiles across multiple teachers and track relationship trajectories throughout adolescence.

5 Conclusions

This study offers robust empirical support for the theoretical proposition that teacher–student relationships are critically linked to adolescent psychological well-being. By identifying school belonging and moral disengagement as key mediating constructs—and examining growth mindset as a potential moderator—the findings move beyond traditional direct-effect models to clarify the layered mediational structure linking relational experiences with adolescents’ psychological outcomes.

The study makes a meaningful contribution to developmental theory by demonstrating that school belonging and moral reasoning are not isolated processes but interconnected psychological pathways associated with both relational quality and well-being outcomes. Notably, although growth mindset did not significantly moderate the primary relationship, it remained an independent predictor of well-being, suggesting additive rather than synergistic effects. This finding identifies potential boundary conditions for implicit theories frameworks and underscores the consistent importance of teacher-student relationship quality across varying individual belief orientations within the studied population, though replication across diverse family structures and cultural contexts is needed to establish broader generalizability.

Critically, this study challenges reductionist accounts of school climate by showing that teacher–student interactions have implications beyond academic outcomes. It calls for a broader conceptualization of educational environments as moral and emotional ecologies—spaces where adolescents’ cognitive integrity, life purpose, and emotional resilience are associated with the quality of interpersonal connections, school belonging, ethical engagement, and adaptive belief systems.

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Availability of Data and Materials: During the data collection process, participants were assured that their information would be kept confidential and that access to the data would be restricted to the research team only. As stated in the consent forms, the datasets generated and analyzed in this study cannot be made publicly available.

Ethics Approval: The research received approval from the Research Ethics Committee of Liaoning Normal University (IRB number: LL2025348). All study procedures were conducted in accordance with the ethical standards of the institutional research committee and the 1964 Helsinki Declaration and its later amendments.

Informed Consent: Written informed consent was obtained from all student participants and their legal guardians prior to data collection. Participants were fully informed of the study’s objectives, procedures, and their right to withdraw at any time without consequences.

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