

Investigating the Influences of Student- and School-Level Factors on Mental Well-Being: The Empirical Insights from SSES 2023 China Data

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The present study investigated the influences of student- and school-level factors on the mental well-being of Chinese primary and secondary school students ($N = 6,612$), in light of the 2023 Survey on Social and Emotional Skills (SSES) data. A hierarchical linear modeling (HLM) analysis was adopted as the statistical approach. At student-level, the results indicated that body image, health behaviors, positive emotions at school, growth mindset, sense of belonging at school, peer relationships, engagement at school, and participation in extra-curricular activities are all positively related to mental well-being; whereas, negative emotions at school and academic anxiety are negatively linked to mental well-being; in addition, bullying victimization, disruptive behaviors, and teacher-student relationships have no significant association with mental well-being. At school-level, it was found that positive attitudes and relations in school, school's offer of extra-curricular activities, and school safety situation are all positively associated with mental well-being; whereas, teachers' views on discrimination and equity, school practices to combat bullying, social and emotional learning, and parent engagement in school have no significant association with mental well-being. The research findings were discussed in terms of Chinese cultural and educational context, which may provide potential policy implications for improving the mental well-being of Chinese primary and secondary school students.

Keywords. Mental well-being, primary and secondary school students, influencing factors, multilevel analysis, HLM, SSES 2023

Over the past two decades, research on mental well-being has ascended to a position of paramount importance within the domain of psychological health (e.g., Arslan, 2019; Arslan & Coşkun, 2026; Diener et al., 2018; Niu, 2024a, 2024b; Seligman et al., 2009; Waters, 2011; Ying et al., 2025). The contemporary global landscape has revealed a concerning deterioration in students' psychological health, with most of the populations exhibiting alarming rates of depression and anxiety (Alvaro et al., 2013; Arslan et al., 2025; Luo et al., 2021; Xie & Xu, 2024). According to the World Health Organization (WHO, 2021), approximately 14% of adolescents aged 10-19 worldwide experience mental disorders, contributing to 13% of the global disease burden within this demographic, with depression, anxiety, and behavioral conditions serving as primary contributors. Moreover, youth residing in low- and middle-income nations encounter heightened vulnerability to psychological distress (Niu et al., 2023; Yu, 2022). In fact, students from developing countries demonstrate markedly elevated prevalence rates of depressive symptoms, anxiety disorders, sleep disturbances, and self-injurious behaviors, reflecting a concerning trajectory of deteriorating psychological well-being (Hou et al., 2024; Xie & Xu, 2024; Yu, 2022). Therefore, it is imperative to implement

comprehensive and evidence-based interventions aimed at enhancing the mental well-being of students from developing countries, thereby enabling them to cultivate sustained resilience, foster adaptive coping mechanisms, and ultimately achieve continuous positive psychological growth alongside healthy behavioral development throughout their critical developmental years and beyond.

Critically, this crisis assumes particularly acute dimensions within the Chinese educational context, where intensive academic pressures and rigid examination-oriented systems have precipitated severe mental health challenges among students (Hou et al., 2024; Niu, 2024a, 2024b; Wu et al., 2021). The prevailing educational paradigm, characterized by an unwavering fixation on standardized test scores and rankings as the paramount indicators of student worth and institutional prestige, systematically marginalizes the cultivation of psychological well-being as a legitimate educational objective (Lan et al., 2023; Niu, 2026; Niu et al., 2023). Paradoxically, this achievement-centric environment engenders a self-defeating cycle wherein heightened institutional and familial emphasis on academic excellence correlates inversely with student mental health outcomes - a phenomenon emblematic of the fundamental tension between performative metrics and holistic development (Lan et al., 2023; Wang & Ma, 2020; Yu, 2022). The relentless, often excessive pursuit of scholastic distinction, fueled by competitive admissions mechanisms and societal expectations of upward mobility, frequently occurs at the direct expense of psychological health,

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generating elevated levels of chronic stress, academic burnout, emotional exhaustion, and markedly diminished life satisfaction among adolescents who find themselves trapped in an endless treadmill of tutoring, examination, and credential accumulation (Lu et al., 2021; Meng et al., 2024; Wang et al., 2024). Consequently, the imperative to systematically identify, empirically validate, and strategically ameliorate the multifaceted factors influencing student mental wellbeing within this high-stakes educational ecosystem has never been more urgent or practically consequential.

Although the existing literature has identified various factors linking to students' mental well-being (e.g., Aldridge & McChesney, 2018; Arslan et al., 2025; Gadermann et al., 2016; Ryan & Deci, 2001; Schwarzer & Wicklund, 1991), related factors remain largely underexplored within Chinese educational context. As previously noted, Chinese traditional pedagogical paradigm has long been preoccupied with academic achievement, systematically marginalizing non-cognitive skills and affective factors that bear little direct relevance to measurable performance (Lan et al., 2023; Wang & Ma, 2020; Wang et al., 2024). Ironically, it is precisely these overlooked dimensions that constitute the critical determinants of students' mental flourishing (Arslan, 2023; Arslan & Wong, 2024; Seligman et al., 2009; Waters, 2011; Xie & Xu, 2024). Moreover, extant research examining these associations has been predominantly confined to single-level analyses (e.g., Newland et al., 2015; Tejada-Gallardo et al., 2023; Ye et al., 2026), rarely integrating both individual and institutional perspectives simultaneously (see László et al., 2019). Compounding this limitation, prior studies have largely relied on small-scale and investigator-collected datasets (e.g., Long et al., 2020; Newland et al., 2015; Prati et al., 2018), with scant utilization of large-scale international databases (e.g., Niu, 2024b; Niu et al., 2023; Odigie et al., 2025). Consequently, there is a compelling need to employ multilevel modeling techniques to systematically investigate student- and school-level factors of mental well-being among Chinese primary and secondary students, leveraging robust and large-sample data to yield generalizable insights.

Theoretical Foundation

The present study is grounded in Bronfenbrenner's ecological systems theory (Bronfenbrenner, 2005), which provides a comprehensive framework for understanding how multiple levels of environmental contexts interact to shape human development. According to this theoretical perspective, individuals develop within a complex system of relationships and environmental layers that directly and indirectly influence their psychological functioning and well-being. The microsystem represents the innermost layer encompassing immediate environments where individuals directly interact, including family, peer groups, and classroom settings. The mesosystem comprises the interconnections and processes occurring between two or more microsystems, such as the relationship between family experiences and school participation. The exosystem extends to broader social structures that indirectly influence development by impacting immediate environments, including school policies, community resources, and educational institutions. The macrosystem reflects the overarching cultural values, socioeconomic conditions, and ideological patterns of a particular society. This ecological framework has been extensively applied in

psychological and public mental health research, demonstrating that students' developmental outcomes cannot be adequately understood by examining individual characteristics alone, but require simultaneous consideration of multiple contextual influences (e.g., Eriksson et al., 2018; Niu, 2025).

Applying ecological systems theory to the investigation of Chinese primary and secondary school students' mental well-being provides a coherent theoretical rationale for examining both student- and school-level determinants. At the microsystem level, the variables derived from the student questionnaire reflect the immediate experiences, personal resources, and relational dynamics that constitute students' daily realities. Intrapersonal factors such as body image, health behaviors, growth mindset, sense of belonging, and school engagement represent individual psychological assets and self-perceptions that are theorized to directly influence well-being through proximal processes of self-regulation, coping, and identity formation. Concurrently, affective experiences - positive and negative emotions at school, as well as academic anxiety - capture the emotional tone of students' ongoing encounters with the academic environment. Interpersonal dimensions, including teacher-student relationships, peer relationships, bullying victimization, and disruptive behaviors, index the quality of social interactions within the classroom and peer group, which are hypothesized to constitute critical relational pathways through which environmental demands are internalized. The theoretical placement of these variables at the microsystem level is justified by their direct relevance to the individual's immediate and day-to-day school life.

At the mesosystem level, certain school-level variables are positioned to represent the interconnections between distinct microsystems. Specifically, factors such as positive attitudes and relations in school, teachers' views on discrimination and equity, and school practices to combat bullying are not merely reflections of within-school interactions; they also indicate how schools coordinate with families, communities, and other external agents. Moreover, parent engagement in school explicitly captures the home-school linkage, which is a prototypical mesosystem process. These variables are theoretically expected to moderate or mediate the influence of immediate interpersonal experiences by shaping the consistency and coherence of expectations and support across different settings. Their placement at the mesosystem level underscores that mental well-being may be influenced not only by what happens within the classroom but also by the alignment and quality of connections between the school and other significant contexts in students' lives.

At the exosystem level, the remaining school-level variables pertain to institutional structures and policy decisions that indirectly affect students by shaping the overall conditions of their schooling. The school's provision of extracurricular activities, the school safety situation, and the implementation of social and emotional learning (SEL) programmes are determined by school administrators and education authorities, rather than being products of direct student-teacher or peer interactions. These exosystem factors are theorized to influence students' psychological functioning indirectly - by offering opportunities for holistic development, ensuring physical and psychological security, and fostering skill-building through structured curricula - thereby shaping the broader

organizational climate within which microsystem processes unfold. Although they do not involve direct interpersonal exchanges with students, these institutional features are hypothesized to create enabling or constraining conditions that affect how students experience their immediate school environment.

Finally, the macrosystem is represented by the broader Chinese cultural and educational context, which permeates all lower levels of the ecological hierarchy. The deeply entrenched examination-oriented culture, characterized by intense academic competition, high-stakes testing, and a societal emphasis on educational credentials, establishes a dominant set of values and expectations that influence how students, teachers, and families prioritize their time, effort, and emotional investment. Additionally, collectivist cultural norms, which stress interpersonal harmony, group cohesion, and face-saving, are theorized to moderate the expression and interpretation of relational experiences such as peer conflict, teacher authority, and help-seeking behaviors. While macrosystem influences are not directly operationalized as measurable variables in the present quantitative analysis, they constitute an essential interpretive backdrop for understanding why certain student- and school-level factors may operate differently in the Chinese setting compared to Western contexts. The macrosystem provides the overarching meaning system that gives potential directions to the interactions occurring at lower ecological levels.

Literature Review

Mental Well-Being

In recent decades, the study of mental well-being has increasingly emerged as a prominent area of inquiry within psychological and educational research. Mental well-being is understood as a dynamic condition characterized by positive emotional and psychological functioning (Ryan & Deci, 2001). This multifaceted concept encompasses an individual's capacity to realize their personal potential, engage in productive and creative work, establish and maintain healthy interpersonal relationships, and make meaningful contributions to the community (Kirkwood et al., 2010; Niu et al., 2023). Generally, mental well-being encompasses an individual's physical health, psychological state, social adaptation, and extends to academic or professional accomplishments, which serves as a crucial measure of quality of life, shaped by broader social, economic, and environmental factors (Fan & Liu, 2024; Niu et al., 2023). Given its profound implications for individual flourishing and societal development, cultivating mental well-being has become a priority worthy of sustained empirical investigations across diverse populations and contexts.

A growing body of research underscored the vital role of mental well-being in promoting overall physical health, enhancing psychological resilience, improving academic performance, and strengthening supportive social networks (Diener et al., 2018; Kaya & Erdem, 2021; Kirkwood et al., 2010). The empirical evidence consistently demonstrated that mental well-being serves as a significant predictor of academic achievement among student populations. Longitudinal research indicated that higher subjective well-being predicts superior academic performance one year later, with life satisfaction and positive emotions exerting particularly strong effects on students' grade point averages (Wu et al., 2025). Similarly, empirical research conclusions and meta-analytic findings

revealed a positive correlation between students' general well-being and academic achievement across diverse educational contexts, with effect sizes varying by age, school level, and cultural background (Bücker et al., 2018; Cárdenas et al., 2022; Kaya & Erdem, 2021). Conversely, psychological distress - including elevated levels of depression, anxiety, and stress - has been shown to significantly impair academic performance, contributing to lower grades, course withdrawals, and reduced persistence to graduation (Xiong et al., 2024). On the other hand, mental well-being facilitates more effective and satisfying social interactions, which in turn reinforce a sense of belonging and mutual support (Niu et al., 2023). Given its wide-ranging influences on both personal development and social connectedness, mental well-being is considered a fundamental aspect of human flourishing and holds profound significance for individuals across the lifespan. Therefore, promoting mental well-being among students represents not merely a health imperative but an educational priority essential for optimizing both psychological functioning and academic success.

Student-Level Factors and Mental Well-Being

At the intrapersonal aspect, students' mental well-being is profoundly shaped by their self-perceptions, emotional experiences, cognitive beliefs, and health-related behaviors. Body image represents a critical determinant, with empirical evidence demonstrating that body dissatisfaction serves as a consistent risk factor for psychological distress, depression, and eating pathologies among adolescents (Neumark-Sztainer et al., 2006; Stice, 2002). A positive body image, conversely, has been associated with higher self-esteem, optimism, and resilience, which buffer against mental health challenges (J. Liu et al., 2025; Tylka, 2018). Complementing body image, healthy behaviors exert potential protective effects on mental health. A recent meta-analysis revealed that physical exercise interventions produce moderate-to-large beneficial effects on overall mental health, well-being, and substantial reductions in anxiety, depression, and stress among students (L. Liu et al., 2025). The affective dimension of school experiences also plays a pivotal role: Positive emotions at school, including joy, enthusiasm, and contentment, broaden students' cognitive perspectives and build psychological resources that enhance resilience and academic engagement (Fredrickson, 2001; Reschly et al., 2008), whereas negative emotions such as anxiety, boredom, and upset narrow attentional focus and impede well-being (Tian et al., 2013). Particularly, a growth mindset - the belief that abilities can be developed through efforts - has emerged as a protective factor against mental health problems. Students with growth mindsets demonstrated lower levels of psychological distress and higher emotional skills compared to those with fixed mindsets (Burnette et al., 2023; Niu, 2026; Yeager & Dweck, 2020). Furthermore, sense of school belonging - the feeling of being accepted, respected, and supported within the school community - constitutes a fundamental psychological need: Higher levels of school belonging predict lower internalizing and externalizing problems, higher self-worth, and better psychological adjustment across developmental stages (Niu, 2026; Pittman & Richmond, 2007). Conversely, academic anxiety impairs mental well-being through its deleterious effects on attentional control and cognitive performance, with worry components showing consistent negative correlations with emotional and mental well-being (Eysenck et al., 2007; Niu, 2026;

Schwarzer & Wicklund, 1991). Clearly, these intrapersonal variables dynamically shape students' mental health trajectories.

Beyond intrapersonal factors, students' mental well-being is significantly influenced by interpersonal relationships and contextual experiences. For example, peer victimization and bullying represent potent risk factors for mental health problems: Adolescents who experience peer victimization demonstrate significantly worse mental health outcomes, including elevated levels of depression, anxiety, and psychological distress (Katsantonis et al., 2024; Niu, 2025; Odigie et al., 2025). Disruptive behaviors, while sometimes conferring social status among peers, are generally associated with negative developmental outcomes and compromised well-being when they violate school norms and interpersonal boundaries (Long et al., 2020). The quality of teacher-student relationships constitutes another critical protective factor: Supportive, warm, and respectful interactions with teachers predict enhanced emotional well-being, academic engagement, and psychological adjustment (Pianta, 1999; Ye et al., 2026). Peer relationships, encompassing friendship quality, peer support, and social acceptance, serve dual functions for mental health: Positive peer interactions provide emotional support and mental well-being, whereas peer rejection and social isolation predict loneliness, depression, and reduced life satisfaction (Newland et al., 2015; Niu et al., 2023; Tejada-Gallardo et al., 2023). School engagement - the degree of behavioral, emotional, and cognitive investment in school activities - demonstrates robust inverse associations with internalizing problems: Students with higher engagement report lower levels of depression and anxiety, greater academic efficacy, and enhanced subjective well-being (Li & Lerner, 2011; Wang & Peck, 2013).

School-Level Factors and Mental Well-Being

A substantial body of empirical evidence demonstrated that school-level factors significantly influence students' mental wellbeing. Positive school climate, characterized by supportive interpersonal relationships, shared values, and sense of community, serves as a fundamental protective factor against adolescent mental health difficulties (Aldridge et al., 2018; Aldridge & McChesney, 2018). Longitudinal research indicated that positive school climate predicts lower levels of depression and anxiety, while fostering greater life satisfaction and positive affect among students (Sahib et al., 2025). Specifically, school climate operates through enhancing students' sense of belonging and school identification, which mediate the relationship between environmental characteristics and mental health outcomes (Klik et al., 2023). Distinct from general school climate, teachers' attitudes toward fairness and equity represent a critical dimension of school environment. It was found that perceived teacher justice, encompassing distributive, procedural, and relational fairness, significantly predicts students' well-being, with unfair treatment associated with increased school alienation and emotional distress (Hascher & Mori, 2024a, 2024b). Inversely, when students perceive teachers as treating them fairly and without discrimination, they report higher levels of school satisfaction and lower levels of aggression (Gini et al., 2024). Collectively, this evidence highlights that school climate and perceived teacher justice are not merely contextual backdrops but active determinants of students' psychological adjustment.

Therefore, fostering equitable and supportive school environments should be considered a fundamental strategy for mental health promotion in educational settings.

Beyond climate and teacher attitudes, structural school features substantially impact students' mental health. For example, participation in extracurricular activities demonstrated consistent positive associations with well-being, including higher optimism and life satisfaction alongside reduced depressive symptoms and anxiety (Gadermann et al., 2016; Malagodi et al., 2025; Schonert-Reichl et al., 2013). However, the benefits of extracurricular participation are moderated by activity type, intensity, and individual characteristics, with over-scheduling potentially inducing stress and burnout (Farb & Matjasko, 2012). Also, research reported that school safety constitutes another essential factor: School safety is inversely related to internalizing symptoms and suicidal ideation, but positively linked to students' mental health status (Brabant et al., 2016; László et al., 2019; Prati et al., 2018). Further, comprehensive anti-bullying interventions that incorporate school-wide policies, classroom curricula, and peer support components may reduce victimization and improve psychological outcomes (Fraguas et al., 2021; Niu, 2025). Previous research showed that SEL programs have generally demonstrated robust effects through meta-analytic evidence, showing significant improvements in social-emotional skills and reductions in emotional distress (Durlak et al., 2011). Additionally, parental engagement functions as a protective mechanism: Family involvement in school activities and positive family-school relationships enhance students' psychological wellbeing and buffer against mental health risks (Wang & Sheikh-Khalil, 2014). Taken together, these findings underscore the multifaceted nature of school influences on students' mental wellbeing, whereby emphasizing the need for comprehensive ecological approaches that address climate, teacher attitudes, structural features, and family partnerships.

The Present Study

This study utilized the 2023 round of the Survey on Social and Emotional Skills (SSES) database to examine student- and school-level determinants of Chinese students' mental well-being. The selection of variables in this study was primarily derived from the prior literature and the data resources made available by SSES 2023, including body image, health behaviors, positive emotions at school, negative emotions at school, growth mindset, sense of belonging at school, academic anxiety, bullying victimization, disruptive behaviors, teacher-student relationships, peer relationships, engagement at school, and participation in extra-curricular activities at student-level, as well as positive attitudes and relations in school, teachers' views on discrimination and equity, school's offer of extra-curricular activities, school safety situation, school practices to combat bullying, social and emotional learning, and parent engagement in school at school-level. The adoption of this dataset offers three distinctive methodological advantages. Firstly, the hierarchical data structure enables multilevel modeling, allowing a simultaneous examination of individual characteristics and institutional conditions while accounting for nested dependencies. Secondly, as an officially collected dataset, it guarantees data quality through standardized protocols (OECD, 2021, 2024a, 2024b). Furthermore, the comprehensive variable coverage provides rich

contextual information, facilitating systematic investigation of multiple influencing factors on mental well-being. Thirdly, the large-scale international samples ensure statistical robustness and enhance the generalizability of findings across diverse educational contexts. In brief, these features collectively support a nuanced and evidence-based understanding of students' mental well-being in the Chinese educational settings.

Overall, the selection of SSES 2023 is primarily justified by the nature of the research focus - mental well-being - and the need for a dataset that provides robust psychological and affective measures. The SSES dataset is specifically designed to capture students' social-emotional skills, with a strong emphasis on psychological constructs that are closely aligned with mental well-being. As such, it offers a comprehensive range of study variables pertaining to students' emotional states, interpersonal functioning, and psychological resources, which are directly relevant to the investigation of mental well-being. This makes SSES particularly well-suited for examining the non-cognitive and affective dimensions central to the research design. In contrast, other international large-scale assessments present certain limitations in this regard. For instance, while the Programme for International Student Assessment (PISA) includes some well-being-related items, its primary focus remains on academic achievement and cognitive outcomes. Its coverage of non-cognitive and social-emotional variables, though not absent, is relatively limited compared to the breadth and depth offered by SSES. Consequently, studies utilizing PISA data often examine well-being primarily in relation to academic performance, with fewer measures capturing the full spectrum of psychological and affective constructs. Similarly, the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS) are primarily designed to assess student achievement in mathematics, science, and reading literacy, respectively. Although they include some attitudinal and contextual questionnaires (e.g., student engagement, self-concept, and school climate), these measures are not central to the survey design and provide only partial coverage of well-being-related domains. Their limited scope in psychological and social-emotional variables makes them less suitable for a study focused specifically on mental well-being. Therefore, given the conceptual alignment between the SSES framework and the current research objectives, SSES 2023 was identified as the most appropriate choice for this study. Its emphasis on social-emotional skills allows for a more comprehensive and theoretically grounded examination of factors on mental well-being, ensuring that the analysis captures potential key variables informed in the literature.

The research questions (RQ) were as follows.

RQ1: How do student-level factors associate with mental well-being among Chinese primary and secondary school students?

RQ2: How do school-level factors connect to mental well-being among Chinese primary and secondary school students?

Method

Participants

The participants were obtained from SSES 2023, a large-scale assessment administrated by the Organization for Economic Co-operation and Development (OECD). SSES 2023 involved over

60,000 students from 16 cities across 15 countries or regions (OECD, 2024a). While its primary objective was to explore how family, school, and community factors shape the social-emotional development of 10- and 15-year-old students (OECD, 2024b), the rich background data collected also enabled analyses related to mental well-being. The survey employed a two-stage stratified cluster sampling design to ensure representative results. In the first stage, schools were selected using a probability proportional to size (PPS) approach, followed by an equal probability selection framework within those schools in the second stage (OECD, 2021). The present study was limited to analysis the Chinese primary and secondary school students. Missing data were addressed through multiple imputation, a method known to yield robust estimates in large-scale educational assessments (Kaplan & Su, 2016). The final analytical sample consisted of 6,612 students from 149 schools, including both 10-year-olds and 15-year-olds (boys = 51.7%, girls = 48.3%; younger cohort = 51.6%, older cohort = 48.4%) who are in the crucial years for the development of mental well-being.

Variable Description

Dependent Variable

Mental well-being (ST_WELLBEING) formed the dependent variable that incorporated five items in SSES 2023: (a) I have felt cheerful and in good spirits; (b) I have felt calm and relaxed; (c) I have felt active and vigorous; (d) I have woken up feeling fresh and rested; and (e) My daily life has been filled with things that interest me. All indicators were based on the student questionnaire, and were measured with a Likert-type format with ratings from 1 to 5, respectively, as follows: 1 for "At no time", 2 for "Some of the time", 3 for "More than half of the time", 4 for "Most of the time", and 5 for "All of the time." Notably, in the SSES assessment, raw scale values from contextual variables underwent specific calibration procedures employing the generalized (Rasch) partial credit model within the item response theory (IRT) framework (Masters & Wright, 1997; OECD, 2021; Rasch, 1960; Warm, 1989). Following an item parameter calibration, estimates were standardized to a metric with a mean of approximately 50 and a standard deviation of approximately 10 (OECD, 2021; OECD, 2024b). Accordingly, the present study utilized these standardized scores rather than raw values to evaluate mental well-being, with higher scores reflecting individuals' better mental state.

Student-Level Independent Variables

Body image (ST_BODYIMAGE), health behaviors (ST_HEALTHBEH), positive emotions at school (ST_POSEMOT), negative emotions at school (ST_NEGEMOT), growth mindset (ST_GROWTHMI), sense of belonging at school (ST_BELONG), academic anxiety (ST_ANXTEST), bullying victimization (ST_BULLY), disruptive behaviors (ST_DISRUP), teacher-student relationships (ST_RELTEACH), peer relationships (ST_STUCLASS), engagement at school (ST_SCHENGAM), and participation in extra-curricular activities (ST_EXTRACUR) were all student-level independent variables in this study. All variables were assessed based on the student questionnaire. Body image, growth mindset, sense of belonging at school, teacher-student relationships, and peer relationships were assessed with a Likert-type format with ratings from 1 to 4, respectively, as follows: 1 = "Strongly disagree", 2 = "Disagree", 3 = "Agree", and 4 = "Strongly

Table 1. Examples of items for composite variables in SSES 2023.

Variables	Item coding	Item wording
Dependent variables		
Mental well-being	ST_WELLBEING	I have felt cheerful and in good spirits.
Student-level independent variables		
Body image	ST_BODYIMAGE	Body image: I like my look just the way it is.
Health behaviors	ST_HEALTHBEH	Health behaviors: Do at least 20 minutes of vigorous physical activity.
Positive emotions at school	ST_POSEMOT	Emotions at school: Excited.
Negative emotions at school	ST_NEGEMOT	Emotions at school: Angry.
Growth mindset	ST_GROWTHMI	With enough effort, everyone can increase their intelligence.
Sense of belonging at school	ST_BELONG	I feel like I belong at school.
Academic anxiety	ST_ANXTEST	I worry that I will get poor marks in school.
Bullying victimization	ST_BULLY	Other students took away or destroyed things that belonged to me.
Disruptive behaviors	ST_DISRUP	I <skipped> a whole school day.
Teacher-student relationships	ST_RELTEACH	When my teachers ask how I am doing, they are really interested in my answer.
Peer relationships	ST_STUCLASS	If I walked into my classes upset, my classmates would be concerned about me.
Engagement at school	ST_SCHENGAM	Volunteering or service activities.
Participation in extra-curricular activities	ST_EXTRACUR	Extra-curricular activities: Sporting team or sporting activities.
School-level independent variables		
Positive attitudes and relations in school	PR_ATTREL	Students feel part of the school community.
Teachers' views on discrimination and equity	PR_TCVIEWS	It is important to treat students from all socioeconomic backgrounds in the same manner.
School's offer of extra-curricular activities	PR_SCHLOFF	School's offer of extra-curricular activities: Art club or art activities.
School safety situation	PR_SCHSAFT	Physical injury caused by violence among students.
School practices to combat bullying	PR_REPBULLY	Classroom activities aiming at raising students' awareness on <bullying>.
Social and emotional learning	PR_SESPRO	Teachers are requested to promote the development of these skills as part of their work.
Parent engagement in school	PR_PARENG	Discussed their child's progress with a teacher on their own initiative.

agree." The variable of health behaviors was assessed with a Likert-type format with ratings from 1 to 5, individually, as follows: 1 = "Never", 2 = "Once a week or less", 3 = "2-3 days a week", 4 = "4-6 days a week", and 5 = "Every day." Positive emotions at school and negative emotions at school were assessed with a Likert-type format with ratings from 1 to 5, respectively, as follows: 1 = "Never or almost never", 2 = "Less than half of the time", 3 = "About half of the time", 4 = "More than half of the time", and 5 = "All or almost all of the time." Academic anxiety was assessed with a Likert-type format ranging from 1 to 5, individually, as follows: 1 = "Strongly disagree", 2 = "Disagree", 3 = "Neither agree nor disagree", 4 = "Agree", and 5 = "Strongly agree." Bullying victimization was measured with a Likert-type format with ratings from 1 to 4, respectively, as follows: 1 = "Never or almost never", 2 = "A few times a year", 3 = "A few times a month", and 4 = "Once a week or more." The variable of disruptive behaviours was answered on a 4-point Likert scale, namely 1 = "Never", 2 = "One or two times", 3 = "Three or four times", and 4 = "Five or more times." As well, engagement at school and participation in extra-curricular activities were measured with a Likert-type format with ratings from 1 to 4, respectively, as follows: 1 = "I don't", 2 = "Once a month", 3 = "Once a week", and 4 = "More than once a week." As mentioned earlier, given the calibration of item parameters in SSES assessment,

these variables were all evaluated by the standardized scores in SSES 2023.

School-Level Independent Variables

Positive attitudes and relations in school (PR_ATTREL), teachers' views on discrimination and equity (PR_TCVIEWS), school's offer of extra-curricular activities (PR_SCHLOFF), school safety situation (PR_SCHSAFT), school practices to combat bullying (PR_REPBULLY), social and emotional learning (PR_SESPRO), and parent engagement in school (PR_PARENG) were all school-level independent variables in this study. All variables were assessed in light of the principal questionnaire. Positive attitudes and relations in school was measured with a Likert-type format with ratings from 1 to 4, respectively, as follows: 1 = "Not at all", 2 = "To a small extent", 3 = "To a moderate extent", and 4 = "To a large extent." Teachers' views on discrimination and equity were evaluated with a Likert-type format ranging from 1 to 4, separately, as follows: "None or almost none", "Some", "Many", and "All or almost all." School's offer of extra-curricular activities was responded by answering eleven questions, each was based on a dichotomous response: 1 for "No" and 2 for "Yes." School safety situation was evaluated with a Likert-type format ranging from 1 to 5, separately, as follows: 1 = "Never", 2 = "Less than monthly", 3 = "Monthly", 4 = "Weekly", and 5 = "Daily." School practices to

combat bullying, was responded by answering nine questions, each was based on a dichotomous response: 1 for “No” and 2 for “Yes.” Social and emotional learning was also responded by answering nine questions, each was based on a dichotomous response: 1 for “No” and 2 for “Yes.” As well, parent engagement in school was responded by answering four questions, each about the percentage of parents involved in the relevant activities in school. Likewise, given the calibration of item parameters in SSES assessment, these variables were all evaluated by the standardized scores in SSES 2023.

Covariates

Gender (Gender_Std), cohort (CohortID), immigration (IMMIGBACK), socio-economic status (SES), student population of low achievement (PRQM10802), and student population of low SES (PRQM10805) were used as covariates in this study. For the variable of gender, it was coded as 0 for boys and 1 for girls. For the variable of cohort, it was coded as 0 for younger cohort and 1 for older cohort. For the variable of immigration, it was coded as 0 for native and 1 for immigrant background. For the variable of SES, it was evaluated by the standardized index composited from parental education, parental occupation, and a range of household possessions (OECD, 2024a, 2024b). For student population of low achievement, it was responded with a dichotomous selection: 0 for “10% and less” and 1 for “11% and more.” As well, for student population of low SES, it was also answered with a dichotomous response: 0 for “10% and less” and 1 for “11% and more.”

Table 1 displays related examples of items for all composite variables at student- and school-level in SSES 2023.

Analytical Procedures

It was reported that traditional regression models often fail to account for the hierarchical structure of nested data, which can result in biased statistical estimates and lead to ecological or atomistic fallacies; in contrast, multilevel modeling allows for the simultaneous decomposition of variance across different levels, thereby reducing such biases (Hox et al., 2017; Raudenbush & Bryk, 2002). Given that the independent variables in this study were structured hierarchically - with students nested within schools - hierarchical linear modeling (HLM) was adopted as an appropriate analytical technique to examine both student- and school-level factors concurrently (Hox et al., 2017; Luke, 2004). All analyses were conducted using the multi-level software program HLM 6.08 (Raudenbush et al., 2004).

To address the research questions, three models were estimated. Firstly, a fully unconditional model (i.e., without any independent variables) was specified to partition the total variance of student mental well-being into within- and between-school components. This step provided a basis for subsequent analyses by calculating the intraclass correlation coefficient (ICC). Secondly, a partially conditional model was estimated, introducing student-level independent variables to assess their effects on student mental well-being. Thirdly, a fully conditional model was constructed by adding school-level independent variables to the second model, thereby evaluating the joint effects of both student- and school-level factors on student mental well-being. All student-level continuous variables were centered around the group mean and all school-level variables were centered around the grand mean. Also, the slopes were

specified as random in the HLM analysis. The final model, comprising independent variables from both student- and school levels, is presented as follows.

Level-1 Model:

$$Y_{ij} = \beta_{0j} + \beta_{1j}Gender_St + \beta_{2j}CohortID + \beta_{3j}IMMIGBACK + \beta_{4j}SES + \beta_{5j}ST_BODYIMAGE + \beta_{6j}ST_HEALTHBEH + \beta_{7j}ST_POSEMOT + \beta_{8j}ST_NEGEMOT + \beta_{9j}ST_GROWTHMI + \beta_{10j}ST_BELONG + \beta_{11j}ST_ANXTEST + \beta_{12j}ST_BULLY + \beta_{13j}ST_DISRUP + \beta_{14j}ST_RELTEACH + \beta_{15j}ST_STUCLASS + \beta_{16j}ST_SCHENGAM + \beta_{17j}ST_EXTRACUR + r_{ij}$$

Level-2 Model:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}PRQM10802 + \gamma_{02}PRQM10805 + \gamma_{03}PR_ATTREL + \gamma_{04}PR_TCVIEWS + \gamma_{05}PR_SCHLOFF + \gamma_{06}PR_SCHSAFT + \gamma_{07}PR_REPBULLY + \gamma_{08}PR_SESPRO + \gamma_{09}PR_PARENG + \mu_{0j}$$

Where Y_{ij} represents mental well-being of student i in school j , β_{0j} is the regression intercept for mean student mental well-being of school j , and β_{1j} to β_{17j} involve the regression slopes of independent variables at student-level, standing for Gender, cohort, immigration, SES, body image, health behaviors, positive emotions at school, negative emotions at school, growth mindset, sense of belonging at school, academic anxiety, bullying victimization, disruptive behaviors, teacher-student relationships, peer relationships, engagement at school, and participation in extra-curricular activities, individually. r_{ij} is the random error related to student i in school j . Additionally, where γ_{00} is the overall average student mental well-being for all schools, and γ_{01} to γ_{09} refer to the regression slopes of independent variables at school-level, representing student population of low achievement, student population of low SES, positive attitudes and relations in school, teachers' views on discrimination and equity, school's offer of extra-curricular activities, school safety situation, school practices to combat bullying, social and emotional learning, and parent engagement in school, respectively. μ_{0j} is the random error term associated with school j .

Results

Descriptive Statistics

As a preliminary step, descriptive statistics for all study variables were first examined in the present design. Table 2 displays the means (M) and standard deviations (SD) for the dependent variable, as well as for the independent variables at both student- and school-level.

Multi-Level Analysis

The fully unconditional model of the HLM analysis is shown in Table 3. The ICC value revealed that the total variance in student mental well-being was 11.40%, revealing that subsequent multilevel analyses were appropriate (Cohen, 1988; Hox et al., 2017; Luke, 2004). On the other hand, the random effect displayed a significant variation ($\beta = 14.079$, $p < 0.001$), demonstrating that student mental well-being significantly varies across schools. The partially conditional model is showed in Table 4 and the fully conditional model is displayed in Table 5. The proportion of variance explained in students' mental well-being was 61.87% at the student level and 53.83% at the school level. Containing both student- and school-level independent variables, the fully conditional model revealed the following research findings.

Table 2. Descriptive statistics of all study variables.

Variables	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Dependent variable				
Mental well-being	51.10	11.11	17.88	76.64
Contextual variables				
Gender (Girls)	0.48	0.50	0.00	1.00
Cohort (Older cohort)	0.48	0.50	0.00	1.00
Immigration	0.11	0.31	0.00	1.00
SES	-0.13	0.58	-2.14	2.53
Student population of low achievement (11% and more)	0.19	0.40	0.00	1.00
Student population of low SES (11% and more)	0.11	0.31	0.00	1.00
Student-level independent variables				
Body image	51.28	8.90	23.13	75.75
Health behaviors	56.50	11.71	-4.71	76.61
Positive emotions at school	51.59	12.14	17.92	76.07
Negative emotions at school	44.33	10.95	29.40	78.54
Growth mindset	50.74	10.77	17.59	70.84
Sense of belonging at school	53.63	12.48	13.61	82.17
Academic anxiety	46.26	11.37	22.33	71.68
Bullying victimization	47.60	10.00	40.53	92.03
Disruptive behaviors	44.58	7.23	39.54	81.55
Teacher-student relationships	53.78	11.49	18.71	75.68
Peer relationships	55.55	12.48	14.92	82.74
Engagement at school	51.90	11.52	22.42	74.80
Participation in extra-curricular activities	53.47	11.83	35.95	98.48
School-level independent variables				
Positive attitudes and relations in school	56.31	7.68	28.47	60.81
Teachers' views on discrimination and equity	52.59	8.91	4.82	57.96
School's offer of extra-curricular activities	57.64	7.26	39.81	65.50
School safety situation	40.00	7.63	33.54	59.15
School practices to combat bullying	59.29	3.43	44.79	60.36
Social and emotional learning	57.90	6.55	32.24	60.39
Parent engagement in school	56.70	12.13	31.91	78.15

Note. *M* = Mean value, *SD* = Standard deviation. *Min* = Minimum value, *Max* = Maximum value.

With regard to covariates, it was found that gender has no significant association with mental well-being ($\beta = -0.334$, $SE = 0.191$, $p > 0.05$), indicating that there are no significant differences in mental well-being between male and female students; cohort is significantly related to mental well-being, and younger cohort had higher scores than older cohort ($\beta = -6.908$, $SE = 0.372$, $p < 0.001$), revealing that the mental well-being level of 10-year-old students was higher than that of 15-year-old students; immigration has no significant connection to mental well-being ($\beta = -0.188$, $SE = 0.328$, $p > 0.05$), indicating that there are no significant differences in mental well-being between native and immigrant students; SES is significantly and positively linked to mental well-being ($\beta = 0.640$, $SE = 0.225$, $p < 0.01$); student population of low achievement has no significant association with mental well-being ($\beta = 0.462$, $SE =$

0.382 , $p > 0.05$); as well, student population of low SES has no significant correlation with mental well-being ($\beta = -0.474$, $SE = 0.475$, $p > 0.05$).

Table 3. Fully unconditional model of the HLM analysis.

Fixed effect	Coefficient	<i>SE</i>	T-ratio
Intercept	51.049***	0.333	153.419
Random effect	Variance	<i>SD</i>	Chi-square
Between-school variance	14.079***	3.752	997.147
Within-school variance	109.470	10.463	

Note. *** $p < 0.001$. *SE* = Standard error; *SD* = Standard deviation.

In terms of student-level independent variables, it was found that body image ($\beta = 0.154$, $SE = 0.014$, $p < 0.001$), health behaviors ($\beta = 0.127$, $SE = 0.012$, $p < 0.001$), positive emotions at school ($\beta = 0.135$, $SE = 0.025$, $p < 0.001$), growth mindset ($\beta = 0.121$, $SE = 0.014$, $p < 0.001$), sense of belonging at school ($\beta = 0.033$, $SE = 0.014$, $p < 0.05$), peer relationships ($\beta = 0.091$, $SE = 0.013$, $p < 0.001$), engagement at school ($\beta = 0.179$, $SE = 0.026$, $p < 0.001$), and participation in extra-curricular activities ($\beta = 0.040$, $SE = 0.010$, $p < 0.001$) are all significantly and positively associated with mental well-being; whereas, negative emotions at school ($\beta = -0.116$, $SE = 0.012$, $p < 0.001$) and academic anxiety ($\beta = -0.051$, $SE = 0.012$, $p < 0.001$) are significantly and negatively associated with mental well-being; in addition, bullying victimization ($\beta = -0.010$, $SE = 0.012$, $p > 0.05$), disruptive behaviors ($\beta = 0.012$, $SE = 0.014$, $p > 0.05$), and teacher-student relationships ($\beta = 0.006$, $SE = 0.012$, $p > 0.05$) have no significant link to mental well-being.

As for school-level independent variables, it was found that positive attitudes and relations in school ($\beta = 0.079$, $SE = 0.025$, $p < 0.001$), school's offer of extra-curricular activities ($\beta = 0.057$, $SE = 0.028$, $p < 0.05$), and school safety situation ($\beta = 0.058$, $SE = 0.027$, $p < 0.05$) are all significantly and positively associated with mental well-being; whereas, teachers' views on discrimination and equity ($\beta = -0.0004$, $SE = 0.024$, $p > 0.05$), school practices to combat bullying ($\beta = -0.040$, $SE = 0.036$, $p > 0.05$), social and emotional learning ($\beta = -0.024$, $SE = 0.023$, $p > 0.05$), and parent engagement in school ($\beta = 0.022$, $SE = 0.017$, $p > 0.05$) have no significant association with mental well-being.

Discussion

With a two-level HLM analysis, the current research investigated how student- and school-level factors influence the mental well-being of Chinese primary and secondary school students, in light of SSES 2023 data. Two research questions have been addressed, accordingly. In addition, the discussion was conducted from five aspects: Significant positive factors at the student level, significant negative factors at the student level, insignificant factors at the student level, significant positive factors at the school level, as well, non-significant factors at the school level. In particular, Chinese culture and educational landscapes serve as crucial contextual conditions and foundational references for the five aspects of discussion.

Firstly, significant positive factors at the student level. This study revealed that body image, health behaviors, positive emotions at school, growth mindset, sense of belonging at school, peer relationships, engagement at school, and participation in extra-

curricular activities are all positively associated with students' mental well-being, reflecting many previous studies (e.g., Fredrickson, 2001; Niu, 2026; Tejada-Gallardo et al., 2023; Tylka, 2018; Wang & Peck, 2013).

Table 4. Partially conditional model of the HLM analysis.

Fixed effect	Coefficient	SE	T-ratio
Intercept	54.459***	0.328	166.218
Contextual variables			
Gender (Girls)	-0.323	0.190	-1.693
Cohort (Older cohort)	-6.687***	0.379	-17.628
Immigration (Immigrant background)	-0.173	0.326	-0.529
SES	0.642**	0.225	2.858
Student-level independent variables			
Body image	0.154***	0.014	10.623
Health behaviors	0.127***	0.012	10.523
Positive emotions at school	0.135***	0.025	5.342
Negative emotions at school	-0.116***	0.012	-9.564
Growth mindset	0.120***	0.014	8.740
Sense of belonging at school	0.034*	0.014	2.356
Academic anxiety	-0.051***	0.012	-4.233
Bullying victimization	-0.011	0.011	-0.961
Disruptive behaviors	0.013	0.014	0.941
Teacher-student relationships	0.006	0.012	0.510
Peer relationships	0.091***	0.013	7.019
Engagement at school	0.179***	0.026	6.787
Participation in extra-curricular activities	0.040***	0.010	3.920
Random effect	Variance	SD	Chi-square
Between-school variance	5.464***	2.337	832.155
Within-school variance	50.539	7.109	

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. SE = Standard error; SD = Standard deviation.

Such positive associations reflect the multifaceted nature of psychological health within the Chinese educational context. Body image and health behaviors represent the physical dimension of well-being, suggesting that Chinese students who maintain positive self-perceptions and regular physical activity possess greater psychological resources to cope with academic stressors (L. Liu et al., 2025; Tylka, 2018). Positive emotions at school and growth mindset operate as cognitive-affective resources that may buffer against the pervasive performance pressure characterizing Chinese classrooms, where examination success is disproportionately emphasized (Niu, 2026). The significance of school belonging and peer relationships underscores the collectivist orientation of Chinese culture, indicating that interpersonal connections within educational settings provide essential emotional support and psychological validation (Niu, 2026; Niu et al., 2023; Pittman & Richmond, 2007). Furthermore, engagement at school and extracurricular participation demonstrate that well-being extends beyond academic domains to encompass broader school experiences. These findings collectively suggest that interventions targeting multiple ecological levels may be particularly effective for promoting mental well-being among Chinese students navigating high-stakes educational environments.

Secondly, significant negative factors at the student level. This

study found that negative emotions at school and academic anxiety are negatively related to students' mental well-being, in line with some prior cases (e.g., Eysenck et al., 2007; Schwarzer & Wicklund, 1991; Tian et al., 2013).

Table 5. Fully conditional model of the HLM analysis.

Fixed effect	Coefficient	SE	T-ratio
Intercept	54.567***	0.312	175.000
Contextual variables			
Gender (Girls)	-0.334	0.191	-1.755
Cohort (Older cohort)	-6.908***	0.372	-18.547
Immigration (Immigrant background)	-0.188	0.328	-0.574
SES	0.640**	0.225	2.844
Student population of low achievement (11% and more)	0.462	0.382	1.209
Student population of low SES (11% and more)	-0.474	0.475	-0.997
Student-level independent variables			
Body image	0.154***	0.014	10.650
Health behaviors	0.127***	0.012	10.470
Positive emotions at school	0.135***	0.025	5.349
Negative emotions at school	-0.116***	0.012	-9.569
Growth mindset	0.121***	0.014	8.782
Sense of belonging at school	0.033*	0.014	2.331
Academic anxiety	-0.051***	0.012	-4.229
Bullying victimization	-0.010	0.012	-0.909
Disruptive behaviors	0.012	0.014	0.919
Teacher-student relationships	0.006	0.012	0.487
Peer relationships	0.091***	0.013	7.060
Engagement at school	0.179***	0.026	6.798
Participation in extra-curricular activities	0.040***	0.010	3.890
School-level independent variables			
Positive attitudes and relations in school	0.079**	0.025	3.121
Teachers' views on discrimination and equity	-0.0004	0.024	-0.015
School's offer of extra-curricular activities	0.057*	0.028	1.985
School safety situation	0.058*	0.027	2.155
School practices to combat bullying	-0.040	0.036	-1.113
Social and emotional learning	-0.024	0.023	-1.049
Parent engagement in school	0.022	0.017	1.312
Random effect	Variance	SD	Chi-square
Between-school variance	5.369***	2.317	776.812
Within-school variance	50.543	7.109	

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. SE = Standard error; SD = Standard deviation.

Indeed, within the Chinese cultural and educational context, characterized by intensified academic pressure and the pervasive phenomenon of involution (*Neijuan*; rat race), these findings carry particular significances (Niu, 2024b). Students immersed in hyper-

competitive environments where examination performance determines self-worth frequently experience chronic emotional distress that depletes psychological resources (King & Chen, 2019; Yu, 2022). Academic anxiety, manifested through persistent worry about grades and future prospects, triggers rumination and emotional exhaustion, thereby compromising mental health (Eysenck et al., 2007; King & Chen, 2019; Ryan, 2019). In fact, the negative impact of school-related negative emotions reflects the affective toll of navigating educational systems that prioritize measurable achievement over holistic development (Wu & Zhang, 2020). For Chinese students confronting relentless pressure to outperform peers, these emotional burdens accumulate over time, making them especially vulnerable to diminished mental well-being.

Thirdly, insignificant factors at the student level. Unexpectedly, it was found that bullying victimization, disruptive behaviors, and teacher-student relationships have no significant links to students' mental well-being, contradicting many previous studies (e.g., Katsantonis et al., 2024; Long et al., 2020; Pianta, 1999). These unexpected findings may reflect the unique educational and cultural characteristics in China. Possible explanations concern measurement and reporting tendencies. Actually, cultural values deeply shape different perceptions of bullying victimization (Smith & Robinson, 2019; Smith et al., 2016; Yin et al., 2024). Within Chinese collectivist culture, where interpersonal harmony and face-saving are highly valued (Niu et al., 2023), students might underreport bullying victimization or disruptive behaviors due to social desirability bias (Smith et al., 2016; Yin et al., 2024), thereby attenuating their statistical associations with mental well-being. Additionally, the collectivist orientation emphasizes group cohesion, potentially making bullying less overt or less damaging than that in Western individualistic contexts (Niu, 2025; Smith & Robinson, 2019). Regarding teacher-student relationships, the cultural expectation of teachers as authority figures rather than emotional confidants may mean that Chinese students derive psychological support primarily from peer networks rather than teachers. More importantly, the overwhelming dominance of academic pressure in Chinese schools might overshadow these relational factors, attenuating their explanatory power relative to the proximate and compelling impacts of academic anxiety and negative affect, which more directly index the quintessential stressors pervading students' routine experiences.

Fourthly, significant positive factors at the school level. This study indicated that positive attitudes and relations in school, school's offer of extra-curricular activities, and school safety situation are all positively connected to Chinese students' mental well-being. Positive attitudes and relations in school reflect a supportive organizational climate where students feel valued and respected (Aldridge et al., 2018; Klik et al., 2023), which may counteract the alienation often engendered by highly competitive academic settings. When schools foster relational trust and communal spirit, they provide psychological safety that buffers against the emotional toll of examination pressure (Aldridge & McChesney, 2018; Sahib et al., 2025). The significance of extracurricular offerings reflects that opportunities for holistic development beyond academic pursuits enable students to cultivate diverse interests, experience mastery in non-academic domains, and forge meaningful peer connections, thereby enhancing overall

mental well-being (Gadermann et al., 2016; Malagodi et al., 2025). Also, school safety represents a fundamental prerequisite for healthy development: Safe environments ensure that students are not navigating additional threats beyond their academic burdens (Brabant et al., 2016; László et al., 2019; Prati et al., 2018). Clearly, these findings suggest that Chinese schools can promote mental well-being by cultivating positive climates, expanding developmental opportunities, and ensuring safety, thereby creating institutional conditions that support students amid high-stakes educational demands.

Fifthly, non-significant factors at the school level. This study showed that teachers' views on discrimination and equity, school practices to combat bullying, social and emotional learning, and parent engagement in school have no significant associations with Chinese students' mental well-being. These unexpected findings may be understood through the lens of Chinese collectivist culture, where group harmony and interdependence shape how school factors operate. Teachers' views on discrimination and equity, while theoretically important, may be subsumed within broader cultural expectations of hierarchical harmony, where students are socialized to accept authority rather than actively evaluate teacher fairness as central to their psychological experience (Han & Han, 2019). Regarding anti-bullying practices, collectivist norms emphasizing conflict avoidance and face-saving mean that bullying may manifest indirectly through social exclusion rather than overt aggression (Niu, 2025), potentially rendering school practices designed for visible bullying less effective at capturing or addressing the relational aggression that impacts well-being. Concerning parental engagement, its non-significant role is particularly interpretable within Chinese cultural parameters. In China, parental involvement predominantly focuses on academic monitoring, homework supervision, and examination preparation rather than emotional support or psychological attunement (Li et al., 2019; Wu, 2022). When parents engage with schools primarily to discuss academic performance rather than children's holistic well-being, such engagement may function as an extension of academic pressure rather than a source of psychological nourishment, thereby failing to enhance mental health outcomes.

Strengths and Limitations

Following Bronfenbrenner's ecological systems theory (Bronfenbrenner, 2005), the present findings offer both empirical examination and theoretical refinement regarding the multilevel determinants of adolescent mental well-being within the Chinese educational context. At the microsystem level, the significant roles of positive emotions, growth mindset, peer relationships, and school engagement underscore that proximal processes – students' daily affective experiences and interpersonal interactions – constitute the most immediate and potent pathways through which psychological resources are cultivated or depleted. Conversely, the non-significance of teacher-student relationships, a microsystem factor widely supported in Western literature, challenges the universal applicability of certain relational mechanisms and suggests that cultural schemas may moderate which proximal processes carry psychological weight. At the mesosystem and exosystem levels, the significant contributions of school-level positive attitudes and relations, extracurricular offerings, and school safety confirm that

institutional conditions shape students' developmental contexts by structuring the quality of their daily experiences. However, the null effects of anti-bullying practices, SEL programs, and parental engagement indicate that these exosystem factors, despite their theoretical importance, may be rendered less effective when they are misaligned with the macrosystem's overriding achievement-oriented cultural logic. At the macrosystem, such a misalignment points to a potential insight: Ecological systems do not operate independently but are hierarchically nested, with the macrosystem - characterized by China's examination-driven culture and collectivist values - exerting a dominant influence that can either amplify or neutralize the effects of lower-level systems. In sum, Bronfenbrenner's ecological systems theory offers a principled and internally consistent rationale for the multilevel analytical approach adopted in this study. By explicitly situating each variable within its corresponding ecological layer, the framework clarifies that mental well-being is not a purely individual phenomenon but emerges from the confluence of personal characteristics, interpersonal relationships, institutional arrangements, and cultural values. This theoretical mapping not only justifies the inclusion of both student- and school-level predictors but also guides the interpretation of any observed patterns within the broader socio-cultural context.

As well, the current research findings may offer several preliminary theoretical implications for the ecological systems framework. Firstly, the results suggest that the relative salience of different ecological levels may be culturally contingent: In contexts where academic performance heavily dominates institutional priorities, microsystem factors that directly index students' internal psychological resources may play a more prominent role than exosystem interventions that are not deeply embedded in local cultural practices. Secondly, the absence of significant effects for certain school-level factors does not necessarily imply theoretical irrelevance; rather, it may reflect the possibility that the macrosystem's prevailing performance-oriented values could override or co-opt those factors, redirecting them toward academic ends rather than well-being enhancement. Thirdly, these patterns tentatively indicate that the interactions among ecological layers are not uniform across cultural settings, and that the effectiveness of school-level policies and programs likely depends on their congruence with broader societal norms and expectations. While these interpretations are suggestive rather than conclusive, they point to the value of further empirical work that explicitly models cross-level interactions and cultural moderators within non-Western educational settings. Overall, this study contributes to a more nuanced and context-sensitive application of ecological systems theory, though the generalizability of these theoretical extensions awaits validation through more longitudinal and cross-cultural research designs.

This study has several limitations that need to be solved in the future. Firstly, one methodological constraint of this study pertains to the cross-sectional nature of the SSES 2023 dataset, which precludes causal interpretations. Future investigations would benefit from adopting longitudinal designs to track developmental trajectories of adolescent mental well-being over time. Secondly, another limitation concerns the exclusive reliance on student self-reports for measuring mental well-being. Subsequent research should incorporate multiple informants, including parents, peers,

and teachers, to mitigate potential social desirability bias. Moreover, the integration of qualitative methodologies, such as semi-structured interviews or classroom observations, could further enrich understanding of the contextual nuances surrounding adolescents' psychological experiences. Thirdly, a third avenue for future inquiry involves expanding the analytical approach beyond the two-level HLM employed here. Structural equation modeling (SEM) could further examine whether the effects of student- and school-level factors vary across demographic subgroups, including gender, age cohort, or ethnic background. Finally, the generalizability of findings is constrained by the exclusive focus on Chinese sample. Comparative studies encompassing diverse Asian contexts or cross-cultural investigations contrasting Eastern and Western educational systems would help establish the boundary conditions of the observed relationships and enhance the external validity of conclusions drawn from this research.

Concluding Reflections

This study illuminates a troubling paradox at the core of Chinese educational reform: Despite policy rhetoric emphasizing holistic development, the institutional structures designed to support student mental well-being appear largely impotent. The null roles of social and emotional learning programs, anti-bullying practices, and parental engagement suggest these initiatives operate as symbolic gestures rather than transformative interventions, their potential neutralized by an educational ecosystem relentlessly oriented toward examination performance. More disturbingly, the non-significance of teacher-student relationships and teachers' views on discrimination and equity challenges foundational assumptions about adult support in collectivist cultures, hinting that even relational bonds may be instrumentalized within Chinese achievement-obsessed environments. The multilevel design reveals that students' psychological resources (e.g., emotions and mindsets) and behavioral conditions (e.g., connection and engagement) matter more than the institutional supports officially designed to nurture them, exposing a profound disconnect between educational policy and situational reality. These findings demand a critical reflection on whether Chinese primary and secondary schools can genuinely function as developmental contexts when academic achievement monopolizes institutional purpose. Ultimately, this research underscores that promoting adolescent mental well-being requires not merely programmatic additions but fundamental reckoning with cultural values and structural priorities that systematically privilege performance over personhood.

Compliance with Ethical Standards

Disclosure of Potential Conflicts of Interest. The author declares no conflicts of interest related to the research, authorship, and/or publication of this article.

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Ethical Approval. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments, or comparable ethical standards. Ethical approval for all individual participants in each country/economy participating in SSES 2023 has been

officially obtained from the OECD. Therefore, it did not require approval from the Institutional Review Board.

Data Sharing Statement. The datasets generated by the survey research during and/or analyzed during the current study are available in the 2023 Survey on Social and Emotional Skills (SSES) repository, <https://www.oecd.org/en/about/programmes/oecd-survey-on-social-and-emotional-skills.html>

Informed consent. The informed consent for all individual participants in each country/economy of SSES 2023 has been officially completed by the OECD.

Declaration of Artificial Intelligence Use. AI was used during the writing process to help edit and condense the manuscript for length. All scientific content, interpretations, and conclusions are solely the work of the author.

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