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Associations between overprotective parenting style and academic anxiety among Chinese high school students

Dexian Li¹, Wencan Li², Xin Lin^{3*} and Xingchen Zhu^{4*}

Abstract

Background Increasing attention has been paid to the effect of overprotective parenting style, which is prevalent in China, on academic anxiety among high school students. The present study aims to clarify the intrinsic dynamic mechanism and explore gender heterogeneity in this relationship. We also analyze the mediating roles of self-concept and positive coping style, and identify intervention programs for academic anxiety and psychological disorders from these dynamic connections.

Methods Data were analyzed using a stratified whole-cluster random sampling method from a sample of 2,286 high school students aged 14–19 years in three regions of China: Shanxi ($n = 784$), Hebei ($n = 675$), and Henan ($n = 827$). Pearson correlation, ordinary least squares (OLS) regression analysis, path analysis, and Fisher's permutation test (FPT) were used to examine the effects of overprotective parenting style on high school students' academic anxiety.

Results There was a significant positive predictive effect between overprotective parenting style and high school students' academic anxiety ($\beta = 0.848$, $t = 144.855$, $p < 0.001$). Students' self-concept was significantly and positively correlated with positive coping style ($\beta = 0.418$, $t = 20.720$, $p < 0.001$) and served as mediators in this relationship. Additionally, overprotective parenting style may indirectly alleviate academic anxiety through these mediating factors. Gender variations were also revealed: female students (0.338) showed more negative effects of an overprotective parenting style on academic anxiety compared to male students (0.269).

Conclusion The findings of this study indicate that overprotective parenting style increases the risk of academic anxiety among Chinese high school students. However, this effect is partially mediated by students' self-concept and positive coping style. Therefore, schools and educational policymakers should consider the interrelationships and interactions when designing intervention strategies for adolescents' academic anxiety and psychological disorders. The objective is to effectively decrease the occurrence of adverse behavioral outcomes among adolescents.

Keywords Overprotective parenting style, Academic anxiety, Self-concept, Positive coping style, Chain mediating effects, Gender heterogeneity, Chinese high school students

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Introduction

The prevalence of academic anxiety among adolescents is generally high, which severely compromises their healthy character formation and academic development, and has enormous social costs worldwide [1]. In China, a country with a rich cultural heritage and a distinctive educational system, this issue is particularly prevalent [2]. In traditional Chinese culture, respect for teachers and education is a fundamental value. Academic performance is often regarded as an important indicator of personal value and family honour [3]. This value intensifies adolescents' hyperfocus on academic achievement, which in turn precipitates academic anxiety [4]. It has been demonstrated that elevated levels of academic anxiety can impair students' cognitive skills, such as attention and memory. Subsequently, this can affect their non-cognitive abilities, such as learning motivation and academic emotions [5]. This impairment can lead to academic delays, absenteeism, truancy, or even dropping out of school, and is a risk factor for lingering negative emotions or impaired mental health [6, 7]. A previous study showed that anxiety symptoms among adolescents worldwide is 20.5%, with Chinese adolescents experiencing a dramatically higher rate of 37.4%, a statistic that calls for serious reflection among educators in China [8, 9].

Family ecology theory proposes that the external social and family environments coexist and interact with an individual's personality traits, emotional responses, and behaviors [10]. In the context of the contemporary knowledge-based economy, where the pursuit of quality and improved life is paramount, China has recorded a natural population growth rate of -0.60%, marking the first instance of negative population growth in 61 years [11]. The family structure in general shows a trend towards miniaturisation, with more and more families having only one child or a small number of children [12]. This type of family structure often leads to parents being overly attentive and protective of their children, resulting in an overprotective parenting style [13]. Actually, emerging studies have reported that this type of parenting negatively impacts various aspects of individual development, including social anxiety, depression, dependent personality disorder, and suicidal behavior in adolescents [14–17].

It is particularly noteworthy that China's distinctive educational system and cultural background, including the considerable pressure of the college entrance examination system, the excessive emphasis on academic performance, and the high expectation of children's achievement in the "face culture", serve to exacerbate the issue of academic anxiety among high school students [18]. In this cultural context, scholars tend to prioritise academic performance and grades to the exclusion of other factors, particularly the nuanced shifts

and substantial impact of students' academic emotions [19]. This is particularly pertinent for high school students, who are undergoing a transitional phase from psychological dependence to personal independence. During this period of heightened emotional sensitivity and susceptibility to misinterpretation of parental intentions, they may experience pressure from an overinterpretation of parental expectations and excessive academic anxiety [20]. Therefore, addressing high school students' academic anxiety has become an urgent task for the state and schools in order to prevent and minimize detrimental consequences promptly. To advance research in this area, the present study was intended to explore the mechanisms of association and heterogeneity between overprotective parenting style and academic anxiety among high school students.

Literature review

Overprotective parenting style and academic anxiety among high school students

From the evaluative perspective, academic anxiety is defined as the persistent emotional distress characterized by worry and fear, which arises when an individual's academic performance and learning activities fail to meet personal expectations or are poorly evaluated by others within a cultural context [21].

According to previous research, there is a direct causal relationship between an overprotective parenting style and the development of anxiety problems in high school students [8]. As Eberly Lewis et al. point out in their study, overprotective parenting style can impair student performance and lead to decreased academic confidence and increased risk of academic anxiety [22]. They are more likely to develop the idea that their environment is unsafe and unpredictable. The higher the level of perceived overprotection, the higher the level of internalised problems, anti-social behaviour [23]. More worryingly, they may find it difficult to find safety in groups or environments outside their parents' home and may be unable to cope effectively with external challenges [24].

Students from families with overprotective parenting styles are more susceptible to the negative effects of academic anxiety during their academic journey [25, 26]. For instance, research has shown that parents' intense planning and supervision during high school can lead to heightened frustration when their children enter university. When faced with challenges or victimization, these students tend to feel overwhelmed, which can trigger anxiety and depressive episodes [27]. Based on this, our first hypothesis (H1) posits that an overprotective parenting style may increase academic anxiety in high school students.

Self-concept as a mediator between overprotective parenting style and academic anxiety

Self-concept refers to an individual's perception and understanding of themselves, including their beliefs, feelings, and thoughts about their abilities, characteristics, and identity [28]. It is shaped by individual experiences and stabilized through social interactions, plays a significant role in shaping students' motivation, behavior, and academic outcomes [29, 30]. Self-concept is a pivotal predictor of academic anxiety among adolescents [31, 32]. Cognitive appraisal theory states that people with a negative self-concept may have doubts about their own success and attribute good outcomes to external help or favorable circumstances rather than to their own endeavours [33, 34]. This lack of self-confidence can lead to increased anxiety and despair when faced with failure, as individuals blame themselves for perceived incompetence [35].

The development of students' self-concept is significantly influenced by interactions with family members [36, 37]. The self-determination theory posits that the external environment can influence the self-cognition and self-concept of adolescents by facilitating the fulfillment of their three fundamental psychological needs: autonomy, competence and belonging. Ultimately, this can enhance their internal motivation and ensure the healthy development of adolescents [38]. SDT provides a vital analytical framework for understanding the impact of parenting styles on the self-concept of high school students [39, 40]. In the context of parenting styles, this entails providing autonomous support, establishing reasonable expectations, and cultivating a nurturing family environment [41]. A parenting style that fulfils these fundamental psychological needs of students can facilitate the growth of their self-concept in a positive manner [42]. Although SDT has been extensively employed in the field of education, its particular application in the relationship between parenting style and self-concept of high school students remains underexplored.

Parenting styles, particularly in how parents communicate and interact with their children, play a crucial role in shaping children's self-concept [43, 44]. There is a significant negative correlation between overprotective parenting style and self-concept, so that what appears to be a "good parenting style" of "overprotecting and overindulging the child" actually hinders the development of independence and emotional regulation skills in adolescence and adulthood [45, 46].

A negative self-concept is a significant predictor of internalised psychological problems, including anxiety and depression. These emotional states are characterised by persistent worry, low mood, and a lack of interest in daily activities [47]. Specifically, a negative self-concept increases the risk of excessive academic anxiety among

high school students by affecting their sense of self-efficacy, sense of value, and cognition of their own abilities [48]. More importantly, an overprotective parenting style may not only directly prevent adolescents from forming positive self-concepts but also indirectly increase their academic anxiety levels by increasing their psychological burden and sense of dependence [49, 50].

In sum, our second hypothesis (H2) proposes that self-concept may mediate the relationship between overprotective parenting style and academic anxiety, which implies that such parenting style contributes to students' negative self-concept, resulting in an increase in students' academic anxiety.

Positive coping style as a mediator between overprotective parenting style and academic anxiety

A positive coping style is recognized as an important contributor to positive emotions, physical and mental health, and subjective well-being. Fostering a positive coping style can enhance students' resilience and confidence in utilizing constructive strategies to manage academic crises, thereby reducing the likelihood of persistent academic anxiety [51, 52]. Daughters et al. (2009) emphasized that inadequate or poor coping strategies, particularly during adolescence, may result in psychopathological symptoms in adulthood [53]. In contrast, developing strong coping skills in early adolescence is crucial for adjusting to new challenges and improving social adaptation [54]. Therefore, families and schools should promote and reinforce positive, problem-focused coping strategies for students as an integral part of building a healthy personality [55].

Parenting styles play a crucial role in influencing adolescents' risk factors, coping styles, and potential psychopathology [56]. A rational and binding parenting style, in which parents make reasonable demands on their children and set clear boundaries, helps them forge positive coping attitudes and good enforcement behaviors [57]. On the contrary, a parenting style that is subservient to the child and unconditionally satisfies his/her needs can lead to a lack of independence and self-control. In such an overprotective parenting environment, children tend to develop a capricious and dependent personality, which is not conducive to the development of a positive coping style [58]. Attachment theory suggests that adolescents who are often overprotected by their parents are prone to defensive, hostile, and aggressive behavior in situations [59]. In particular, an overprotective parenting style tends to promote emotional or avoidant coping strategies in children because parents are skeptical of their children's ability to deal effectively with external challenges [60]. Such parents often worry excessively about their children's safety, school adjustment, and academic pressures, while failing to promote their children's autonomy and

independence [61]. As a result, children from overprotective families tend to experience more frequent parental interventions during their academic journey and longer periods of academic anxiety compared to their peers [62].

Moreover, coping styles shape the way student interact with their academic and social environments, either mitigating or exacerbating academic anxiety [63]. Developing positive coping strategies, therefore, is essential for reducing anxiety and promoting academic success. On the one hand, students who develop positive coping strategies, such as problem-solving and seeking social support, are better equipped to manage academic challenges, reducing their levels of stress and anxiety. These coping mechanisms help them approach academic setbacks with resilience, allowing them to recover more quickly from failures and maintain a sense of control over their learning environment. In contrast, students who rely on negative coping styles, such as avoidance or denial, are more likely to feel overwhelmed by academic demands, leading to increased anxiety [64, 65]. When faced with academic stress, these students may avoid confronting problems, resulting in a buildup of unresolved issues that further heighten anxiety.

On the other hand, coping styles can affect social interactions in academic settings [66]. Students with effective coping skills are more likely to engage in collaborative learning, seek help from peers and teachers, and form positive relationships, all of which contribute to a supportive academic environment [67]. Those with poor coping strategies may withdraw from social interactions or react with frustration, which can isolate them from support networks and amplify feelings of academic anxiety [68].

Based on the analysis of existing studies, it was found that a positive coping style established by high school students can decrease the detrimental influence of an overprotective parenting style on students' academic anxiety. Our third hypothesis (H3) suggests that a positive coping style may mediate the relationship between overprotective parenting and academic anxiety, such that overprotective parenting leads to lower use of positive coping strategies, which in turn increases academic anxiety in high school students.

The chain mediating role of self-concept and positive coping style between overprotective parenting style and academic anxiety

According to self-determination theory, how individuals perceive themselves in relation to environmental stressors directly impacts their coping strategies [69]. Those with a positive self-concept tend to have confidence in their ability to manage difficult situations, which helps them choose constructive coping mechanisms, such as problem-solving and seeking social support. This is

because their positive self-perception allows them to believe in their capacity to handle internal and external demands, even when faced with stress. On the other hand, individuals with a negative self-concept are more likely to doubt their abilities, leading to the adoption of maladaptive coping styles like avoidance or denial [70].

Empirical evidence shows that uncertain or stressful events can deplete personal resources, making self-concept a key predictor of an individual's coping style [71]. When self-concept declines, individuals are more vulnerable to stress, which impairs their ability to engage in positive coping strategies and increases psychological anxiety [72]. This connection is particularly crucial during high school, a period when students' self-concept strongly influences how they cope with academic challenges [73].

High levels of self-concept empower students to approach stressful situations with greater confidence, allowing them to use effective coping strategies, such as problem-solving or seeking support [74]. By contrast, students with low self-concept may lack the belief in their abilities to overcome obstacles, making them more likely to rely on maladaptive coping mechanisms, which can exacerbate stress and anxiety. Research shows that students who consistently employ positive coping strategies not only maintain a healthier self-image but also experience fewer symptoms of stress. This leads to lower levels of academic anxiety, more effective short-term coping, and improved academic performance [75].

In the context of overprotective parenting, students who possess a robust self-concept and effective coping strategies may be better equipped to withstand the adverse effects of such a parenting style. Overprotective parents may inadvertently limit their children's ability to develop independence and coping skills, but students with a high self-concept are more likely to "rescue" themselves from these limitations through their personal growth, achieving a form of self-redemption despite their early family dynamics [76].

In summary, there is a direct relationship between an individual's self-concept and their positive coping style, both of which are connected to academic anxiety. Our fourth hypothesis (H4) posits that students' self-concept and positive coping style play a chain mediating role in the mechanism of the association between overprotective parenting style and academic anxiety. Both self-concept and positive coping styles are key factors in mitigating the negative impact of overprotective parenting on academic anxiety.

Gender heterogeneity in the impact of overprotective parenting style on students' academic anxiety

Overprotective parenting is likely to have a stronger negative effect on girls' academic anxiety than on boys

due to differences in societal expectations and emotional responses [77]. In many cultures, parents tend to be more protective of daughters, perceiving them as more vulnerable and in need of extra care. This often leads to higher parental involvement in the lives of girls compared to boys. While this protective behavior may be well-intentioned, it can limit girls' development of independence and self-reliance. When girls are overly shielded from challenges, they may struggle to cope with academic pressures on their own, which can increase their levels of academic anxiety [78].

In contrast, boys are generally encouraged to be more independent and self-reliant, which helps them develop coping mechanisms for dealing with stress. As a result, they may be better equipped to handle academic challenges without relying on constant parental support [79]. This difference in upbringing means that girls are more likely to experience anxiety when faced with academic stress, as they may feel less capable of handling these challenges independently [80].

Additionally, societal expectations often place greater emotional and social demands on girls [81, 82]. Girls are typically expected to perform well academically and meet parental and societal expectations, which can create added pressure [83]. The fear of disappointing their parents can intensify their anxiety, especially when combined with the overprotective parenting style that reinforces their dependence on parental guidance [84]. Boys, on the other hand, may experience less emotional pressure and therefore be less affected by overprotective parenting in terms of academic anxiety [79].

In sum, the combination of greater parental protection, heightened societal expectations, and less developed independence makes girls more vulnerable to academic anxiety in the context of overprotective parenting compared to boys. Our fifth hypothesis (H5) suggests that if an overprotective parenting style leads to higher levels of academic anxiety among students, this effect may be more pronounced in the female population than in the male population. Specifically, academic anxiety is more prevalent among female students in environments with an overprotective parenting style.

The present study

Although existing research has examined the impact of overprotective parenting on academic anxiety, there has been limited focus on the underlying psychological mechanisms, such as the mediating roles of self-concept and positive coping style. Additionally, few studies have explored how these factors jointly influence academic anxiety. Furthermore, there is a lack of research addressing gender differences in how boys and girls respond to overprotective parenting, leaving potential gender-specific vulnerabilities unexplored. This study aims to fill

these gaps by investigating the chain mediation roles of self-concept and positive coping style, while also analyzing the gender differences in the effects of overprotective parenting on academic anxiety. By investigating how these two factors mediate the relationship between overprotective parenting and academic anxiety, this study aims to provide a deeper understanding of the pathways through which parenting practices impact students' emotional well-being.

The importance of this study lies in its potential to uncover the psychological processes that link parenting styles to academic outcomes, particularly in high school students. Additionally, this research can contribute to a broader understanding of how overprotective parenting may differentially affect boys and girls, shedding light on gender-specific vulnerabilities. Ultimately, the findings from this study could help in developing more targeted strategies to reduce academic anxiety and promote healthier student development.

Based on the research objectives, hypotheses H1 to H5 were formulated. They are presented in Fig. 1.

Hypothesis 1 (H1) Overprotective parenting style may increase academic anxiety in high school students.

Hypothesis 2 (H2) Self-concept may serve as a mediating factor in the influence of overprotective parenting style on students' academic anxiety.

Hypothesis 3 (H3) Positive coping style may serve as a mediating factor in the influence of overprotective parenting style on students' academic anxiety.

Hypothesis 4 (H4) Self-concept and positive coping style may serve as chain mediators in the relationship between overprotective parenting style on their academic anxiety.

Hypothesis 5 (H5) If overprotective parenting style leads to higher academic anxiety in students, this effect may be more pronounced in female population compared to male population.

Materials and methods

Participants

We employed a stratified random whole-cluster sampling method that involved several stages. A total of 2,760 participants from 12 high schools in three provinces in China (Shanxi, Hebei, and Henan, which are mainly concentrated in northern and central China) were selected to ensure a diverse sample. The survey was conducted at the beginning of the 2023 academic year. After receiving approval from the participating schools, we obtained written consent from both the participants and their guardians. The consent forms were designed to protect

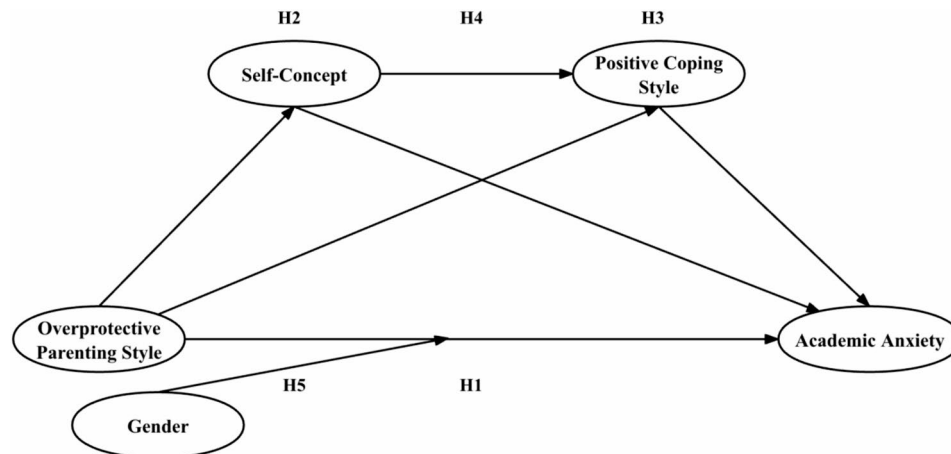


Fig. 1 Research hypothesis model. The relationship between overprotective parenting style and academic anxiety among Chinese high school students is mediated by students' self-concept and positive coping style

anonymity by not including signatures or student names. Participants were informed that participation was voluntary and that they had the right to withdraw at any time.

Data were collected using paper-and-pencil questionnaires that students completed independently during class time under the supervision of trained research assistants. To ensure privacy, completed questionnaires were immediately sealed in envelopes. As an incentive, participants were offered small gifts such as pens or cards. After reviewing the data, we excluded 474 questionnaires for inconsistencies, resulting in a final response rate of 82.826% and 2,286 valid questionnaires for analysis. The participants ranged in age from 14 to 19 years, with a mean age of 16.50 years ($SD = 1.638$). The sample comprised 1,249 boys (54.637%) and 1,037 girls (45.363%). Of the total number of participants, 1,154 (50.481%) were only children, while 1,132 (49.519%) had siblings. Furthermore, 42.782% ($N = 978$) of the participants resided in rural areas, while 57.218% ($N = 1308$) were from urban areas. In terms of the socio-economic status of the participants' families, 1,373 fathers (60.061%) were engaged in managerial or technical occupations. All research materials and procedures were approved by the university research ethics committee.

Measure

Academic Anxiety. In order to more accurately reflect the specific characteristics of Chinese high school students, the Adolescent Academic Anxiety Scale (AASA), as compiled by Xie, was adopted in this study [85]. This scale has been validated in previous research and is recognized for its reliability and validity in measuring academic anxiety in high school students [86]. The AASA consists of 18 items distributed across three dimensions: academic evaluation anxiety (questions 1–5), academic performance anxiety (questions 6–12), and academic

situational anxiety (questions 13–18). Sample items include: "I worry that teachers will give me a poor academic evaluation," "I often worry and feel anxious about how I am doing academically," and "From time to time, my thinking gets confused when I consider the academic dilemmas I face." Each item is rated on a 5-point Likert scale, with 1 indicating "not at all" and 5 indicating "very much," with higher scores indicating greater anxiety. For academic anxiety, CFA results showed a good model fit with three dimensions ($CFI = 0.971$, $TLI = 0.924$, $RMSEA = 0.031$, $SRMR = 0.066$). The reliability and validity of the scale have been confirmed in numerous studies with high school students [87, 88], and it achieved a Cronbach's alpha coefficient of 0.863 in the current study.

Overprotective Parenting Style. The Egma Minnen av Bardndosnaupporstran (EMBU) was originally developed by Carlo Perris in 1980 to assess perceptions of parental rearing behaviors [89]. Subsequently, the Chinese scholar Yue adapted this scale for the Chinese context in 1993, modifying it to reflect national conditions [90]. Further revisions led to the creation of the Simplified Parenting Style Scale (S-EMBU-C) by Jiang et al. in 2010, which took into account the contemporary characteristics of family education in China [91]. This scale retained the core questions from each dimension of the original EMBU, but eliminated repetitive and lengthy items, thereby increasing respondent engagement and improving the validity and reliability of the scale. Responses are scored on a 4-point Likert scale (1 = never, 4 = always), with item 15 being reverse scored. Higher scores indicate a more overprotective parenting style, characterized by control, strict limitations, and high levels of parental involvement. For example, the scale includes items such as: "My parents demand that I come home and explain what I have been doing outside the house" and "My parents have strict limits on what I

can and cannot do and never give in.” This scale was used in a study of Hong Kong adolescents that confirmed that an overprotective family structure is associated with increased family conflict and influences developmental outcomes of egocentrism in Chinese adolescents [92]. The CFA for overprotective parenting style demonstrated excellent model fit indices ($CFI=0.975$, $TLI=0.948$, $RMSEA=0.039$, $SRMR=0.051$). The scale showed good internal consistency with a Cronbach’s alpha of 0.861.

Self-Concept. Based on Shavelson’s multidimensional hierarchical theoretical model [93], the Self-Description Questionnaire (SDQ) developed by Marsh and colleagues was used in the present study. This scale, known for its comprehensive assessment of high school students’ self-concept, has robust psychometric properties. The SDQ consists of 23 items distributed across five dimensions: academic, physical, interpersonal, emotional, and general self-concept [94]. Higher scores on this scale indicate more positive self-identification. Given the broad scope of the main variables in this study, the analysis of students’ self-concept was conducted holistically, without differentiating between dimensions. An example item from the scale is: “I often feel more relaxed. Students self-administered the questionnaire, with each item rated on a 5-point Likert-type scale ranging from 1 (not at all) to 5

(completely), reflecting their daily perceptions, attitudes, feelings, and behaviors. The scale has been shown to have reliable psychometric validity [95]. Higher scores indicate a stronger self-concept among participants. The CFA results indicated good model fit ($CFI=0.961$, $TLI=0.954$, $RMSEA=0.059$, $SRMR=0.068$). The overall Cronbach’s alpha coefficient for the scale in this study was 0.879.

Positive Coping Style. This study used the Secondary School Students’ Coping Styles Inventory (SSCSI) developed by Huang et al. This 30-item inventory was administered to a cohort of high school students [96]. Among these items, there is a positive coping style subscale that includes 12 items (specifically 1–11 and 20). This subscale measures an individual’s ability to adopt positive attitudes and behaviors when faced with challenges, dilemmas, and adversity. For example, one item is ‘I try my best to find solutions to problems.’ Responses were recorded on a 5-point Likert scale, with 1 representing ‘never’ and 5 representing ‘always.’ Higher scores indicate a greater propensity for positive behavior and more effective coping strategies. The sample mean score for the positive coping dimension was 2.87, with a standard deviation of 0.41. This scale has demonstrated good psychometric properties in Chinese populations and is widely used in both educational and psychological research contexts [97]. The CFA for positive coping style showed satisfactory fit indices ($CFI=0.954$, $TLI=0.975$, $RMSEA=0.037$, $SRMR=0.045$). In the current study, the Cronbach’s alpha coefficient for the positive coping style was 0.967, indicating high reliability.

Control Variables. Previous research guided the selection of control variables [98, 99]. The control variables were divided into two categories, family features and personal features related to high school students’ academic anxiety (Table 1).

Table 1 Measurement instructions for variables

Variables	Variable description
Core variables	
overprotective parenting style	Continuous variable
self-concept	Continuous variable
positive coping style	Continuous variable
academic anxiety	Continuous variable
Control variables	
Father’s level of education	1 = below junior high school, 2 = high school/secondary school /vocational school, 3 = post-secondary, 4 = ordinary college, 5 = bachelor’s degree and above
Mother’s level of education	1 = below junior high school, 2 = high school/secondary school /vocational school, 3 = post-secondary, 4 = ordinary college, 5 = bachelor’s degree and above
Father’s occupation	0 = management (state agencies/institutions) or technical (teachers/engineers/ doctors/lawyers); 1 = other occupations
Mother’s occupation	0 = management (state agencies/institutions) or technical (teachers/engineers/ doctors/lawyers); 1 = other occupations
Family’s economic conditions	1 = very difficult, 2 = relatively difficult, 3 = medium, 4 = relatively rich, and 5 = best
Residence	0 = rural; 1 = urban
Number of children	0 = single child; 1 = has siblings
Gender	0 = female; 1 = male
Age	Continuous variable (unit: year)
Grade	1 = freshman, 2 = sophomore, 3 = junior

Statistical analysis

In this project, we used SPSS version 26.0, STATA version 16.0, and Mplus version 8.3 for data analysis and model construction. First, Harman’s single-factor test was conducted to address potential general method bias due to the self-reported nature of the data. Next, the relationships between the variables of interest were examined using Pearson’s correlation analyses. In addition, the hypothesized chain mediation model was examined using path analysis, where overprotective parenting style was the predictor variable and students’ self-concept and positive coping style served as mediator variables, with academic anxiety as the outcome variable. The presence of a mediating effect was inferred if the 95% confidence interval (CI) for the indirect effect did not include zero. To confirm the chain mediating role of self-concept and positive coping style in the relationship between overprotective parenting style and academic anxiety, 5,000

Table 2 Correlations among continuous variables

	1	2	3	4
1.Overprotective parenting style	-			
2. Self-concept	-0.489 ***	-		
3. Positive coping style	-0.370 ***	0.499 ***	-	
4. Academic anxiety	0.848 ***	-0.546 ***	-0.438 ***	-
Mean	2.540	3.538	2.870	2.246
SD	0.744	0.625	0.414	0.376

**Correlation is significant at 0.01 level (two-tailed). *Correlation is significant at 0.05 level (two-tailed)

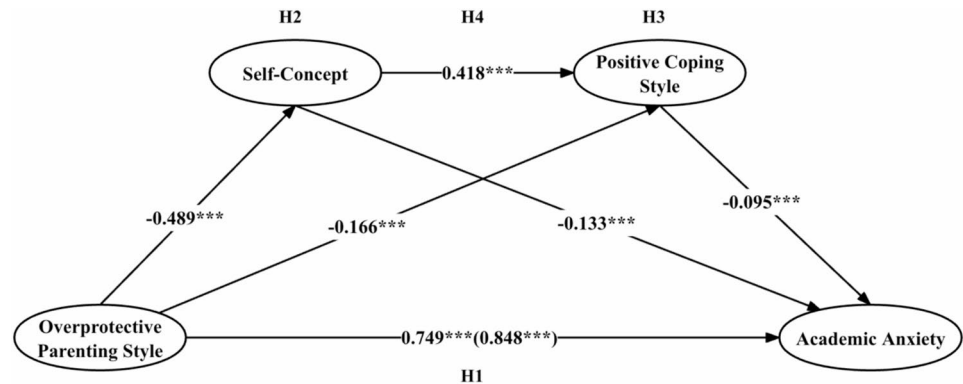


Fig. 2 Mediation model tested in the study. Pathways between variables are represented by standardized beta estimates. Direct effects of overprotective parenting style on high school students’ academic anxiety are shown in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

bootstrap resamples were conducted using bias-corrected bootstrapping to ensure the reliability of the mediation model. Finally, the sample was stratified between male and female students to identify potential heterogeneity. Fisher’s permutation test was used to examine the significance of heterogeneity in the analyses.

Results

Common method bias test

In this study, Harman’s single-factor test was initially employed to assess the presence of common method bias, following the methodology described by Zhou and Long (2004) [100]. An exploratory factor analysis was conducted to evaluate the full spectrum of themes related to the primary study variables. The analysis revealed that eleven factors, each with eigenvalues exceeding one, were identifiable. The principal factor accounted for 24.301% of the variance, which fell below the critical threshold of 40%. Consequently, this study did not exhibit significant common method bias, and homological bias appeared to minimally impact the study’s outcomes, thereby validating the continuation of data analysis.

Correlation analysis of variables

Pearson’s correlation analysis was utilized to examine bivariate correlations between the core variables of this study, with the results detailed in Table 2. This table presents the means, standard deviations, and Pearson’s correlation coefficients for each core variable. The analysis

revealed significant correlations among all of the core variables. Specifically, overprotective parenting style was positively correlated with academic anxiety ($r = 0.848$, $p < 0.001$) and negatively correlated with self-concept ($r = -0.489$, $p < 0.001$) as well as negatively with positive coping style ($r = -0.370$, $p < 0.001$). Furthermore, self-concept exhibited a positive correlation with positive coping style ($r = 0.499$, $p < 0.001$) and a negative correlation with academic anxiety ($r = -0.546$, $p < 0.001$). Additionally, a negative correlation was observed between positive coping style and academic anxiety ($r = -0.438$, $p < 0.001$).

Mediation analysis

Path analysis was conducted using the mean scores of the validated measures to examine the relationships between variables. These metrics indicate that the research path used in this study has some predictive validity. Therefore, we conducted a chain mediation model, which is a path analysis consisting of three indirect effects: (1) self-concept mediated the relationship between overprotective parenting style and high school students’ academic anxiety; (2) positive coping style also mediated this relationship; and (3) collectively, self-concept and positive coping style mediated the effect of overprotective parenting style on academic anxiety (see Fig. 2).

First, the total effect results showed (as in Fig. 2) that there was a significant positive predictive effect between overprotective parenting style and academic anxiety among high school students ($\beta = 0.848$, $t = 144.855$,

Table 3 Direct, indirect, and total effects of the hypothesized model

Model pathways	Esti- mated effect (β)	Boot SE	95% CI		
			Lower	Upper	
Direct effect					
Overprotective parenting style →Academic anxiety	0.749	0.011	0.726	0.729	
Indirect effects					
Overprotective parenting style →Self-concept→Academic anxiety	0.065***	0.008	7.656%	0.051	0.080
Overprotective parenting style →Positive coping style →Academic anxiety	0.016***	0.003	1.885%	0.011	0.022
Overprotective parenting style→Self-concept→Positive coping style →Academic anxiety	0.019***	0.003	2.238%	0.014	0.025
Total effect	0.848***	0.005		0.838	0.858

Note. Overprotective parenting style as a predictor variable. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

$p < 0.001$). Second, after taking into account the effects of the control variables, the chain mediation model showed that the positive predictive effect between overprotective parenting style and academic anxiety remained significant ($\beta = 0.749$, $t = 68.350$, $p < 0.001$). The significant value decreased only slightly.

Meanwhile, overprotective parenting style had a significant negative predictive effect on both students' self-concept ($\beta = -0.489$, $t = -31.425$, $p < 0.001$) and positive coping style ($\beta = -0.166$, $t = -7.982$, $p < 0.001$). Self-concept was a significant negative predictor of academic anxiety among high school students ($\beta = -0.133$, $t = -9.330$, $p < 0.001$), positive coping style was a significant negative predictor of academic anxiety ($\beta = -0.095$, $t = -7.738$, $p < 0.001$), and self-concept was significantly positively related to positive coping style ($\beta = 0.418$, $t = 20.720$, $p < 0.001$).

Finally, the results of the mediation effect test via bias-corrected bootstrap (as shown in Table 3) indicated that the overall effect of overprotective parenting style on academic anxiety among high school students was 0.848 ($SE = 0.005$, 95% CI [0.838, 0.858], $p < 0.001$), and the direct effect was 0.749 ($SE = 0.011$, 95% CI [0.726, 0.729], $p < 0.001$), which demonstrated statistically significant overall and direct effects. In the pathway overprotective parenting style \rightarrow self-concept \rightarrow academic anxiety, the indirect effect was 0.065 ($SE = 0.008$, 95% CI [0.051, 0.080], $p < 0.001$), with a mediated effect value of 7.656% of the total effect value (0.849); in the pathway

Table 4 Impact of overprotective parenting style on academic anxiety: gender-related differences

Variables	(1) Academic anxiety	(2) Aca- demic anxiety
	Male	Female
Overprotective parenting style	0.269*** (0.007)	0.338*** (0.011)
Control variable	yes	yes
Sample size	1249	1037
R^2	0.822	0.689
Fisher empirical p value	0.000***	

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The robust standard errors are in parentheses. The Fisher empirical p value is used to test the significance of the coefficient difference between the groups, which was obtained by 5,000 self-sampling times

overprotective parenting style \rightarrow positive coping style \rightarrow academic anxiety, the indirect effect was 0.016 ($SE = 0.003$, 95% CI [0.011, 0.022], $p < 0.001$), with a mediated effect value of 1.885% of the total effect value; in the pathway overprotective parenting style \rightarrow self-concept \rightarrow positive coping style \rightarrow academic anxiety, the indirect effect was 0.019 ($SE = 0.003$, 95% CI [0.014, 0.025], $p < 0.001$), with a mediated effect value of 2.238% of the total effect value. The statistical significance of these three indirect effects was maintained as the bootstrapped 95% confidence interval did not include zero. The data analyses revealed that the indirect effects of overprotective parenting style on high school students' academic anxiety were dependent on high school students' self-concept and positive coping style, which played significant negative partial mediation roles in the association between overprotective parenting style and high school students' academic anxiety.

Heterogeneity results

Models (1) and (2) in Table 4 illustrated the impacts of overprotective parenting style on academic anxiety for boys and girls, respectively. In both instances, the coefficients were statistically significant at the 1% level and were negative. Importantly, the effect of overprotective parenting style on girls' academic anxiety (0.338) exceeded that for boys' academic anxiety (0.269). Additionally, Fisher's exact test confirmed that the difference in gender-specific coefficients regarding the influence of overprotective parenting style on academic anxiety was significant at the 1% level. These results suggested that, overall, academic anxiety was more prevalent among girls than among boys. Moreover, there was evidence of gender heterogeneity in the effects of an overprotective parenting style on academic anxiety, with a more pronounced impact on girls compared to boys.

Discussion

Overprotective parenting style directly linked to increased academic anxiety in high school students

Despite extensive research on the influence of parenting styles on adolescent mental health, significant knowledge gaps remain regarding the precise relationship between an overprotective parenting style and academic anxiety in high school students. To address this gap in knowledge, this study aimed to investigate the impact of an overprotective parenting style on academic anxiety in Chinese students, with a particular focus on potential gender differences in this relationship. Our findings support the hypothesis that overprotective parenting exacerbates academic anxiety, with the magnitude of this effect varying between male and female students.

Prior research has underscored the influence of parenting styles on diverse forms of anxiety. For example, Hudson et al. (2024) found that parents who are excessively involved and protective of their children limit their autonomy and increase anxiety [101]. Our findings lend support to this notion, indicating that students with overprotective parents are less likely to develop the autonomy and coping skills required to navigate academic challenges, which may ultimately result in an increase in anxiety within the school environment. This finding serves to reinforce the idea that, while often well-intentioned, overprotective behaviour can have unintended negative effects on students' mental health [102].

Cultural context is critical in understanding the dynamics of overprotective parenting. In Chinese culture, "filial piety" and "family harmony" are considered core values [103]. These values emphasise children's respect and obedience towards their parents, as well as strong relationships between family members. In the overprotective parenting style, parents may unconsciously restrict their children's autonomy out of a deep concern for their children and the pursuit of "filial piety". Such restrictions may stem from anxiety about the child's uncertain future and a deep concern about whether the child will succeed in social competition [104]. In this cultural context, parents may be more inclined to adopt overprotective strategies to ensure their children's safety and success, thus exacerbating the production of academic anxiety [105].

Our study also extends existing literature on gender differences in the effects of overprotective parenting. Prior research has indicated that girls may be more vulnerable to the emotional consequences of parental control due to social expectations and heightened emotional responsiveness [106, 107]. The findings of this study indicate that female students tend to experience higher levels of academic anxiety than male students when they are exposed to an overprotective parental environment. This implies that gender is a moderating factor in how students internalise and respond to parental behaviour.

Given these findings, it is clear that both parenting style and gender play a crucial role in shaping adolescents' psychological and academic outcomes. Our study emphasizes the need for balanced parenting practices that foster autonomy and resilience, particularly in the context of academic pressures. Future research should continue to explore how different parenting styles influence various forms of anxiety, including academic anxiety. By refining our understanding of these dynamics, we can develop more targeted interventions aimed at reducing anxiety and improving adolescent well-being. This will help educators, parents, and mental health professionals support adolescents in navigating the complex interplay of academic and emotional challenges they face.

The mediating effect of self-concept and positive coping style between overprotective parenting style and academic anxiety in high school students

This study confirmed the second hypothesis (H2) by demonstrating that self-concept is a mediator of the effects of overprotective parenting style on students' academic anxiety. The results of this study suggest that a positive self-concept serves as a protective buffer by influencing an individual's internalized constructs, thereby mitigating the adverse effects of an overprotective parenting style on students' academic anxiety.

The results align with prior research, which underscores the importance of self-concept in shaping how students respond to stressors, including academic challenges. For instance, Rosenberg's (1989) theory of self-concept suggests that individuals with a strong sense of self-worth are better equipped to cope with external pressures, including parental overprotection [108]. Similarly, studies by Rohmalimna and Sie (2022) have shown that students with a more positive self-concept are less likely to internalize negative parental behaviors and are more resilient in academic contexts [109].

Our findings extend the work of Goagoses et al. (2023), who found that overprotective parenting is linked to poorer self-regulation in adolescents but did not explore self-concept as a mediator [110]. By filling this gap, our research suggests that self-concept plays a pivotal role in how students respond to overprotective parenting. Specifically, those with a higher self-concept are more resilient to the negative effects of such parenting styles, whereas students with lower self-concept are more vulnerable to academic anxiety. This finding highlights the significance of interventions designed to bolster self-concept [111], as such interventions can assist in mitigating some of the adverse effects of overprotective parenting on academic anxiety. Our study highlights the importance of self-concept not only as a protective factor against mental health issues but also as a critical internal resource for buffering the negative effects of overprotective parenting

on academic anxiety [112]. The findings suggest that fostering a mature, positive self-concept can help students navigate academic challenges more effectively and reduce the impact of inappropriate parenting styles. This has important implications for school psychologists, counselors, and policymakers who aim to improve adolescent well-being and educational outcomes [113]. By focusing on strategies that build self-concept, such as promoting self-awareness, independence, and resilience, interventions can better equip students to manage academic pressures and lessen the anxiety linked to overprotective parenting.

The current findings provide support for the third hypothesis (H3), which suggests that the adverse effect of an overprotective parenting style on students' academic anxiety can be reduced by the adoption of positive coping styles.

As noted in previous studies, a positive coping style is widely recognized as both a habitual response to stress and a protective factor for an individual's psychological well-being and behavior [114]. This study builds on earlier research, which has highlighted that students who adopt positive coping strategies are generally more emotionally stable and less influenced by irrelevant external factors, resulting in lower accumulation of academic stress [115, 116]. Our findings align with this body of work by showing that students who engage in positive coping behaviors are better able to recover from negative events, adapt their learning strategies, and actively participate in academic tasks, which in turn reduces their likelihood of experiencing academic anxiety [117].

Our study also supports the notion that positive coping enables students to reframe their perceptions of academic stress, minimizing the negative consequences associated with it [118]. However, consistent with previous findings, we observed that students who are subjected to excessive parental intervention are less likely to engage in positive coping behaviors, leading to prolonged cycles of academic anxiety and an increased risk of mental health problems [118–121].

Crucially, our study extends previous research by highlighting the mediating role of positive coping styles in mitigating the adverse effects of overprotective parenting. This builds on the findings of Shao et al. (2023), who demonstrated that effective coping strategies can buffer the negative psychological outcomes associated with overprotective environments [122]. In this context, our research suggests that accurate self-perceptions and goal-directed coping plans help students break down, integrate, and resolve academic challenges, significantly reducing their risk of academic anxiety [123]. Therefore, programs that teach stress management, problem-solving, and resilience skills can help students develop positive coping mechanisms, contributing to a more

supportive learning environment [124]. By prioritizing these skills in curricula, schools can help students manage the stress associated with overprotective parenting and reduce the occurrence of academic anxiety.

Chain-mediated effects of self-concept and positive coping style between overprotective parenting style and academic anxiety in high school students

The research findings revealed that self-concept and positive coping style together exert a negative chain mediating effect between overprotective parenting and students' academic anxiety, confirming our fourth hypothesis (H4). This discovery not only aligns with previous research but also expands on it by offering a deeper understanding of the mechanisms at play. While prior studies have explored the direct effects of overprotective parenting on various psychological outcomes, such as increased anxiety and diminished self-regulation [125], our research builds on these findings by illustrating the specific mechanisms through which these effects occur.

Firstly, previous research has emphasized the role of self-concept in shaping students' emotional well-being and academic outcomes [126]. However, most studies have examined self-concept in isolation without considering its interplay with other factors like coping strategies [127, 128]. Our study extends this understanding by demonstrating that self-concept acts as the initial mediator in a chain, where students with higher self-concept are better equipped to buffer the negative effects of overprotective parenting. This not only confirms existing knowledge about the protective role of self-concept but also situates it within a broader framework of psychological resilience that includes coping styles.

Secondly, positive coping styles have been identified in past studies as key strategies for managing stress and reducing anxiety [129, 130]. However, these studies have largely focused on coping in general, without addressing how it interacts with specific parenting styles like overprotectiveness. Our research expands this field by showing that positive coping does not function in isolation—it is influenced by the development of a strong self-concept. In other words, students who have a healthy self-concept are more likely to adopt positive coping mechanisms, which in turn reduce their academic anxiety [131]. This provides a more nuanced view of how internal psychological traits and external influences work together to shape emotional outcomes [132].

Furthermore, our findings offer new insights into the prevention of such overprotective parenting behaviours. While previous research has often highlighted the detrimental effects of such parenting on adolescents' emotional development [133], our study provides a more hopeful perspective by identifying self-concept and coping strategies as potential protective factors. These

findings suggest that interventions targeting self-concept development and the promotion of positive coping skills can reduce the negative impact of overprotective parenting on academic anxiety, a critical area for parents, educators, and counselors to address.

Variations between male and female students in the impact of overprotective parenting style on students' academic anxiety

The findings revealed that overprotective parenting has a significant differential predictive effect on academic anxiety between male and female high school students, confirming our fifth hypothesis (H5). Specifically, the impact of overprotective parenting on academic anxiety is more pronounced in female students than in males.

This study builds upon and extends previous research by offering a more detailed examination of the gender-specific effects of overprotective parenting on academic anxiety. While earlier studies have established a general link between overprotective parenting and increased anxiety levels in adolescents [134], the gendered impact of such parenting styles has not been thoroughly examined. Our findings add a crucial layer to this body of work by demonstrating that overprotective parenting has a disproportionately stronger effect on female students' academic anxiety compared to males.

Previous research has shown that girls tend to be more emotionally affected by parental behaviors, often experiencing higher levels of stress and self-critical thinking in response to familial expectations [135]. Our study builds on this understanding by highlighting that overprotective parenting, which typically restricts autonomy and fosters dependence, exacerbates these tendencies in female students, leading to higher levels of academic anxiety. This aligns with prior findings that girls are more likely to internalize pressures and experience heightened emotional responses to academic stressors [136].

Additionally, while boys may experience some of the same pressures from overprotective parenting, research suggests that they are often socialized to be more independent, which may buffer them from the full extent of the anxiety associated with overprotection. Our study reinforces this perspective, showing that male students are less affected by overprotective parenting in terms of academic anxiety, likely due to societal expectations that encourage independence and problem-solving in boys from an earlier age [137].

In expanding on earlier work, this study provides new insights into the intersection of gender, parenting styles, and academic outcomes. It extends the literature by emphasizing the need for gender-sensitive approaches when examining the psychological effects of parenting. While much of the existing research has focused on the general outcomes of overprotective parenting, our

findings suggest that gender plays a critical role in moderating these effects, particularly in the context of academic anxiety.

Furthermore, this study underscores the importance of developing more balanced parenting practices that promote autonomy and emotional resilience, especially for female students. The promotion of individual psychological characteristics and behavioural patterns, including accurate self-perception and a constructive coping style, can assist in mitigating the adverse effects of excessive protection on the academic anxiety of adolescents. In doing so, the study not only fills gaps in the research but also offers practical recommendations for educators and parents to better support students' psychological well-being in the face of academic challenges.

Theoretical contribution and implications for the practice

This study makes several important theoretical contributions by elucidating the mechanisms through which overprotective parenting influences academic anxiety, with a particular focus on gender differences. First, by establishing the mediating roles of self-concept and positive coping style, our study offers a more profound comprehension of the intrinsic dynamic processes that underpin this relationship, while simultaneously identifying potential intervention points. By demonstrating that both self-concept and positive coping style serve as chain mediators, this research provides a more nuanced view of how these internal psychological factors buffer or exacerbate the impact of overprotective parenting on academic anxiety. This insight aligns with and expands upon existing theories, such as self-categorization theory and stress coping theory, by integrating the dynamic interplay between self-perceptions and coping mechanisms in academic contexts [138, 139].

This study makes a contribution to the existing literature on the relationship between the overprotective parenting style and academic anxiety among high school students in China by examining gender heterogeneity. While prior research has generally linked overprotective parenting to increased anxiety in adolescents, this study highlights that the intensity of this effect is notably stronger for female students. This gender-specific insight aligns with social role theory and provides a clearer theoretical framework for understanding how societal and familial expectations differentially influence academic anxiety among boys and girls [81].

The findings from this study also have significant implications for practice, particularly in educational and familial contexts. Given that overprotective parenting exacerbates academic anxiety, it is crucial for educators and parents to understand and address the impact of such parenting styles on students. Research highlights that overprotective parenting can hinder children's

development of independence and coping skills, leading to increased anxiety [140]. Schools should therefore implement programs and workshops aimed at raising awareness about these effects and promoting balanced parenting practices. These programs provide opportunities for parents to implement constructive strategies that encourage independence and resilience in their children. This can help counteract the detrimental effects of parents' overprotective attitudes and behaviors on their children [141].

The findings have practical implications for the design of intervention programmes that focus on enhancing protective factors, such as self-concept and positive coping styles, which can mitigate the harmful effects of overprotective parents. Evidence suggests that positive coping styles can significantly buffer academic anxiety and improve emotional stability [118, 142]. Schools should integrate coping skills training into their curricula to equip students with the tools needed to manage academic stress effectively. Programs that teach stress management techniques can enhance students' resilience and reduce academic anxiety, which, in turn, can lead to improved academic performance and overall well-being [117, 124].

The gender-specific findings of this study suggest that interventions should be tailored to address the unique challenges faced by male and female students. Research indicates that female students are particularly vulnerable to the negative effects of overprotective parenting in terms of academic anxiety [143]. Targeted support for girls could involve creating safe spaces where they can discuss their concerns and develop coping strategies that address their specific experiences [80]. By understanding these gender differences, interventions can be more effectively designed to meet the needs of all students.

Limitations

This study has several limitations. Firstly, the data were collected from only three provinces: Shanxi, Hebei, and Henan. Consequently, the findings may not be generalizable to the broader population. Future studies should aim to obtain a nationally representative sample to increase the external validity and potentially uncover regional variations in overprotective parenting style and students' academic anxiety. Secondly, the cross-sectional design of this study precludes any inferences about causal relationships among the variables. Parenting styles may vary over time and across cultures, and the development of self-concept and the adoption of coping strategies are dynamic processes. Therefore, it is recommended that future research employ longitudinal methods or lagged crossover models [144] to trace changes in these indicators over time. Such approaches will allow for a more detailed understanding of the causal relationships and

enhance the analysis of how parenting styles influence academic anxiety in high school students. Thirdly, the complexity of controlling for multiple variables and the extensive workload limited the scope of our analysis to single-factor influences without exploring multiple competencies concurrently. Future studies might benefit from employing a combination of research methods to improve the precision of the measurements. Fourthly, this study focused solely on the mediating mechanisms of overprotective parenting style on students' academic anxiety. Further research could examine this relationship from the perspective of moderating mechanisms, which could elucidate more detailed underlying processes and inform targeted educational interventions for managing academic anxiety among high school students.

Conclusion

This study explored various antecedents that influence academic anxiety among Chinese high school students, and investigated the current status and heterogeneity of academic anxiety. Specifically, this study found that overprotective parenting style may play a facilitating role in stimulating academic anxiety among high school students. In addition, potential mediators of the relationship between overprotective parenting style and academic anxiety among high school students were identified as self-concept and positive coping style. More meaningfully, this study also analysed the following mediation pathways: overprotective parenting style → self-concept → positive coping style → academic anxiety. Finally, the study revealed significant gender differences in the mechanism of influence of overprotective parenting style on academic anxiety among high school students. Both theory and practice benefit from this study. First, this study extends the existing theoretical framework on the relationship between overprotective parenting style and high school students' academic anxiety. It also reveals the intrinsic mechanism by which overprotective parenting style may directly induce high school students' academic anxiety. Second, this study integrated the dual perspectives of family and individual characteristics to explore other potential influences on the alleviation of high school students' academic anxiety. Self-concept and positive coping style may inhibit the radicalisation of academic anxiety in high school students by overprotective parenting style. To some extent, a more comprehensive description of the pathways influencing high school students' academic anxiety has been provided. Finally, the results of the present article have practical implications for the education of families and for the intervention of academic anxiety in high school adolescents.

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Author contributions

Dexian Li: Conceptualization, Formal analysis, Writing - original draft; Wencan Li: Methodology, Software, Writing - original draft; Xin Lin: Writing - review & editing; Xingchen Zhu: Methodology, Software, Writing - review & editing.

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Data availability

In this study, the original data can be further consulted to the corresponding author.

Declarations

Ethics approval and consent to participate

All methods were performed in accordance with the relevant guidelines and regulations. The study protocol was approved by the ethics committee of Liaoning Normal University. Written informed consent to participate in this study was provided by the participant's legal guardian/next of kin.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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