

Original Research

Psychological Profiles of Trait Mindfulness and School Climate in Adolescents: Examining Growth Mindset as a Precursor to Social-Emotional Competence

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Academic Editor: Jose Pedro Espada

Submitted: 29 November 2025 Revised: 1 February 2026 Accepted: 13 February 2026 Published: 19 October 2026

Abstract

Background: Adolescents' social-emotional competence (SEC) is a fundamental aspect of their psychological well-being. Although growth mindset is widely recognized as a pivotal developmental asset, its role in predicting how internal resources, such as trait mindfulness, interact with external environments like school climate to shape SEC remains poorly understood. The present study addresses this gap by treating growth mindset as a precursor to the distinct psychological profiles defined by mindfulness and school climate, while subsequently evaluating how these patterns predict variations in SEC. **Methods:** Bolck-Croon-Hagenaars (BCH) A total of 1153 Chinese adolescents completed measures of growth mindset, trait mindfulness, school climate, and SEC. Data were analyzed using Latent Profile Analysis (LPA) within a robust three-step framework. This approach utilized the R3STEP algorithm to examine growth mindset as a predictor of profile membership and the Bolck-Croon-Hagenaars (BCH) method to evaluate profile-specific differences in SEC as a distal outcome, thereby ensuring stable estimates by explicitly accounting for classification uncertainty. **Results:** Regression analysis confirmed that growth mindset positively predicted SEC. LPA identified four distinct patterns based on trait mindfulness and school climate: (1) High Mindfulness-High Support (High Resource Integration, HRI); (2) High Mindfulness-Low Support (Intrinsically Advantaged, IA); (3) Low Mindfulness-High Support (Environmentally Dependent, ED); and (4) Low Mindfulness-Low Support (Dual-Risk, DR). Using the R3STEP procedure, growth mindset was treated as a primary antecedent that significantly predicted profile membership, with higher scores increasing the likelihood of assignment to the HRI profile. Furthermore, the BCH method revealed significant variations in SEC across these groups, with the HRI subgroup exhibiting the highest level of competence. **Conclusions:** The findings underscore the predictive role of a growth mindset and the existence of heterogeneous adolescent profiles characterized by distinct patterns of trait mindfulness and perceived school climate. The findings suggest that tailored, profile-specific interventions that consider both individual psychological resources and environmental context may be more effective than a one-size-fits-all approach for enhancing adolescents' SEC.

Keywords: social-emotional competence; growth mindset; trait mindfulness; school climate; latent profile analysis

1. Introduction

Current shifts in the global social fabric have cast a spotlight on early adolescence as a pivotal window for nurturing social-emotional competence (SEC). This developmental phase is notoriously volatile; thus, SEC functions not merely as a skill set, but as a vital protective buffer ensuring that students don't just survive these transitions, but truly flourish (Chen et al., 2025; Collie et al., 2024; Costa et al., 2025; Durlak et al., 2011; Taylor et al., 2017; Weissberg et al., 2015). Yet, the reality in contemporary middle school settings is sobering. The escalating rates of adolescent mental health challenges—manifesting primarily as heightened anxiety, depressive symptoms, and pervasive academic-related stress—alongside rising interpersonal conflicts, underscore an urgent need to identify the complex mechanisms that foster these skills (Racine et al., 2021).

To decipher the origins of these competencies, one must look beyond isolated predictors; SEC is fundamentally the result of the dynamic interplay between an adolescent's internal psychological architecture and the broader school ecosystem within which they are embedded. On one hand, individual-level resources—most notably a growth mindset (Dweck, 2006; Yeager and Dweck, 2012) and trait mindfulness (Brown and Ryan, 2003)—furnish the psychological agency required for sophisticated self-regulation and emotional fortitude. Yet, these internal traits do not operate in a vacuum. Instead, they are deeply contingent upon a positive school climate (Cohen et al., 2009; Thapa et al., 2013), which provides the essential contextual scaffolding and relational safety nets that allow such individual potentials to be fully realized.

Guided by the foundational principles of Bronfenbrenner's Ecological Systems Theory (1979; Bronfenbrenner and Morris, 2006), the present study re-conceptualizes SEC



not as a standalone trait, but as a developmental manifestation of the dynamic Person-Context interaction. This theoretical lens allows us to purposefully integrate growth mindset and trait mindfulness—viewed here as core individual assets (the “Person” component)—with school climate, which serves as the immediate micro-system (the “Context” component). Central to this framework is growth mindset, which we conceptualize as a foundational belief system and an antecedent driver of resource integration. We argue that a growth mindset provides the motivational agency required for adolescents to actively synthesize internal assets and leverage external supports. Rather than treating these variables as an arbitrary collection, we argue that internal assets and external supports interlock to form a unified “psychological niche”. We explore how these resources combine into distinct resource profiles, thereby uncovering the systemic pathways that either hinder or catalyze adolescents’ social-emotional flourishing (Bornstein et al., 2015).

Despite these conceptual links, much of the prevailing scholarship remains tethered to a variable-centered paradigm, often scrutinizing predictors in isolation. Such linear reductionism implicitly assumes that developmental relationships function with mechanical uniformity across all students, potentially masking the qualitative heterogeneity inherent in the adolescent experience. To transcend these limitations, this study adopts Latent Profile Analysis (LPA)—a robust, person-centered framework designed to shift the analytical lens from fragmented variables to the holistic resource configurations within individuals (Meyer and Morin, 2016). Unlike traditional models that focus on additive effects, LPA recognizes that trait mindfulness and perceived climate may coalesce in non-linear ways, creating “imbalanced” profiles (e.g., high internal resources paired with low environmental support) that traditional regression cannot isolate. By unearthing the latent structures where internal assets and external contexts intersect, this approach allows for the disentangling of shape and level effects (Morin and Marsh, 2015), providing a nuanced understanding of how diverse student subgroups navigate their socio-ecological realities.

Ultimately, this granular perspective transcends the misleading generalizations of “averaged” parameters that characterize traditional, variable-centered models. Because social data are rarely ergodic, relying on a single set of population parameters often fails to represent the unique developmental trajectories of individual students (Howard and Hoffman, 2018). Such a strategy yields a diagnostic roadmap for crafting high-precision interventions that move beyond statistical abstractions (Spurk et al., 2020). Consequently, these tailored supports can resonate with the idiosyncratic, systemic needs of the middle school population, addressing the holistic realities of adolescent growth (Rohatgi and Scherer, 2020; Spurk et al., 2020).

1.1 Literature Review

This review seeks to transcend the fragmented scrutiny of traditional paradigms by situating SEC development within a holistic, person-centered framework. We contend that the adolescent experience is defined not by isolated variables, but by the complex coalescence of internal mindfulness and environmental scaffolding. By examining how trait mindfulness and school climate intersect to form latent profiles, we explore differences in SEC across subgroups. Within this systemic landscape, growth mindset serves as the pivotal predictor—the cognitive engine that drives these developmental patterns. Ultimately, this review justifies the transition to LPA, identifying it as a necessary departure from linear models to address the idiosyncratic, heterogeneous needs of diverse student populations.

1.1.1 Core Constructs in Adolescent Development

(1) Social-Emotional Competence. SEC holds particular significance during adolescence, a period characterized by rapid cognitive, emotional, and social transformations. This set of abilities enables adolescents to navigate complex social interactions effectively, manage their evolving emotions, and achieve both personal and collective goals. Empirical evidence consistently underscores SEC’s profound and multifaceted influence on a variety of positive developmental outcomes, including enhanced academic performance, improved mental health, stronger interpersonal relationships, greater resilience, and more active civic engagement (Jones et al., 2015; Mahoney et al., 2021; Taylor et al., 2017). For adolescents, robust SEC is a critical predictor of successful transitions into adulthood and overall life satisfaction. However, as highlighted by recent methodological critiques, relying solely on averaged parameters of SEC can result in a misleading depiction of adolescent growth, potentially overlooking the idiosyncratic needs of diverse student populations.

Organizations such as the Collaborative for Academic, Social, and Emotional Learning (2020; n.d.) provide a comprehensive framework, outlining five core competencies that define SEC: self-awareness (understanding one’s emotions, thoughts, and values), self-management (regulating emotions, setting and achieving goals), social awareness (empathizing with others and understanding social norms), relationship skills (establishing and maintaining healthy connections), and responsible decision-making (making constructive choices about personal and social behavior) (CASEL, 2020). Critically, from a person-centered perspective, these competencies are not merely independent facets but represent an integrative system where the dynamic integration of these dimensions defines the individual’s adaptive capacity. Developing these competencies is particularly important for adolescents as they navigate identity formation, peer group influence, and increasing academic and social pressures. For instance, strong self-management skills enable adolescents to cope with aca-

demic stress and resist negative peer pressure, while well-developed relationship skills are crucial for forming supportive friendships and navigating romantic relationships.

Existing research consistently demonstrates the inherent complexity of SEC development, which is critically influenced by the interactive dynamics across multiple ecological layers (Bronfenbrenner, 1979). These layers include individual biological and psychological characteristics, immediate proximal contexts such as family and school environments, and the wider socio-cultural context (Collins and Steinberg, 2006; Thompson, 2007). Adopting a holistic-interactionist perspective, this review contends that an adolescent's psychological makeup and their proximal environment operate as an integrated whole; taken in isolation, specific traits may lose their meaning and consequence for that individual's behavioral course. This multifaceted perspective highlights that an individual's capacity to navigate social and emotional demands is not innate but rather is shaped by the complex interplay between the individual and the environment. Consequently, fostering SEC requires a holistic understanding that extends beyond individual attributes to encompass the broader systems in which adolescents are embedded. The school environment, in particular, offers structured opportunities for skill development and provides significant social and emotional scaffolding during these formative years.

(2) Individual Resources: Growth Mindset and Trait Mindfulness. Research on the individual-level determinants of adolescent development increasingly highlights the pivotal roles of internal cognitive and psychological resources. Among these, growth mindset is conceptualized as the fundamental belief that one's core qualities—including intelligence, talents, and personality traits—are not static entities but malleable attributes that can be developed and enhanced through sustained effort and strategic engagement (Dweck, 2006). This mindset serves as a psychological catalyst for perseverance; it empowers individuals to reframe setbacks not as insurmountable indictments of their ability, but as essential feedback loops for improvement. Adolescents with a strong growth mindset tend to embrace academic and personal difficulties, actively seek new learning experiences, and value the process of improvement over mere performance outcomes, fostering an adaptive approach to personal and intellectual growth.

The concept of trait mindfulness—the disposition to be openly and non-judgmentally aware of the present moment, including one's thoughts, feelings, and bodily sensations (Brown and Ryan, 2003)—has garnered significant attention in personal development and psychological well-being research. Unlike state mindfulness—a temporary condition cultivated through specific practices—trait mindfulness represents a stable individual difference in attentional control and emotional regulation. Individuals with higher trait mindfulness exhibit greater emotional stability,

reduced reactivity to stressors, and enhanced metacognitive awareness (Baer et al., 2006). This dispositional clarity facilitates a “decentered” perspective, allowing for more considered and less impulsive responses to both internal and external stimuli, thereby promoting greater psychological flexibility.

While growth mindset and trait mindfulness represent distinct internal resources, they function as complementary dimensions of an adolescent's psychological makeup. Growth mindset provides the fundamental motivational “engine” for long-term goal pursuit, while trait mindfulness offers the regulatory “scaffolding” necessary to manage immediate emotional demands. From a holistic-interactionist perspective, these internal strengths do not operate in isolation; rather, they are continuously shaped by—and in turn, influence how individuals perceive—the broader environmental systems in which they are embedded. This underscores the necessity of examining growth mindset not merely as a standalone trait, but as a potential antecedent that informs the distinct psychological patterns adolescents form with their external contexts. Consequently, to understand the stage upon which these internal resources manifest, a closer examination of the school climate is required.

(3) Environmental Context: School Climate. The school environment serves as a critical ecological layer that extends far beyond the mere aggregation of individual characteristics (Eccles and Roeser, 2011). Far from being static educational institutions, schools function as vibrant, high-stakes social ecosystems where adolescents navigate a substantial portion of their formative years, negotiating the complexities of academic learning, social interaction, and identity formation. Within this context, school climate refers to the overall atmosphere and socio-emotional character of a school environment. According to Cohen et al. (2009), this construct is not a monolithic reality but is co-constructed by the collective experiences of students, staff, and parents. It reflects their shared norms, aspirations, and relational patterns, seamlessly interwoven with the pedagogical methodologies and organizational structures that define the school's unique institutional identity.

From a holistic-interactionist perspective, a positive and supportive school atmosphere does not exert a uniform “main effect” on all students; rather, it provides a contextual scaffold of teacher–student relationships, equitable disciplinary structures, and opportunities for student agency. Crucially, the developmental significance of school climate lies in how it is subjectively perceived and internalized by the individual adolescent, forming a unique “person-in-context” configuration. A strong sense of community and safety serves as an environmental buffer, potentially scaffolding the internal regulatory capacities of students—such as trait mindfulness—while they navigate the stressors of puberty. By recognizing the school climate as a proximal element in this integrative system, we move beyond view-

ing it as a distal background variable, positioning it instead as a core indicator of the distinct patterns that characterize adolescent social-emotional development.

1.1.2 Linking Growth Mindset and Cognitive-Contextual Patterns to SEC

(1) Individual and Contextual Predictors of SEC. The cultivation of SEC during adolescence is not a stochastic process; rather, it is fundamentally rooted in the dynamic synergy between internal psychological assets and external environmental scaffolding. To decode the complex architecture of adolescent growth, it is imperative to first delineate how individual cognitive orientations, regulatory capacities, and contextual perceptions independently contribute to SEC. Drawing upon Social Cognitive Theory (Bandura, 1986), Self-Regulation Theory (Carver and Scheier, 1998), and Ecological Systems Theory (Bronfenbrenner, 1979), this section establishes the empirical pillars upon which growth mindset, trait mindfulness, and school climate underpin social-emotional functioning.

Research consistently identifies growth mindset as a cornerstone of social-emotional flourishing. Conceptualized as a pivotal self-efficacy belief, it fosters the conviction that personal attributes are malleable rather than fixed (Bandura, 1986). Individuals anchored in this mindset exhibit superior self-management capacities, as they tend to reframe daunting challenges as iterative learning opportunities rather than indictments of their inherent ability (Yeager et al., 2016). This cognitive orientation not only fortifies persistence in the face of adversity but also cultivates a distinct openness to feedback—a prerequisite for the development of robust social awareness and empathy (Yeager and Dweck, 2012).

Parallel to these motivational beliefs, trait mindfulness provides a sophisticated mechanism for conscious self-regulation (Carver and Scheier, 1998). A substantial body of evidence underscores that higher trait mindfulness is inextricably linked to heightened self-awareness and impulse control. By facilitating a non-reactive observation of internal states, mindfulness shifts the adolescent response pattern from reflexive reactivity to considered intention (Baer et al., 2006; Brown and Ryan, 2003; Chua et al., 2025). Furthermore, this dispositional equanimity enables individuals to be more attuned to others' experiences, thereby directly supporting relationship skills and more responsible decision-making (Black et al., 2012; Vilaverde et al., 2020).

Complementing these internal resources, the school environment functions as a primary microsystem that shapes development through its daily relational fabric and institutional routines (Bronfenbrenner, 1979). A positive and supportive school atmosphere—defined by nurturing teacher–student dyads and equitable disciplinary structures—serves as a potent predictor of student engagement and emotional well-being (Cohen et al., 2009; Durlak et al., 2011; Thapa et al., 2013). Conversely, a maladaptive

environment characterized by low relational trust can impede the development of emotional security, thereby constraining the natural maturation of SEC.

While the empirical evidence presented above establishes these factors as robust independent predictors, viewing them in isolation risks oversimplifying the holistic reality of adolescent development. From a systemic perspective, growth mindset, trait mindfulness, and school climate do not function as parallel, disconnected streams; rather, they operate as an integrated network of influences. The primary limitation of a purely variable-centered approach is its failure to account for the reciprocal nature of person-in-context interplay, where internal traits and environmental perceptions converge into unique patterns. This foundational understanding of their individual roles serves as the necessary precursor to examining the latent profiles these factors exhibit within the adolescent experience.

(2) Growth Mindset as an Antecedent to Mindfulness-Climate Patterns. Rather than viewing these factors as parallel streams, they are better understood as a reciprocal, interconnected system. Here, a growth mindset acts as the cognitive lens through which adolescents navigate environmental scaffolding; simultaneously, mindfulness and school climate feed into each other in a continuous loop of mutual reinforcement. Deciphering such interdependencies is essential—it allows the present study to move beyond simple additive logic and instead capture the configural profiles that characterize person-environment associations.

1) Linking Mindset to Internal Attributes: Growth Mindset and Trait Mindfulness Indicators

Empirical evidence suggests that a growth mindset fosters trait mindfulness. Grounded in Bandura's (1986) Social Cognitive Theory, which posits that internal beliefs serve as pivotal regulators of cognitive processing, adolescents possessing a growth mindset are predisposed to perceive their internal regulatory mechanisms—specifically mindfulness-related processes like the management of attention and emotion—as malleable competencies that can be refined through sustained effort. This perspective fosters active engagement in mindful practices and encourages an open, non-judgmental stance toward inner experiences (Yeager and Dweck, 2012). By reducing self-criticism, this adaptive approach cultivates a persistent learning orientation toward one's inner states—a quality that represents a quintessential component of mindfulness.

2) Linking Mindset to Contextual Perceptions: Growth Mindset and School Climate Indicators

A growth mindset also significantly calibrates how adolescents perceive their school climate. Students with a growth mindset tend to view academic challenges and interpersonal feedback not as threats to fixed capabilities, but as opportunities for growth (Blackwell et al., 2007; Henderson and Dweck, 1990). This cognitive framing facilitates a more resilient appraisal of the school environment; even

amidst significant challenges, such students are predisposed to proactively seek support, interpret institutional policies as equitable, and perceive educator efforts as fundamentally beneficial—all of which cultivate a more favorable and internalized perception of the school climate. Bronfenbrenner's (1979) Ecological Systems Theory aligns with this view by prioritizing the individual's subjective experience of the microsystem. Within this framework, a growth mindset operates as an internal interpretive lens, fundamentally shaping how adolescents perceive and engage with their school environment.

3) Indicator Covariation: Integration of Trait Mindfulness and School Climate

More importantly, trait mindfulness and school climate do not operate in isolation; rather, they function as interconnected components of a broader developmental ecosystem. Within this framework, individual assets and environmental perceptions are deeply intertwined, forming cohesive psychological configurations that collectively define the adolescent experience. From one perspective, trait mindfulness, acting as a stable dispositional attribute, enhances self-understanding, emotion regulation, and perspective-taking (Kabat-Zinn, 2005; Elias et al., 1997; Seligman, 2002), thereby fostering greater interpersonal harmony within the school environment. Adolescents with higher trait mindfulness are more likely to emulate empathetic behaviors and effectively manage conflicts, thus contributing to a more positive, safer, and resilient social environment (Brown and Ryan, 2003; Schonert-Reichl et al., 2015). Furthermore, trait mindfulness may act as a buffer, enhancing resilience to suboptimal climates by promoting adaptive coping and reducing reactivity (Shapiro et al., 2006). Collectively, these mechanisms illustrate how individual mindfulness functions in tandem with the broader school ecology, establishing an integrated system where internal assets and environmental contexts are inextricably linked. Conversely, a supportive school climate, characterized by warmth and psychological safety, reinforces students' innate capacities for present-moment awareness and non-judgmental observation (Cohen, 2006). Bronfenbrenner's (1979) Ecological Systems Theory and Sameroff's (2009) Transactional Model of Development suggest that a positive school climate reduces students' stress and insecurity, thereby creating a psychological environment conducive to fostering mindfulness. Bandura's (1986) Social Learning Theory further proposes that a positive school climate, where teachers and peers model mindfulness-related behaviors such as patience, emotional regulation, and empathy, promotes students' internalization of these qualities through observation and vicarious learning. In sum, these theoretical frameworks underscore school climate as a pivotal ecological factor in nurturing and sustaining mindfulness in adolescents.

Ultimately, these interrelationships suggest that internal resources and environmental perceptions are not

merely correlated but are inextricably entwined in a co-evolutionary process. The growth mindset functions as the distal architect of this system, providing the cognitive readiness required to leverage environmental support and internalize regulatory habits. This intricate web of mutual influence of trait mindfulness and school climate provides the theoretical imperative for identifying how these variables coalesce into distinct, person-centered profiles, as the efficacy of one resource is inherently contingent upon the status of the others.

(3) Synthesis: Shifting From Variable-Centered to Person-Centered Frameworks. While much of the existing literature offers a robust map of linear pathways, these findings remain largely bound by a variable-centered perspective—an approach that implicitly assumes psychological associations function with mechanical uniformity across the entire student population. Such linear reductionism, however, tends to gloss over the non-ergodic nature of adolescent development; in reality, the configurations of trait mindfulness and school climate often manifest in divergent, heterogeneous patterns that a simple population average fails to capture (Howard and Hoffman, 2018). Moving toward a person-centered framework is therefore not merely a methodological choice but a theoretical necessity—one essential for grasping the integrated, patterns-based nature of person-environment interactions. This shift allows us to move past “averaged” abstractions to uncover the latent profiles that define the varied psychological landscapes of adolescents.

Building on this critique, we identify a significant theoretical gap regarding the collective synergy of these constructs. Although research has scrutinised growth mindset, mindfulness, and school climate in isolation, we still lack a cohesive understanding of how their three-way interaction actually shapes the adolescent experience. This represents a distinct methodological void: we do not yet know how an individual's growth mindset functions as a foundational antecedent to their membership within specific psychological profiles. By identifying these empirically derived configurations—where mindfulness and climate perception intersect—this study moves beyond descriptive cataloging. Instead, it aims to pinpoint the precise developmental pathways that drive the development of SEC, ultimately offering a more granular evidence base for targeted interventions.

1.2 The Present Study

The present study addresses these gaps with a set of interconnected objectives aimed at elucidating the synergistic dynamics between intraindividual belief systems, psychological traits, and environmental perceptions. We first examine the direct relationship between growth mindset and SEC. Subsequently, we employ a person-centered approach to identify distinct subgroups of adolescents based on their

unique combinations of trait mindfulness and school climate. By integrating these two constructs as profiling variables, we seek to capture the holistic “person-in-context” patterns that characterize adolescent experiences. Following the identification of these latent profiles, we investigate the predictive utility of an adolescent’s growth mindset in determining their profile membership, thereby examining how cognitive mindsets may navigate or predispose individuals toward specific psychological and contextual configurations. Finally, we compare these profiles based on their overall SEC and its various dimensions to evaluate how the confluence of growth mindset, trait mindfulness, and school climate ultimately catalyzes social-emotional development. Through this multidimensional lens, and informed by the existing literature, we propose the following hypotheses:

Hypothesis 1: Adolescents’ growth mindset will significantly and positively predict their SEC.

Hypothesis 2: Distinct configurations of trait mindfulness and school climate exist, enabling the identification of meaningful latent profiles that represent diverse developmental micro-ecosystems.

Hypothesis 3: Adolescents’ growth mindset will significantly predict their membership of different latent profiles, acting as a cognitive driver that shapes how adolescents attune to their internal awareness and external school environment.

Hypothesis 4: These latent profiles will differ significantly in their overall SEC and its specific dimensions, revealing the differential efficacy of various mindset-mindfulness-climate constellations in fostering SEC.

2. Materials and Methods

2.1 Research Design

2.1.1 Participants and Sampling

This cross-sectional study was conducted in November and December 2024. Using a cluster sampling method, we distributed questionnaires to students from three junior high schools located in different cities within a single province in northern China. All study procedures were formally approved by the Academic Ethics Committee of the School of Arts, Yango University (Approval No.: 2024036). The study was conducted in strict accordance with the ethical standards of the institution and the Declaration of Helsinki. Before data collection, written informed consent was obtained from the legal guardians of all minor participants, and written assent was secured from the students themselves. Of the 1221 questionnaires collected, 1153 were deemed valid after excluding incomplete or invalid responses, resulting in a valid response rate of 94.43%.

2.1.2 Demographic Statistics

The 1153 survey participants were between 12 and 16 years old, with a mean age of 13.73 years ($SD = 0.96$).

The sample comprised 552 boys and 601 girls. Most of the participants—661—resided in urban areas, while 492 were from rural locations. Regarding family structure, 201 participants were only children, and the remaining 952 were siblings.

2.2 Measures

2.2.1 Growth Mindset

To assess growth mindset, we used the Growth Mindset Scale (GMS; [Chen et al., 2023](#)), developed and validated for Chinese students. It comprises 18 items across six dimensions: motivation, attitude, challenge, positive mindset, grit, and adversity. Items are rated on a 5-point Likert scale, from 1 (“strongly disagree”) to 5 (“strongly agree”). The scale demonstrated good internal consistency with a Cronbach’s alpha of 0.894. Its construct validity was highly satisfactory, as evidenced by robust fit indices from confirmatory factor analysis (CFA) ($\chi^2 = 544.591$, $df = 120$, $\chi^2/df = 4.622$, Comparative Fit Index (CFI) = 0.962, Tucker-Lewis Index (TLI) = 0.952, and Root Mean Square Error of Approximation (RMSEA) = 0.056).

2.2.2 Trait Mindfulness

The Mindful Attention Awareness Scale (MAAS) is a 15-item, unidimensional scale that measures trait mindfulness. This revised version of the MAAS was adapted by [Chen et al. \(2012\)](#) for use within a Chinese context. Each item is scored on a 6-point Likert scale, from 1 (“almost always”) to 6 (“almost never”), with higher total scores indicating higher trait mindfulness. The MAAS demonstrates strong psychometric properties, including excellent internal consistency with a Cronbach’s alpha of 0.863. CFA supported the scale’s highly satisfactory construct validity, with the following fit indices: $\chi^2 = 427.251$, $df = 90$, $\chi^2/df = 4.747$, CFI = 0.925, TLI = 0.912, RMSEA = 0.057.

2.2.3 School Climate Scale

We employed a shortened version of the Delaware School Climate Scale Student Questionnaire (DSCS-S; [Bear et al., 2011](#)), adapted for Chinese contexts by [Nie et al. \(2020; 2022\)](#). This 18-item scale comprises four dimensions: teacher–student relations, student–student relations, fairness of rules, and clear expectations. Responses were rated on a 4-point Likert scale, from 1 (“strongly disagree”) to 4 (“strongly agree”). Higher scores indicate a more positive overall school climate as perceived by students. The scale demonstrated high internal consistency, with a Cronbach’s alpha of 0.951. Robust fit indices from CFA ($\chi^2 = 1013.776$, $df = 129$, $\chi^2/df = 7.859$, Goodness-of-Fit Index (GFI) = 0.904, CFI = 0.940, TLI = 0.928, RMSEA = 0.077) further confirmed the scale’s strong construct validity.

2.2.4 SEC Scale

The Social-Emotional Competence Scale (SECS; self-assessment version) was employed to measure students’

SEC. This localized instrument was meticulously engineered by the Chinese Ministry of Education–UNICEF Social-Emotional Learning Project Team (Chen and Mao, 2016; Mao, 2020). Spearheaded by Mao Yaqing and colleagues, the scale is specifically calibrated to the unique sociocultural and educational landscape of the Chinese school system. This context-specific design ensures high ecological validity and internal consistency when assessing the developmental realities of Chinese adolescents. This instrument features 30 questions across six dimensions: self-perception, self-management, other-perception, other-management, collective-perception, and collective-management. Adolescents rate themselves on a 5-point Likert scale (1 = not at all, 5 = fully), with higher scores indicating stronger SEC. The SECS demonstrates strong psychometric properties, including excellent internal consistency (Cronbach's $\alpha = 0.894$) and satisfactory construct validity ($\chi^2 = 2309.215$, $df = 390$, $\chi^2/df = 5.921$, GFI = 0.873, CFI = 0.875, TLI = 0.861, RMSEA = 0.065).

2.3 Statistical Analysis

Statistical analyses were conducted using IBM SPSS Statistics (Version 26; IBM Corp., Armonk, NY, USA) for descriptive and main effect regression, followed by LPA in Mplus (Version 8.3; Muthen & Muthen, Los Angeles, CA, USA). We employed the robust three-step procedure (Asparouhov and Muthén, 2014; Vermunt, 2017) to delineate latent subgroups while explicitly correcting for classification uncertainty in the estimation of predictors and distal outcomes.

To determine the optimal class solution, we sequentially estimated and compared a series of latent profile models, beginning with a baseline solution and incrementally increasing the number of profiles to evaluate relative fit and parsimony. The selection of the best-fitting model was guided by several key statistical indices. First, lower values for the informational criteria (Akaike information criterion [AIC], Bayesian information criterion [BIC], and sample-size-adjusted BIC [α BIC]) suggest a more parsimonious and superior model fit (Nylund et al., 2007). Second, significant p -values for Lo-Mendell-Rubin (LMR) and bootstrapped log-likelihood ratio test (BLRT) suggest the superiority of the K-class model over the K-1 class model (Jung and Wickrama, 2008). Furthermore, entropy values closer to 1 signify higher classification precision, with a value of 0.8 regarded as a standard benchmark for high accuracy.

Following the identification of the optimal profile structure, we conducted LPA using Mplus 8.3 to delineate latent subgroups based on trait mindfulness and school climate. To circumvent the biased parameter estimates associated with traditional “hard assignment” methods, we adopted a robust three-step procedure (Asparouhov and Muthén, 2014; Vermunt, 2017). Specifically, the R3STEP algorithm (Asparouhov and Muthén, 2014) was implemented to examine growth mindset as a predictor of profile

membership. Concurrently, the BCH method (Vermunt, 2017) was employed to evaluate profile-specific differences in SEC as a distal outcome. By explicitly accounting for the probabilistic nature of class membership, this approach ensures more stable and accurate estimates of the relationships between the latent profiles and their associated covariates (Asparouhov and Muthén, 2014).

After determining the trait mindfulness and school climate profiles, regression mixed models with predictors (basic demographic variables and total score of growth mindset) and outcome variables (total scores for SEC and its dimensions) were constructed using the r3step (robust three steps) and BCH (Bolck-Croon-Hagenaars) methods. This enabled observation of the effects of basic demographic variables and growth mindset on the categorization of trait mindfulness and school climate, determining whether there are significant differences in SEC across potential categories.

3. Results

3.1 Descriptive Statistics and Correlation Analysis

Table 1 presents the descriptive statistics and inter-correlations for all measured variables. These findings provide an initial overview of the data and the relationships among the constructs.

3.2 Prediction of SEC by Growth Mindset

To examine the predictive role of growth mindset on SEC, hierarchical regression analyses were performed, controlling for gender and age. Initial Pearson's correlation analysis revealed a significant positive relationship between growth mindset and SEC ($r = 0.668$, $p < 0.001$).

Before interpreting the final model, multicollinearity diagnostics were conducted. Variance Inflation Factors (VIF) values for all predictors ranged from 1.00 to 1.02—well below the conventional threshold of 5—indicating the absence of serious multicollinearity problems.

In the final model, after controlling for the effects of gender and age, growth mindset emerged as a significant positive predictor of SEC ($\beta = 0.663$, $p < 0.001$, 95% CI [0.620, 0.707]). Growth mindset uniquely explained a significant portion of the variance in SEC ($\Delta R^2 = 0.431$, $F(1, 1149) = 895.002$, $p < 0.001$). These findings validate Hypothesis 1, indicating that adolescents' growth mindset significantly and positively predicts their SEC. Detailed results are presented in Tables 2,3.

3.3 Identifying and Interpreting the Ideal Profile Solutions

A potential profile model was established using trait mindfulness and school climate as the manifest variables. After comprehensive consideration, the 4-category model was selected as the optimal model for the following reasons: (a) Considering the AIC, BIC, and α BIC values, the 4-category model demonstrated the optimal balance across these metrics; (b) Vuong-Lo-Mendell-Rubin likelihood ra-

Table 1. Descriptive statistics and correlations for all study variables.

	1	2	3	4	5	6
1. Gender	1					
2. Age	−0.059*	1				
3. Growth mindset	−0.112***	−0.077**	1			
4. Trait mindfulness	−0.092**	−0.020	0.508**	1		
5. School climate	−0.069*	−0.051	0.546***	0.356***	1	
6. Social emotional competence	−0.102**	−0.072*	0.668***	0.429***	0.537***	1
M	-	13.730	66.190	64.290	57.700	117.310
SD	-	0.958	11.880	12.940	9.750	16.790

Note: Number = 1153, Gender coding: 0 = Male, 1 = Female; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, same below.

Table 2. Regression analysis results.

Model	R	R ²	Adjusted R ²	ΔR^2	F Δ (df1, df2)	F (df1, df2)
1	0.668	0.446	0.445	0.445	926.144*** (1, 1151)	926.144*** (1, 1151)
2	0.669	0.447	0.446	0.001	1.268 (2, 1149)	309.703*** (3, 1149)

Note: df, Degrees of freedom; Gender coding: 0 = Male, 1 = Female. *** $p < 0.001$.

Table 3. Model results.

Covariates	B (SE)	β (SE)	t	p	95% CI
Gender (female = 1)	−0.057	−0.029 (0.044)	−1.295	0.196	[−0.143, 0.029]
Age	−0.023	−0.022 (0.023)	−1.012	0.312	[−0.068, 0.022]
Growth mindset	0.663	0.663 (0.022)	29.917	<0.001	[0.620, 0.707]

Note: B, Unstandardized regression coefficient; SE, Standard error; β , Standardized regression coefficient; CI, Confidence interval.

tio test (VLMR) values indicated that the solution for five categories was not superior to the 4-category solution in terms of quality; (c) The Entropy value of the 4-category solution was 0.919 (Table 4); (d) The average probabilities of participants being assigned to the four potential categories were all above 0.91, while the probabilities of being assigned to other groups were all below 0.059 (Table 5), further confirming the accuracy of the 4-category model.

Considering the model fit metrics and simplicity, the 4-category solution was the best-fitting model. This result supports Hypothesis 2, that heterogeneity exists within adolescents' psycho-perceptual pathways.

Fig. 1 displays the frequency and distribution of the identified profile categories, showing how participants were grouped based on their combined scores on the trait mindfulness and school climate. The findings revealed four distinct latent classes of adolescents, each with a unique profile based on their characteristic configurations of trait mindfulness and perceived school climate: Dual-Risk (DR), Environmentally Dependent-Intrinsically Disadvantaged (ED), Intrinsically Advantaged-Environmentally Constrained (IA), and High Resource Integration (HRI).

Accordingly, we conceptualized the latent classes within a two-dimensional framework defined by trait mindfulness and perceived school climate. This approach offers

a clear and intuitive method for understanding the relationships among the four identified profiles (see Fig. 2). Each class occupies a distinct quadrant within this framework, reflecting a unique combination of internal resources and external support.

Specifically, the DR class accounts for 13.8% ($n = 160$) of the total sample, with adolescents in this category demonstrating lower levels of trait mindfulness and reporting the lowest perceived school climate scores. The ED class comprises 23.1% ($n = 267$) of the sample; these adolescents generally exhibit low trait mindfulness but report moderate levels of perceived school climate. The IA class constitutes 30.6% ($n = 352$) of the sample, exhibiting higher trait mindfulness levels, but with perceived school climate scores that do not align with their intrinsic advantages. Finally, the HRI class accounts for 32.5% ($n = 374$) of the sample, with those in this group scoring significantly higher in trait mindfulness and reporting the highest levels of perceived school climate.

3.4 Demographic Factors and Growth Mindset as Predictors of Profiles

This study incorporated demographic variables such as gender, age, and total growth mindset into a mixed regression model as predictors to examine their influence on the classification of psychological perception pathways,

Table 4. LPA results.

Model	LL	AIC	BIC	α BIC	Entropy	VLMR	BLRT
				(SSA-BIC)		<i>p</i>	<i>p</i>
1C	-53,960.685	108,053.370	108,386.678	108,177.041			
2C	-49,269.261	98,738.522	99,243.534	98,925.902	0.965	<0.001	<0.001
3C	-47,821.783	95,911.566	96,588.283	96,162.656	0.952	<0.001	<0.001
4C	-47,176.081	94,688.162	95,536.582	95,002.960	0.919	0.041	<0.001
5C	-46,506.571	93,417.143	94,437.268	93,795.651	0.926	0.072	<0.001

Note: LL, Log likelihood; AIC, Akaike information criterion; BIC, Bayesian information criterion; α BIC, sample-size-adjusted BIC; VLMR, Vuong-Lo-Mendell-Rubin likelihood ratio test; BLRT, bootstrapped log-likelihood ratio test; LPA, Latent Profile Analysis. The selected model is printed in bold.

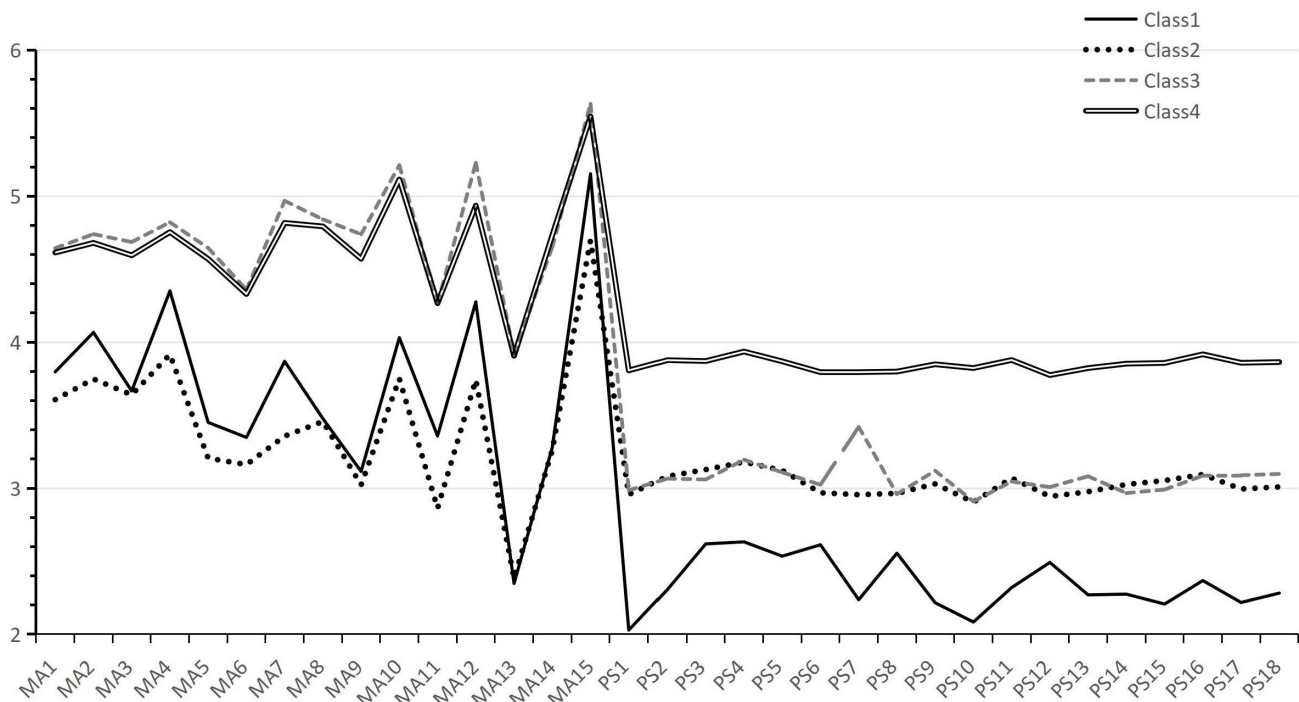


Fig. 1. Line graph comparing profiles. Note: MA1-MA15 indicate 15 questions of Trait Mindfulness, PS1-PS18 indicate 18 questions of School Climate. Class1: Dual-Risk (DR), Class2: Environmentally Dependent-Intrinsically Disadvantaged (ED), Class3: Intrinsically Advantaged-Environmentally Constrained (IA), Class4: High Resource Integration (HRI).

Table 5. The average probability of participants being assigned to the four potential categories.

Profiles	n	%	Probability			
			Class1	Class2	Class3	Class4
Class1	160	13.877	0.966	0.023	0.011	0.000
Class2	267	23.157	0.012	0.919	0.059	0.010
Class3	352	30.529	0.004	0.047	0.939	0.010
Class4	374	32.437	0.000	0.003	0.011	0.986

with the High Resource Integration (HRI) group (accounting for 32.5%) serving as the reference group. Additionally, we included growth mindset as a predictor in the mixed regression model (results are presented in Table 6). The find-

ings indicate that the predictive effect of growth mindset is significant.

Based on the odds ratio (OR) and its significance results, we determined the relationships between predictors and different latent classifications of adolescents' psychological perception pathways. If the OR value is greater than 1 and significant, the independent variable is considered a risk factor for the dependent variable; otherwise, it is regarded as a protective factor. The results demonstrate that:

(1) Neither gender nor age was a significant predictor.

(2) Growth mindset emerged as a significant predictor of profile membership. Specifically, using the HRI profile as the reference group, higher levels of growth mindset were associated with a significantly lower likelihood of being classified into the more maladaptive profiles. For every

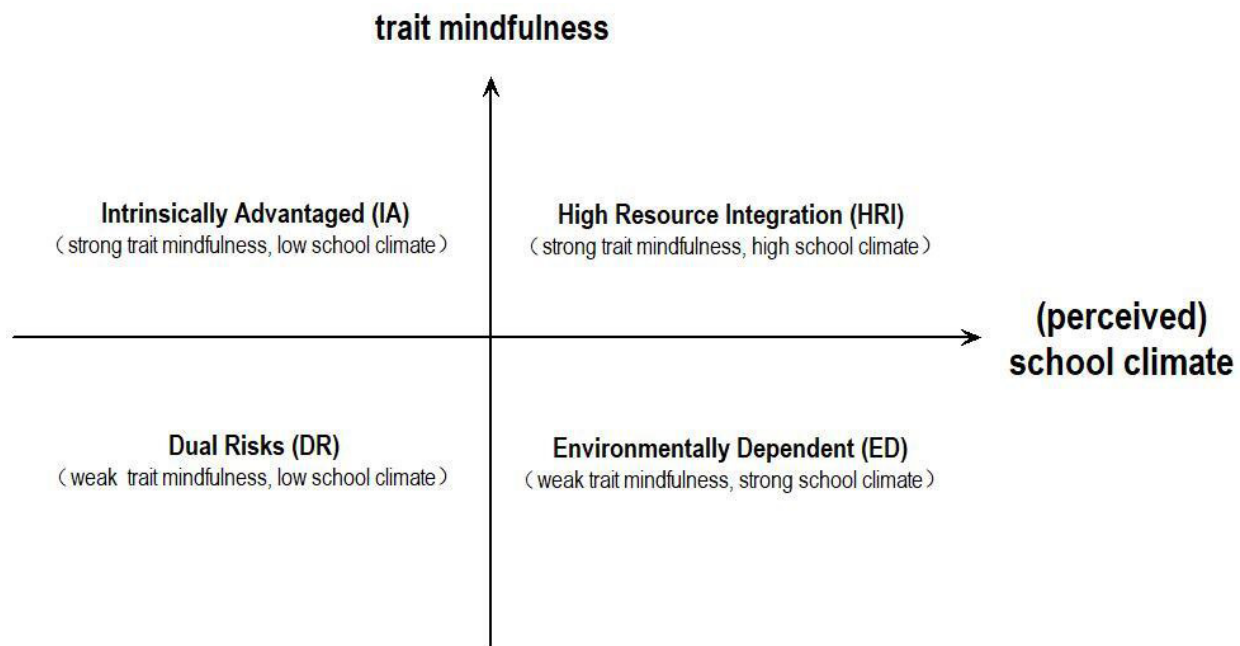


Fig. 2. A two-dimensional framework of adolescent latent classes.

Table 6. Covariate analysis results for the 4-profile model.

Factors	Option	Class1		Class2		Class3	
		Bias regression coefficient (95% CI)	OR	Bias regression coefficient (95% CI)	OR	Bias regression coefficient (95% CI)	OR
Gender	Female	0.032 [−0.43, 0.50]	1.032	0.309 [−0.09, 0.71]	1.362	0.224 [−0.10, 0.54]	1.251
Age		0.001 [−0.23, 0.23]	1.001	0.065 [−0.14, 0.27]	1.068	0.053 [−0.11, 0.22]	1.054
Growth mindset		−2.121*** [−2.64, −1.60]	0.120	−1.719*** [−2.14, −1.30]	0.179	−0.425* [−0.75, −0.10]	0.654

Note: Class1: Dual-Risk (DR), Class2: Environmentally Dependent-Intrinsically Disadvantaged (ED), Class3: Intrinsically Advantaged-Environmentally Constrained (IA). * $p < 0.05$, *** $p < 0.001$.

one-unit increase in growth mindset, the odds of belonging to the DR profile decreased by 88% ($OR = 0.12$, $p < 0.05$), the odds for the ED profile decreased by 82% ($OR = 0.18$, $p < 0.05$), and the odds for the IA profile decreased by 35% ($OR = 0.65$, $p < 0.05$). These findings reinforce the role of a growth mindset as a robust protective factor that reduces the risk of unfavorable latent profile membership.

These results provide evidence to support Hypothesis 3, indicating that a growth mindset can predict an individual's membership of different psychological perception pathway subgroups.

3.5 Effect of Different Latent Types on SEC

Using the identified profiles as independent variables, we developed regression mixed models to analyze their effect on SEC and its dimensions. As shown in Table 7, the BCH results revealed significant differences among the four psychological profiles in terms of the total SEC score and its six dimensions. This finding demonstrates heterogeneity in overall SEC and its dimensions across different psychological profiles, thereby supporting Hypothesis 4.

(1) Significant differences were observed among the HRI, IA, ED, and DR classes regarding total SEC score and its sub-dimensions, which include others-management, collective-perception, and collective-management. The HRI class achieved the highest score, while the IA and ED classes followed, and the DR class scored the lowest.

(2) The HRI class scored significantly higher than all other groups on self-perception and self-management scores. The IA class scored significantly lower than the HRI class, yet it was significantly higher than the ED and DR classes. No significant difference was found between the ED and DR classes.

(3) Regarding other-perception scores, the HRI class scored significantly higher than all other classes. The IA and ED classes both performed significantly better than the DR class, with no significant difference found between them.

4. Discussion

This study adopted a person-centered approach to investigate the intricate relationship between adolescents'

Table 7. Comparison of SEC scores across profile pairs.

Dependent variable	Categories	M (Z)	SE (Z)	Category comparison	χ^2	df	p
Total SEC score				overall test	402.673	3	<0.001
	1:DR	−0.889	0.072	1VS2	24.881	1	<0.001
	2:ED	−0.424	0.056	1VS3	124.193	1	<0.001
	3:IA	0.048	0.042	1VS4	318.619	1	<0.001
	4:HRI	0.657	0.048	2VS3	40.943	1	<0.001
				2VS4	213.234	1	<0.001
				3VS4	89.856	1	<0.001
				overall test	111.329	3	<0.001
Self-perception	1:DR	−0.393	0.093	1VS2	0.882	1	0.348
	2:ED	−0.287	0.061	1VS3	10.644	1	0.001
	3:IA	−0.045	0.051	1VS4	58.476	1	<0.001
	4:HRI	0.413	0.050	2VS3	8.304	1	0.004
				2VS4	78.418	1	<0.001
				3VS4	40.091	1	<0.001
				overall test	238.343	3	<0.001
				1VS2	2.756	1	0.097
Self-management	2:ED	−0.491	0.067	1VS3	68.884	1	<0.001
	3:IA	0.137	0.043	1VS4	143.040	1	<0.001
	4:HRI	0.508	0.046	2VS3	57.001	1	<0.001
				2VS4	150.987	1	<0.001
				3VS4	34.510	1	<0.001
				overall test	124.772	3	<0.001
	1:DR	−0.490	0.085	1VS2	6.117	1	0.013
	2:ED	−0.222	0.064	1VS3	17.550	1	<0.001
Other-perception	3:IA	−0.073	0.051	1VS4	87.905	1	<0.001
	4:HRI	0.435	0.050	2VS3	2.965	1	0.085
				2VS4	64.397	1	<0.001
				3VS4	50.181	1	<0.001
				overall test	258.851	3	<0.001
	1:DR	−0.809	0.085	1VS2	24.019	1	<0.001
	2:ED	−0.295	0.058	1VS3	67.868	1	<0.001
	3:IA	0.010	0.050	1VS4	195.714	1	<0.001
Other-management	4:HRI	0.544	0.045	2VS3	14.173	1	<0.001
				2VS4	127.627	1	<0.001
				3VS4	61.317	1	<0.001
				overall test	371.762	3	<0.001
	1:DR	−0.933	0.079	1VS2	26.632	1	<0.001
	2:ED	−0.406	0.063	1VS3	127.695	1	<0.001
	3:IA	0.081	0.043	1VS4	291.730	1	<0.001
	4:HRI	0.609	0.045	2VS3	37.466	1	<0.001
Collective-perception				2VS4	172.938	1	<0.001
				3VS4	71.584	1	<0.001
				overall test	254.987	3	<0.001
	1:DR	−0.854	0.086	1VS2	24.977	1	<0.001
	2:ED	−0.317	0.062	1VS3	88.706	1	<0.001
	3:IA	0.053	0.043	1VS4	202.228	1	<0.001
	4:HRI	0.538	0.048	2VS3	21.632	1	<0.001
				2VS4	118.444	1	<0.001
Collective-management				3VS4	55.666	1	<0.001

Note: Class1: Dual-Risk (DR), Class2: Environmentally Dependent-Intrinsically Disadvantaged (ED), Class3: Intrinsically Advantaged-Environmentally Constrained (IA), Class4: High Resource Integration (HRI). SEC, social-emotional competence.

growth mindset and SEC, specifically through the mediating roles of trait mindfulness and school climate. Our findings revealed four distinct psychological profiles, highlighting the pivotal role of growth mindset in shaping these profiles and, consequently, influencing the development of adolescents' SEC. These results not only contribute new insights to growth mindset theory and the broader field of positive psychology but also provide novel empirical evidence that enriches our understanding of the diverse developmental paths of SEC in adolescence.

4.1 Potential Psychological Profiles in Adolescents

Using a person-centered latent class analysis, we identified four distinct psychological profiles among adolescents. These profiles offer new insights into the heterogeneity of how adolescents combine trait mindfulness (an internal resource) and perceived school climate (an external support). The findings reveal diverse configurations of these resources and suggest their differential impacts on the development of adolescents' SEC.

4.1.1 High Resource Integration (HRI)

Adolescents in the HRI class exhibited the highest scores in both trait mindfulness and perceived school climate. This finding aligns with Conservation of Resources (COR) Theory (Hobfoll, 1989), which posits that people are motivated to retain, protect, and build resources. This study suggests that when individuals possess a strong internal resource, such as trait mindfulness, along with a highly supportive external resource like school climate, these assets can combine to initiate a gain spiral. This synergy enables individuals to accumulate a larger, more resilient, and more interconnected pool of resources, thereby enhancing their well-being and reducing their vulnerability to stress. Consequently, these adolescents are better equipped to leverage positive environmental factors and respond more adaptively and proactively to challenges, ultimately demonstrating optimal levels of SEC development. This perspective is consistent with the prior research that highlights the synergistic effects of internal and external resources and confirms the importance of their integration for positive adolescent development (Lerner et al., 2005; Masten, 2014).

4.1.2 Intrinsically Advantaged-Environmentally Constrained (IA)

In the IA class, adolescents exhibited high levels of trait mindfulness. However, their perceived school climate scores were disproportionately low, failing to align with their considerable internal psychological resources. This observation reveals the “advantaged yet constrained” phenomenon, where individuals with strong internal resilience may be unable to fully realize their potential due to environmental limitations. This highlights a critical insight—that environmental factors can serve as a “bottleneck” that restricts the optimal development of even highly capable individuals.

4.1.3 Environmentally Dependent-Intrinsically Disadvantaged (ED)

Adolescents in the ED class, who exhibited lower trait mindfulness but a moderate perceived school climate, can be characterized as a state of “fragile equilibrium”. With limited internal resources, these adolescents are more reliant on external environmental support. A moderate school climate thus serves as a critical buffer, helping them maintain adaptive functioning and supporting their socio-emotional development. This reliance, however, also renders their developmental trajectory highly susceptible to fluctuations in their environment.

4.1.4 Dual-Risk (DR)

The DR class, defined by the lowest scores in both trait mindfulness and perceived school climate, exemplifies a “double disadvantage”. This combined absence of internal psychological resources and external environmental support significantly heightens developmental vulnerability. Lacking effective coping mechanisms and struggling to access necessary external support, these adolescents are more susceptible to maladaptive behaviors, emotional issues, or lower social-emotional competence (SEC). This finding is consistent with the Ecological Systems Theory, the Transactional Model of Development, and Cumulative Risk Theory, which collectively emphasize the interconnected, dynamic nature of development and the cumulative, negative impact of multiple risk factors on adolescent well-being (e.g., Bronfenbrenner, 1979; Evans et al., 2013; Sameroff, 2009).

In essence, the integration of internal mindfulness and external climate into a unified classification transcends the traditional “variable-centered” focus on additive effects. By conceptualizing these combined profiles as “psychological niches”, we acknowledge that an adolescent's internal resources and environmental perceptions are inextricably linked. This approach captures the qualitative heterogeneity of how these resources interlock, revealing that the same level of mindfulness may function differently depending on the surrounding school ecology—a systemic nuance that linear regression models inherently overlook.

In summary, this study identified four psychological profiles, which collectively illustrate the diverse patterns through which adolescents integrate internal psychological resources, such as trait mindfulness, with external environmental support, as exemplified by perceived school climate. The delineation of these distinct categories enhances our understanding of the complexity of adolescent development and emphasizes the importance of implementing differentiated and precise intervention strategies. Such a tailored approach is essential for effectively promoting the SEC of adolescents based on their unique resource integration patterns.

4.2 Differences in SEC Across Groups

Our key findings indicate that the heterogeneity in adolescents' psychological profiles is prominently reflected in the disparities of their SEC. The results delineate an adaptive gradient from optimal to suboptimal: adolescents classified as High Resource Integration (HRI) exhibited the highest levels of SEC, followed by the Intrinsically Advantaged-Environmentally Constrained (IA) group. The Environmentally Dependent-Intrinsically Disadvantaged (ED) and Dual-Risk (DR) groups demonstrated lower SEC, with no significant difference observed between them. This finding strongly supports the hypothesis that distinct psychological profiles exert unique influences on adolescent social-emotional development.

Specifically, HRI adolescents, owing to their high levels of both trait mindfulness and perceived school climate, displayed exceptional SEC. Their elevated mindfulness enables effective emotion recognition and management, while a positive school climate provides ample opportunities for learning and practicing social skills and cultivating a sense of responsibility. This synergistic integration of internal and external resources represents the optimal model for promoting SEC in adolescents.

In contrast, IA adolescents, despite possessing relatively high trait mindfulness, still exhibited significantly lower SEC. This suggests that even with robust internal resources, limited external environmental support may constrain the full realization of their socio-emotional potential. This underscores that a healthy environmental context is crucial for translating intrinsic advantages into comprehensive SEC, highlighting the need to prioritize external environmental optimization alongside intrinsic resource cultivation.

Meanwhile, ED adolescents, due to their weaker internal resources (e.g., lower mindfulness), rely more heavily on their external environment for socio-emotional development. A moderately supportive school climate served as a critical buffer, enabling them to outperform the DR group. However, this dependency also reflects deficiencies in intrinsic self-regulation, underscoring the vulnerability of individuals' socio-emotional development when core internal resources are lacking.

The identification of the IA and ED "asymmetric" profiles provides critical evidence for the incremental validity of this study. Specifically, the ED group demonstrates an "environmental compensation" mechanism, where a supportive school climate buffers the impact of low internal mindfulness, allowing these students to maintain a higher SEC than those in the DR group. Conversely, the IA group illustrates a "contextual bottleneck" effect, where high dispositional mindfulness alone is insufficient to achieve optimal SEC in the absence of a supportive climate. These non-linear patterns confirm that SEC development is not a simple sum of resources but a result of configural synergy, justifying the need for a person-centered lens to identify stu-

dents who may be "environment-led" versus "trait-led" in their resilience.

Finally, DR adolescents, facing the dual challenges of deficient internal resources and inadequate external environmental support, scored the lowest in SEC. This group lacks effective internal and external coping mechanisms, potentially leading to greater difficulties in emotion regulation, interpersonal interactions, and adapting to social norms. These findings emphasize the urgency of early identification and multidimensional interventions for this high-risk group to mitigate the cumulative effects of risk factors.

In conclusion, the pronounced differences across psychological profiles further validate the heterogeneity in adolescent development. These findings offer concrete guidance for educators and mental health practitioners: when fostering adolescents' SEC, differentiated and precise support and interventions should be tailored to their unique psychological profiles, rather than adopting a "one-size-for-all" approach.

4.3 The Predictive Role of Growth Mindset

Our findings reveal that adolescents' growth mindset plays a critical role in predicting their SEC. This influence is manifested in two ways: a direct, positive prediction of SEC, and a notable prediction of specific psychological profiles, which ultimately contribute to SEC.

Consistent with Dweck (2006)'s core theory, our study reveals a significant positive relationship between adolescents' growth mindset and their SEC. This can be attributed to the way a growth mindset reframes challenges and difficulties as opportunities for learning and growth, rather than as fixed obstacles. Such a positive cognitive pattern motivates adolescents to engage more proactively in self-improvement and interpersonal interactions. Consequently, they demonstrate greater initiative and effectiveness in key areas like emotional regulation, communication, and problem-solving, which directly enhances their SEC. This result corroborates extensive existing research on the benefits of a growth mindset (e.g., Burnette et al., 2013; Dweck, 2006; Wang et al., 2024), underscoring its foundational role in supporting adolescents' holistic development.

A deeper contribution of this study is the finding that growth mindset significantly predicts adolescents' membership in distinct psychological profiles. Specifically, adolescents with a growth mindset are more likely to exhibit more adaptive psychological patterns, such as the High Resource Integration (HRI) or Intrinsically Advantaged (IA) classes. This can be attributed to their tendency to maintain openness and a non-judgmental stance toward internal experiences (indicating higher trait mindfulness) and to proactively interpret and utilize external environments (e.g., perceiving a more positive school climate). In contrast, adolescents with a fixed mindset are more prone to maladaptive patterns, exhibiting deficits in both internal resources (mindfulness) and external support (school climate). Con-

sequently, they are more likely to belong to the Environmentally Dependent-Intrinsically Disadvantaged (ED) or Dual-Risk (DR) classes. This discovery provides novel empirical evidence for how growth mindset shapes individuals' core cognitive and psychological processes, thereby influencing their overall developmental trajectories and offering guidance for precisely targeted intervention strategies.

4.4 Targeted Intervention Strategies for Different Psychological Profiles

Our research findings demonstrate that growth mindset plays a significant predictive role in adolescents' psychological profiles, providing practical guidance for developing more precise and effective intervention strategies. The following approaches, tailored to four distinct psychological profiles, integrate growth mindset theory with the core objective of enhancing SEC by leveraging growth mindset cultivation, mindfulness practice, and perceived school climate as key intervention entry points.

4.4.1 High Resource Integration (HRI) Students: Sustaining and Elevating Competencies

These students, characterized by high mindfulness and positive perceptions of the school climate, exhibit the strongest adaptability. The intervention focus is not on remediation, but on maintaining and advancing their existing strengths. By encouraging them to apply a growth mindset to more complex challenges, interventions can continuously unlock their potential. Specific approaches include guiding them to participate in interdisciplinary projects or serve as student leaders, reframing difficulties as learning opportunities rather than limitations. This strategy helps them transition from "high adaptability" to "high achievement".

4.4.2 Intrinsically Advantaged (IA) Students: Fostering Integration and Agency

For the IA group, the primary intervention priority is environmental optimization rather than individual skill-building. Since these students already possess robust internal mindfulness, the "bottleneck" to their social-emotional flourishing is contextual. Practitioners should focus on systemic changes—such as improving teacher-student relationships or peer support networks—to unlock the dormant potential of their existing internal strengths. Accordingly, Interventions should strategically employ a growth mindset as a catalyst to bridge the disconnect between their internal and external worlds. This involves teaching them to apply a growth mindset to interpersonal interactions, thereby re-conceptualizing conflicts as opportunities for enhancing communication competencies. Concurrently, a parallel effort in teacher professional development is essential to cultivate a more conducive external environment. The ultimate aim is to facilitate the integration of their high mindfulness and a growth mindset, thereby enabling these students to ac-

tively utilize their intrinsic strengths to shape and navigate their external context.

4.4.3 Environmentally Dependent (ED) Students: Fostering Internalization and Self-Regulation

For the ED group, the primary intervention priority is the internalization of self-regulatory skills to mitigate their "fragile reliance" on external scaffolding. While these students currently maintain adaptive functioning through a supportive school climate, their lack of internal mindfulness renders them developmentally vulnerable to future environmental shifts. Therefore, Interventions should leverage a growth mindset as a mechanism to reconfigure this external dependence into intrinsic strength. Specific strategies include: directing their focus from external validation to internal metrics of progress; systematically integrating mindfulness practices into the school curriculum to cultivate emotional awareness and self-regulation competencies; and implementing positive self-talk techniques to build self-motivation, thereby mitigating their over-reliance on external feedback.

4.4.4 Dual-Risk (DR) Students: Building a Foundational and Holistic Approach

For the DR group, a multi-tiered, foundational approach is required, prioritizing the establishment of basic psychological safety before attempting higher-level competency training. Since these students face a "double disadvantage", interventions must first focus on building a foundational belief in malleability through simple, attainable goals. Consequently, a holistic and comprehensive intervention model is required, with the primary objective of establishing a foundational conviction in a growth mindset. This can be accomplished by: initially implementing simple, attainable goals to facilitate a sense of mastery and cultivate the core belief that "I am capable of learning and growth". Furthermore, it is imperative to assist them in reconceptualizing failure, enabling them to perceive setbacks as integral to the process of success. Ultimately, a sustained, multi-tiered support system—encompassing academic institutions, familial units, and mental health professionals—is indispensable for providing the stable scaffolding necessary for the cultivation of a growth mindset.

4.4.5 Implementation Realities: Navigating Practical Constraints

Translating these profile-specific strategies into school-wide practice inevitably encounters systemic friction. The primary hurdle remains the perennial scarcity of institutional resources—specifically the "time-poverty" within rigid academic schedules and a lack of dedicated funding for specialized intervention materials. Moreover, the efficacy of such nuanced psychological scaffolding hinges on the "pedagogical literacy" of staff; without

sustained professional training, educators may struggle to move beyond theory to authentic delivery. Acknowledging these logistical constraints is not a sign of weakness, but a prerequisite for building sustainable, scalable, and ecologically valid support systems.

4.4.6 Research Limitations and Future Directions

This study provides valuable empirical evidence for understanding adolescent psychological development, offering novel insights into cognitive-contextual configurations and the intricate relationship between growth mindset and SEC. While these contributions lay crucial groundwork, several limitations should be acknowledged to guide subsequent research.

Accordingly, we have substantially tempered our claims regarding the directional influence between these variables. While the current profiles identify meaningful configural patterns, they represent a “snapshot” of adolescent resource integration rather than a confirmed developmental trajectory. The labels used (e.g., “Intrinsically Advantaged” or “Dual Risk”) should be interpreted as descriptive indicators of current psychological states rather than definitive causal mechanisms.

First, the cross-sectional design of this study precludes the identification of definitive causal pathways. Although we employed the robust BCH method within Mplus to evaluate profile-specific differences while explicitly accounting for classification uncertainty, the resulting associations remain probabilistic and correlational in nature. Future research should utilize longitudinal frameworks, such as Latent Transition Analysis, or experimental designs to more clearly delineate the causal mechanisms between growth mindset, cognitive-contextual configurations, and SEC.

Second, while self-report measures are suitable for assessing internal psychological states, exclusive reliance on them may introduce common method variance (CMV) and social desirability bias. Future research should employ multi-method and multi-informant approaches—such as integrating teacher ratings, parental reports, or behavioral observations—to cross-validate findings. Incorporating such diverse data sources would mitigate the risk of inflated associations, thereby enhancing the objectivity and ecological validity of the results regarding adolescent SEC.

Third, as the present sample was drawn exclusively from a Chinese cultural context, the generalizability of the identified cognitive-contextual configurations to other populations remains to be established. Future research should replicate these findings across diverse cultural backgrounds. Adopting a cross-cultural comparative framework would be invaluable for discerning the universality versus cultural specificity of these profiles and the associated intervention mechanisms. Such inquiries would not only bolster the external validity of our conclusions but also foster a more nuanced, culturally-sensitive understanding of adolescent social-emotional development.

5. Conclusions

Overall, this research provides a nuanced map of how individual mindsets and school environments coalesce to shape adolescent growth. By moving beyond conventional variable-centered models, we identified distinct cognitive-contextual configurations that characterize the diverse psychological landscapes of adolescents. Our findings, derived from the robust Mplus BCH analysis, offer strong evidence that a growth mindset acts as a vital precursor, guiding students toward more adaptive configurations of trait mindfulness and school climate.

What stands out in this research is that while trait mindfulness manifests as a stable individual difference, it remains malleable within a supportive educational ecosystem. By fostering growth mindsets and optimizing the school’s relational climate, educators can effectively nudge students toward more adaptive psychological configurations. This, in turn, serves as a fundamental driver for the development of SEC. For educators, the takeaway is clear: fostering SEC is not a fragmented task; it requires a systemic shift that empowers students’ beliefs while simultaneously enriching the school’s relational fabric. Such a dual focus is indispensable for supporting student flourishing in today’s complex educational landscape.

Availability of Data and Materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions

SZ designed the study and drafted the abstract, introduction, literature review, and discussion sections. XY conducted the research and wrote the methodology and results sections. TZ performed the statistical validation, analyzed and interpreted the data, and assisted in drafting the manuscript. QL contributed to the conceptual design of the study framework, and critically revised the manuscript for important intellectual content. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study was conducted in accordance with the guidelines of the Declaration of Helsinki and approved by the Academic Ethics Committee of the School of Arts, Yango University (Approval No.: 2024036). Informed consent was obtained from all students and their legal guardians prior to their participation before they participated in this study.

Acknowledgment

The authors wish to thank LI Xinpeng, WANG Yetong, CAO Penghao, and MU Ruiting for their generous support in acquiring the data for this study.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used Gemini 3.0 Pro (Google) to retrieve relevant research literature. The authors rigorously reviewed and verified the retrieved information to ensure its accuracy. The authors confirm that this tool was not used for drafting or writing the manuscript. The authors take full responsibility for the content of the publication.

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