Behavioral Psychology /Psicología Conductual

Behav. Psychol. **2026**; 34(4): 48614
https://doi.org/10.31083/BP48614

Original Research

Moderating Effect of Academic Isolation on the Relationship Between Parental Social Support and Academic Burnout Among Undergraduate Students in Shandong Province, China: A Study of Gender Differences

Haikuo Yu[1], Dong Yang[1,*]

[1]Department of Educational Administration, International College, Krirk University, 10220 Bangkok, Thailand
*Correspondence: dongyangpsy@foxmail.com (Dong Yang)
Academic Editor: Jose Pedro Espada
Submitted: 27 November 2025 Revised: 26 February 2026 Accepted: 3 March 2026 Published: 11 August 2026

Abstract

Background: In the Chinese education system, undergraduate students transition from highly structured high school learning to a more autonomous university environment, which may increase feelings of academic isolation. However, it remains unclear whether parental social support (PSS) reduces academic burnout under varying levels of academic isolation and whether this process varies by gender. This study aimed to examine the association between PSS and academic burnout, test the moderating effect of academic isolation, and explore gender differences in these relationships. **Methods:** Drawing on the stress-buffering hypothesis, this study examined the association between PSS and academic burnout among undergraduate students, tested the moderating role of academic isolation, and further explored whether this moderating effect varies by gender. A cross-sectional survey was conducted among undergraduate students from universities in Shandong Province, China, yielding 970 valid responses. **Results:** PSS was significantly associated with lower academic burnout ($\beta = –0.498$, $p < 0.001$). Academic isolation moderated this association (interaction $\beta = 0.201$, $p < 0.001$), such that the protective effect of PSS decreased as isolation increased. This moderating effect varied by gender, as indicated by a significant three-way interaction ($\beta = –0.097$, $p < 0.001$), with the full model explaining 31.5% of the variance in burnout ($R^2 = 0.315$). Under conditions of high academic isolation, female students exhibited a greater reduction in burnout associated with PSS than male students, whereas under low isolation, male students benefited more from PSS. **Conclusions:** These findings extend the stress-buffering hypothesis by demonstrating a gender-differentiated buffering pattern across levels of academic isolation. From a practical perspective, the results suggest that burnout prevention and support strategies in higher education should account for students' level of isolation and gender, with targeted interventions designed to strengthen effective support utilization across different student groups.

Keywords: parental social support; academic isolation; academic burnout; gender

1. Introduction

Academic burnout represents a common maladaptive state in the learning process that may hinder students from realizing their academic potential (Ghislieri et al., 2023; Yang et al., 2022). In the present study, academic burnout refers to a state of emotional exhaustion, withdrawal, and detachment that emerges when students become overwhelmed by academic difficulties and demands during learning (Jiang et al., 2024). Among university students, parental social support (PSS) constitutes a major resource that can help students cope with fatigue and strain during their studies (Kim et al., 2018). PSS refers to the emotional support that parents provide their children through their own life experience, social networks, and educational expectations (Shen et al., 2018). Empirical evidence indicates that PSS is associated with lower levels of academic burnout among college students (Ye et al., 2021), possibly because parents provide emotional guidance and supportive resources that help students interpret and manage academic challenges (Susanto, 2019). Grounded in the stress-buffering hypothesis, PSS is expected to reduce burnout by lowering threat appraisals of academic difficulties and strengthening perceived control and coping resources when students face academic stress (Cohen and Wills, 1985).

However, the strength of the "PSS–academic burnout" association may depend on the students' stress context, and in particular, their academic isolation. Within the Chinese education system, students experience a marked transition from highly structured collective learning in high school (e.g., centrally arranged evening self-study sessions) to more autonomy-oriented learning at university, where out-of-class study relies heavily on self-management (Tong and Zhou, 2023; Wolters and Brady, 2021). This transition expands the students' learning autonomy but also requires them to cope more independently with learning-related difficulties associated with self-directed study (Hutasuhut et al., 2021; Koivuniemi et al., 2017; Mickwitz et al., 2025). One salient challenge of autonomy-oriented learning is that students may experience a subjective sense of isolation arising from a perceived lack of support in learning contexts. This experience may become particularly salient following academic failure. In academic settings, such stressors may

be expressed as feeling alone in one's struggles and inadequacies, cut off from the learning community, and perceiving that others are happier or have it easier. Such experiences are conceptualized in the present study as academic isolation (Hascher and Hadjar, 2018; Wilbraham et al., 2024). Prior research suggests that academic isolation can undermine learning motivation, even contributing to academic disengagement or withdrawal in severe cases (Lawston et al., 2023). According to the stress-buffering hypothesis (Cohen and Wills, 1985), academic isolation may function as a moderator in the "PSS–academic burnout" link: greater academic isolation may reflect a stronger stress condition in which academic setbacks are more likely to be appraised as threatening, thereby conditioning how effectively PSS can alleviate burnout (Cohen and Wills, 1985). To examine whether the association between PSS and academic burnout exhibits the protective pattern predicted by the stress-buffering hypothesis across different levels of academic isolation, this study addressed the following research question: how does academic isolation moderate the relationship between PSS and academic burnout?

Beyond this two-way moderation, gender role norms may further differentiate how students perceive and utilize parental support under academic isolation. In the Chinese cultural context, gender is commonly treated as a socially situated demographic classification, dichotomized as male and female and reflecting role expectations that may accompany membership in a gendered social grouping (Fei and Li, 2025). Viewed through the lens of gendered social reproduction and the division of productive and reproductive labor, masculine norms often emphasize independence and achievement orientation, which may inhibit help-seeking in times of difficulty, whereas women are more frequently socialized toward care and emotional labor and may be more likely to mobilize relational resources under stress (Bhattacharya, 2017; Federici, 2020). Accordingly, it is these gendered norms, rather than inherent gender differences, that may shape how students respond to academic isolation. Consistent with social role theory, when academic isolation is high, male students may be more inclined to rely on self-regulation and less likely to proactively seek support, whereas female students may be more likely to access and utilize PSS as a relational coping resource. However, when isolation is low and less threatening, these constraints may be reduced and gendered patterns may shift (Koenig and Eagly, 2014; Liu et al., 2021; Vera Gil, 2024). Therefore, the moderating effect proposed above may vary across gender groups. However, such differences remain largely theoretical and require empirical examination. Accordingly, this study also addressed an additional research question: Do gender differences exist in the moderating effect of academic isolation on the relationship between PSS and academic burnout?

By addressing these two research questions, this study tests the protective pattern predicted by the stress-buffering hypothesis and extends it by examining how this buffering mechanism may differ across gender groups. The findings also offer practical implications for higher education administrators in China by informing targeted strategies to reduce academic burnout among undergraduates.

1.1 Literature Review

1.1.1 Research Hypothesis

Research has shown that the emotional support of parents can significantly reduce burnout-related symptoms in academic settings, including emotional exhaustion (Gungor, 2019; Kim et al., 2018; Ye et al., 2021). According to the stress-buffering hypothesis (Cohen and Wills, 1985), as a key external resource, PSS may suppress burnout responses—such as emotional exhaustion and disengagement—by reducing threat appraisals of academic stressors and enhancing perceived control and effective coping by the student. However, the association between PSS and academic burnout may depend on the students' level of academic isolation. Isolation is a common psychological stressor (Stafford et al., 2013). Academic isolation, as a subjective experience of disconnection within learning contexts, can similarly be conceptualized as a source of stress. According to the stress-buffering hypothesis (Cohen and Wills, 1985), when academic isolation is high, the protective effect of PSS against academic burnout may be more pronounced; when academic isolation is low, the negative association between PSS and academic burnout may be comparatively weaker. Existing research has also reported that isolation may play a moderating role between "antecedent variables–outcome variables" (Lee and Ko, 2018). For example, academic isolation–conceptualized as a perceived disconnection from the academic environment–has been found to intensify the impact of negative emotions on mental health (Wang et al., 2024). When the duration of self-isolation is considered, perceived social support has been shown to buffer the association between Coronavirus Disease 2019 (COVID-19) concerns and mental health outcomes (Szkody et al., 2021). Isolation duration has similarly moderated the negative association between social support and mental health problems (Xie et al., 2024). Based on the stress-buffering hypothesis and prior evidence, isolation-related constructs are therefore likely to function as moderators in "social support–negative outcome" models. Accordingly, we propose that academic isolation may condition the relationship between PSS and academic burnout, as outlined in our first hypothesis:

H1: Academic isolation moderates the relationship between PSS and academic burnout among university students, such that the negative association between PSS and academic burnout is stronger at higher levels of academic isolation, and weaker at lower levels of academic isolation.

Within Confucian cultural traditions and the social norms that continue to influence family life in China, Con-

fucian thought is a distinctive cultural tradition in Shandong Province, whereby boys are often expected to achieve academically and assume provider roles later in life, whereas girls are more frequently associated with caregiving responsibilities. Consequently, parents may invest more academic expectations and support in sons than in daughters (Fei and Li, 2025). Under such normative arrangements, male students may be more likely to draw confidence from parental support when facing academic difficulties (Rueger et al., 2010). In contrast, although traditional gender norms may encourage female students to express emotions and actively seek support, comparatively constrained access to supportive resources may increase their vulnerability to emotional exhaustion during times of academic adversity (Zhang et al., 2021). Moreover, as students gradually internalize these social expectations through observation and imitation, Chinese male and female college students may differ in their needs for–and interpretations of–PSS (Tong and Li, 2024). For instance, the heightened achievement expectations placed on males may lead them to experience parental support as achievement-related pressure, thereby reducing reliance on such support. On the other hand, females are socialized to value emotional connectedness, and hence may be more likely to perceive parental support as an emotional resource (Zhang et al., 2018). In addition, social role theory and related research on gender roles suggest that masculine norms emphasizing self-reliance may inhibit help-seeking under adversity, whereas feminine role expectations may make the seeking of relational support more normative (Koenig and Eagly, 2014; Liu et al., 2021). Accordingly, when academic isolation is high (i.e., under more threatening or stressful learning conditions), the protective association between PSS and academic burnout may be stronger for female students than for male students. Conversely, when academic isolation is low and thus less likely to be appraised as a salient stressor, male students may be less constrained by masculine norms and more willing to accept and utilize parental support to cope with academic challenges. Female students may also sustain engagement through existing resources and networks. Under such lower-isolation conditions, the protective effect of PSS against academic burnout may therefore be stronger for male students than for female students (Koenig and Eagly, 2014; Liu et al., 2021). Building on H1 and the norms for gender roles discussed above, we further propose the following gender-differentiated hypothesis:

H2: The moderating effect of academic isolation on the relationship between PSS and academic burnout differs by gender. The protective effect of PSS is stronger for female students under high academic isolation, whereas the support-utilization effect is stronger for male students under low academic isolation.

1.1.2 Hypothetical Model

The hypothetical model proposed in this study (Fig. 1) is grounded in the theoretical framework and logical reasoning discussed above. In this model, PSS is the independent variable, and academic burnout is the dependent variable. It is hypothesized that PSS negatively influences academic burnout. Furthermore, academic isolation is proposed to moderate the relationship between PSS and academic burnout, and this moderating effect is expected to differ by gender. Due to theoretical links, Fig. 1 includes association lines between gender and related variables such as parental social support and academic isolation.

2. Materials and Methods

2.1 Participants

This study recruited undergraduate students enrolled in universities in Shandong Province, China. As a key component of Shandong's higher education system, undergraduate institutions in this province are broadly representative in terms of student characteristics, family backgrounds (family structure heterogeneity was not assessed, including heterosexual two-parent families, single-parent families, grandparent-led households, and families with two male or two female parents), and educational resources, thereby providing a suitable basis for the present investigation. The research site was selected based on accessibility to the target population and feasibility of recruitment, as one of the authors is originally from Shandong Province and therefore had practical access to undergraduate student populations through local academic contacts. Using purposive sampling, full-time undergraduates were selected from three top-ranked, comprehensive universities in Shandong Province. This sampling strategy was adopted because students in higher-ranked universities tend to receive greater supportive resources from parents and to be more academically engaged (Wei et al., 2022), aligning with the conceptual focus of the study. Participants were required to meet the following inclusion criteria: (1) currently relying primarily on parents for financial support; (2) maintaining a stable enrollment status without a record of long-term absence; (3) not receiving systematic psychological intervention or treatment; and (4) not engaged in long-term part-time employment. To ensure a relatively balanced gender distribution, the research team implemented moderate control of the male–female ratio during recruitment. Exclusion criteria were also applied: (1) evidently inattentive responses (e.g., extremely short or excessively long completion time, repetitive same-option responding). In line with Bloodhart et al. (2019), we excluded responses completed in less than half of the sample median completion time or more than twice the median completion time, and (2) with an IP address located outside the designated sampling region. Data were collected between April 1 and April 25, 2025. An a priori power analysis using G*Power 3.1 (lin-

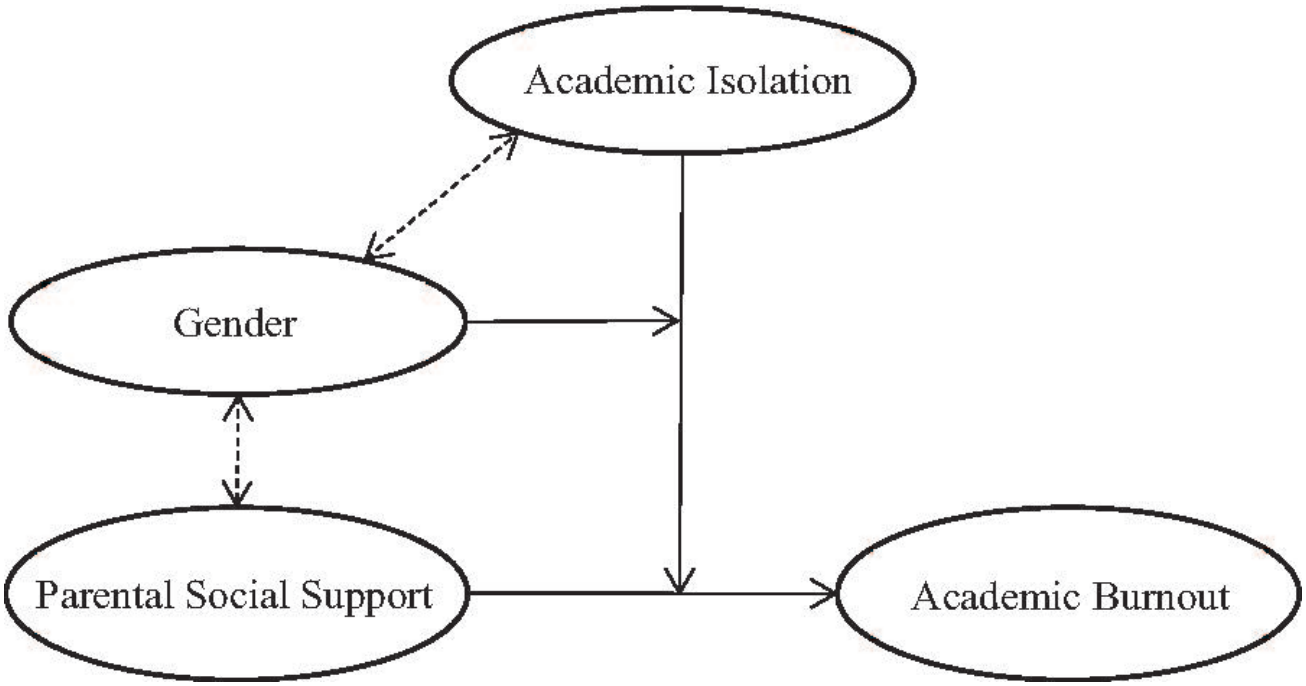

Fig. 1. Research framework diagram.

ear multiple regression: fixed model, R^2 increase; 1 tested predictor [PSS × academic isolation × gender]; total predictors = 7; $\alpha = 0.05$), assuming a small incremental interaction effect ($f^2 = 0.02$), indicated that a minimum sample of approximately N = 403 was required to achieve 80% power (Faul et al., 2009). With the assistance of faculty counselors, the survey link was distributed to class-based online groups, along with a brief description of the study. Participants provided online informed consent before completing the questionnaire. Participation was voluntary, and all personal information was kept strictly confidential. To increase the response rate, each participant who completed the survey received a small campus stationery gift pack as a token of appreciation. A total of 1500 questionnaires were distributed. After excluding invalid responses, 970 valid questionnaires were retained, yielding an effective response rate of 64.67%. In total, 530 cases were removed due to failure to meet inclusion criteria or meeting exclusion criteria. Based on self-reported information, 27 cases were excluded for not primarily relying on parental financial support, 10 for reporting long-term absence, and 15 for reporting long-term part-time employment. In addition, 457 cases were excluded for evidently inattentive responses, and 21 cases because their IP addresses were outside the sampling region. The demographic characteristics of participants are reported in Table 1.

2.2 Materials

Before the survey was administered, all instruments were examined for cross-cultural suitability among Chinese university students. The three scales–PSS, academic isolation, and academic burnout–were first translated from English into Chinese by two bilingual researchers. A separate bilingual translator then performed back-translation, after which all translators reached a consensus regarding the cultural appropriateness of the Chinese versions. Finally, we conducted cognitive interviews with 15 undergraduate students in Shandong Province to further ensure the clarity and comprehensibility of the item wording (Brislin, 1970). This study assessed three constructs and one demographic characteristic. All construct measures were rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), whereas the demographic characteristic was assessed using a dichotomous response format. The instruments are described as follows:

(1) *Parental Social Support*: PSS was assessed using eight parent-related support items adapted from the literature (Yang et al., 2023; Yeh et al., 2008). An explanation is provided to clarify the intent of these items: "The following questions focus on the support you received from your parents for your college studies". For example: "When I need help, my parents help me analyze the ins and outs and possible reasons".

(2) *Academic Isolation*: Academic isolation was assessed using four items from the Isolation subscale of the Self-Compassion Scale (Neff, 2003). An explanation was provided to clarify the intent of the items: "The following questions focus on your feelings during independent study at university, especially feeling left out". For example: "When I fail at something that is important to me, I tend to feel alone in my failure".

Table 1. Basic information on participants.

Feature variable	Project description	Sample size	Percentage (%)
Gender	Male	488	50.3
	Female	482	49.7
Grade	Freshman	367	37.8
	Sophomore	209	21.5
	Junior	168	17.3
	Senior	226	23.3

(3) *Academic Burnout*: Academic burnout was assessed using a 15-question questionnaire (Schaufeli et al., 2002), which also included an explanation to clarify the intent of the questions: "The following questions focus on your learning experiences during your university studies". For example: "I feel emotionally drained by my studies".

(4) *Gender*: Gender was measured as a demographic variable and coded as 1 = male, and 2 = female.

2.3 Analysis Methods

This study utilized AMOS 21.0 software (IBM Corp., Armonk, NY, USA) to perform confirmatory factor analysis (CFA), thereby confirming the reliability and validity of the measurement instruments. Model fit in CFA was evaluated using $\chi^2/df < 5$, comparative fit index (CFI)/incremental fit index (IFI)/normed fit index (NFI) ≥0.90, goodness-of-fit index (GFI) ≥0.85, and root mean square error of approximation (RMSEA) ≤0.08 (Hair et al., 2010). Items were retained when standardized factor loadings ≥0.50 and error variances were positive and significant. Univariate normality was assessed by |skewness| ≤2 and |kurtosis| ≤7, and multivariate normality by Mardia's coefficient <p(p+2) (Hair et al., 2010). Internal consistency was considered acceptable at Cronbach's α ≥ 0.70 and CR ≥0.70, and convergent validity when AVE ≥0.50 (Fornell and Larcker, 1981; Streiner, 2003). Discriminant validity was supported when the 95% CI of inter-factor correlations did not include 1.00 (Rönkkö and Cho, 2022). Moderation analyses in PROCESS were evaluated using bootstrap confidence intervals, with effects considered significant when the 95% bootstrap CI did not include zero (two-tailed $p < 0.05$) (Arain et al., 2020; Clement and Bradley-Garcia, 2022).

2.4 Measurement Model

Reliability and validity analyses of the measurement model for PSS, academic isolation, and academic burnout were conducted using AMOS 21.0 (IBM Corp., Armonk, NY, USA) and SPSS 21.0 software (IBM Corp., Armonk, NY, USA). The model comprised 27 items, as summarized in Table 2. The results indicated a good model fit (χ^2/df = 3.718, CFI = 0.945, GFI = 0.899, RMSEA = 0.053), with all indices meeting the recommended thresholds. All item factor loadings exceeded 0.58 and were statistically significant, while all error variances were positive and significant. The data met univariate and multivariate normality requirements (Mardia's coefficient = 134.702). Reliability analysis showed that Cronbach's α values for all constructs were >0.80, composite reliability (CR) values were all >0.70, and average variance extracted (AVE) values were all >0.50, indicating strong internal consistency and convergent validity. For discriminant validity, the correlation intervals among latent variables did not include 1.00, indicating effective differentiation between constructs. Overall, the measurement model demonstrated satisfactory reliability, validity, and fit. The 27 items were therefore retained for subsequent hypothesis testing.

3. Results

PSS was weakly correlated with academic isolation ($r = -0.195$, $p < 0.001$) and moderately correlated with academic burnout ($r = -0.498$, $p < 0.001$). Academic isolation showed a weak correlation with academic burnout ($r = 0.081$, $p < 0.05$). Gender was weakly correlated with PSS ($r = -0.139$, $p < 0.001$), academic isolation ($r = 0.171$, $p < 0.001$), and academic burnout ($r = 0.160$, $p < 0.001$). This study tests Hypotheses 1 and 2 using Models 1, 2, and 3 presented in Table 3. In Model 1, only PSS was included. The results indicate that PSS significantly reduced students' academic burnout ($\beta = -0.498$, $p < 0.001$, $R^2 = 0.248$).

3.1 The Moderating Role of Academic Isolation

The addition of the interaction term "PSS × academic isolation" to Model 1 resulted in Model 2, which showed a significant interaction ($\beta = 0.201$, $p < 0.001$). Moreover, the explanatory power of the model increased from R^2 = 0.248 to R^2 = 0.296 (ΔR^2 = 0.048, ΔF (2, 966) = 32.93, $p < 0.001$). Simple slope analysis indicated that academic burnout generally decreases as PSS increases, with a steeper decline observed under conditions of low academic isolation. In contrast, the decline in burnout is more gradual under high academic isolation. In other words, the higher the level of academic isolation, the weaker the protective effect of PSS, whereas lower academic isolation strengthens this protective effect (Fig. 2). Therefore, these results support H1, suggesting that academic isolation moderates the relationship between PSS and academic burnout.

Table 2. Reliability and validity indicators.

Model fit: χ^2 = 1193.473, $p < 0.001$, χ^2/df = 3.718, GFI = 0.899, CFI = 0.945, NFI = 0.926, IFI = 0.945, PNFI = 0.847 (all >0.8), RMSEA = 0.053 (<0.08)
Factor loading: 0.727−0.808, 0.726−0.817, 0.580−0.800 (all >0.500)
Error variance: 18.83%, 32.15%, 33.63% (all were positive and significant)
Correlations: −0.224, −0.536, 0.106
Univariate normality: skewness (0.539 ≤ values ≤ 0.840) (all absolute value) <2, kurtosis (0.017 ≤ values ≤ 0.343) (all absolute value) <7
Multivariate normality: Mardia's coefficient = 134.702 < 783 (calculated as p (p+2), where p is the number of measurement items)
Item consistency: Cronbach's α—0.914, 0.865, 0.945 (all >0.8)
Convergent validity: CR—0.914, 0.865, 0.945 (all >0.7); AVE—0.572, 0.616, 0.538 (all >0.5)
Discriminant validity: Confidence interval [−0.303, −0.146], [−0.596, −0.468], [0.024, 0.191] (all did not include 1)
Notes1: Variables from left to right are PSS, academic isolation, and academic burnout. The pairwise relationships from left to right are PSS and academic isolation, PSS and academic burnout, and academic isolation and academic burnout.
Notes2: CR, composite reliability; AVE, average variance extracted; CFI, comparative fit index; GFI, goodness-of-fit index; NFI, Normed Fit Index; IFI, Incremental Fit Index; PNFI, Parsimony-Adjusted Normed Fit Index; RMSEA, root mean square error of approximation; χ^2, chi-square; χ^2/df, normed chi-square; PSS, parental social support.

Table 3. Hierarchical regression analysis of the influence of gender and social support on Academic Burnout.

Variable	Academic burnout		
	Model 1	Model 2	Model 3
	β	β	β
Independent variable			
Parental social support	−0.498***	−0.471***	−0.440***
Academic isolation		−0.028	−0.064
Gender			0.078**
Two-way interaction term			
Parental social support × Academic isolation		0.201***	0.204***
Parental social support × Gender			0.003
Gender × Academic isolation			−0.030
Three-way interaction term			
Parental social support × Academic isolation × gender			−0.097***
R	0.498	0.544	0.562
R^2	0.248	0.296	0.315
F	318.438	135.284	63.285

Notes: ***$p < 0.001$, **$p < 0.01$.

3.2 Testing the Moderating Effect of Gender on the Relationship Between "PSS × Academic Isolation → Academic Burnout"

Model 3 was constructed by adding gender, all lower-order terms, and the three-way interaction term "PSS × academic isolation × gender" to Model 2. The three-way interaction significantly predicted academic burnout (β = −0.097, $p < 0.001$), with model explanatory power increasing from $R^2 = 0.296$ to $R^2 = 0.315$ ($\Delta R^2 = 0.019$, $\Delta F(3, 962) \approx 8.89$, $p < 0.01$). These results indicate that gender moderates the relationship between PSS and academic burnout. Accordingly, the findings support H2, suggesting that gender moderates the moderating effect of academic isolation on the relationship between PSS and academic burnout.

To further analyze the moderating pattern of the three-way interaction between "PSS × academic isolation × gender", this study conducted simple slope analysis of PSS on academic burnout. PSS was treated as a continuous independent variable, and slopes were estimated at both high (+1 SD = 1) and low (−1 SD = −1) levels of academic isolation, and separately for male (Gender = 1) and female (Gender = 2) participants.

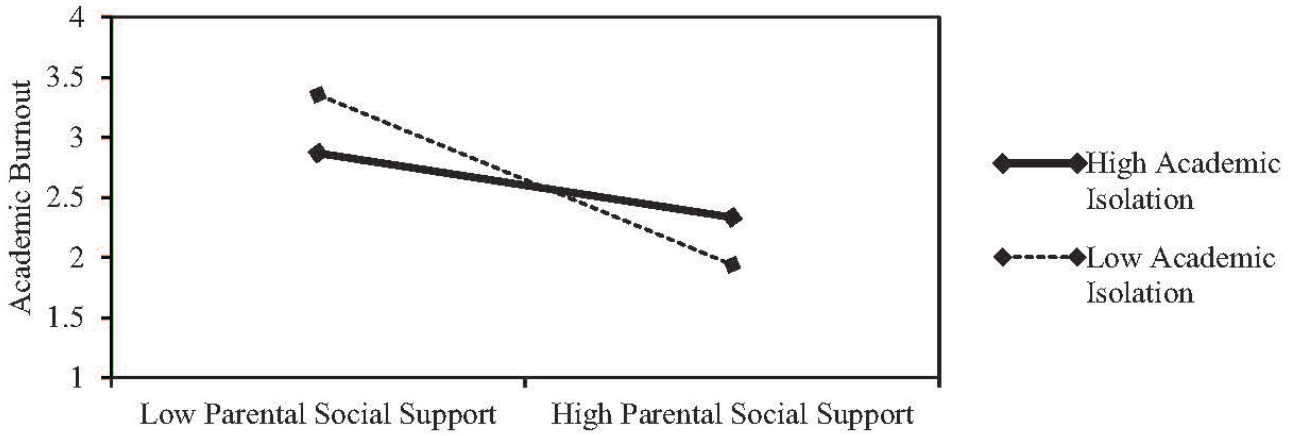

Fig. 2. Two-way interaction diagram. *Note*: Under conditions of high academic isolation, this downward trend was relatively modest, whereas under conditions of low academic isolation, academic burnout declined more steeply as PSS increased.

Table 4. Simple slopes of parental social support predicting academic burnout.

	Slope (1)	Slope (2)	Slope (3)	Slope (4)
	High Isolation = 1 Gender = 1	High Isolation = 1 Gender = 2	Low Isolation = −1 Gender = 1	Low Isolation = −1 Gender = 2
β	−0.143*	−0.332***	−0.743***	−0.543***

Notes: ***$p < 0.001$, *$p < 0.05$; 1 = Male; 2 = Female.

As shown in Fig. 3 and Tables 4 and 5, under conditions of high academic isolation, PSS significantly reduces academic burnout for both males ($\beta = -0.143$, $p < 0.05$) and females ($\beta = -0.332$, $p < 0.001$). Comparing the effects across genders under high academic isolation revealed that the slope for males was significantly less than that for females (slope difference = 0.189, $p < 0.05$). This indicates that at higher levels of academic isolation, PSS is more effective at alleviating academic burnout among female students than among male students. Among students experiencing low academic isolation, PSS exerts a significant negative effect on academic burnout in both females ($\beta = -0.543$, $p < 0.001$) and males ($\beta = -0.743$, $p < 0.001$). Comparisons under low academic isolation showed that the slope for females was significantly less than that for males (slope difference = −0.200, $p < 0.05$). This suggests that at low levels of academic isolation, PSS is more effective at reducing academic burnout among male students than among female students.

Table 5. Comparison of the simple slopes of the three-way interaction.

Pair of slopes	Slope difference (β)	95% Confidence interval
(1) and (2)	0.189*	[0.028, 0.438]
(3) and (4)	−0.200*	[–0.459, –0.061]

Notes: *$p < 0.05$; (1) = male+high academic isolation; (2) = female+high academic isolation; (3) = male+low academic isolation; (4) = female+low academic isolation.

4. Discussion

This study examined whether academic isolation moderates the association between PSS and academic burnout among undergraduate students (H1), and whether this moderating effect differs by gender (H2).

The results for H1 indicate that academic isolation moderates the association between PSS and academic burnout, lending support to the broader proposition that isolation-related constructs can operate as moderators in "social support–negative outcome" models (Song et al., 2025). Specifically, under low academic isolation, academic burnout decreased substantially as PSS increased, suggesting that perceived parental support can meaningfully reduce burnout when students experience relatively favorable learning conditions. The magnitude of this protective association was comparatively modest under high academic isolation, although increases in PSS were still associated with lower burnout. This pattern implies that the benefits of PSS may be constrained when students experience stronger isolation-related stressors. Notably, this moderating pattern runs counter to the stress-buffering hypothesis, which would predict a stronger protective effect of support under higher stress (Cohen and Wills, 1985). One plausible interpretation is that in high-stress contexts indexed by high academic isolation, parental support may be less salient or less "usable" for addressing academic strain than theory would suggest. Low academic isolation, in contrast, may reflect a more supportive learning environment in which students can more effectively translate PSS into

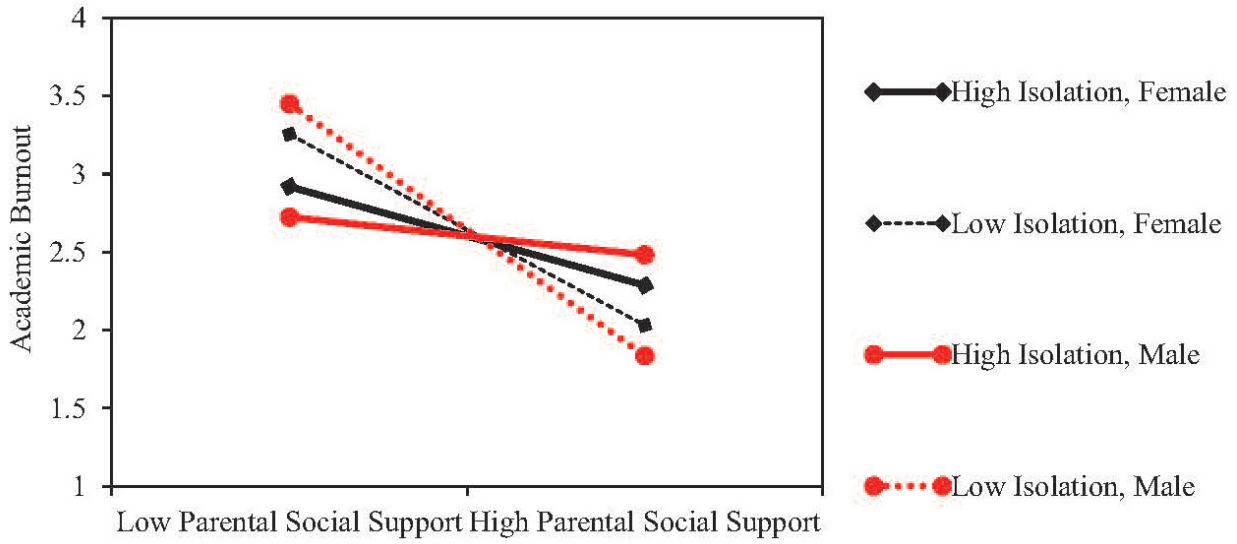

Fig. 3. Three-way interaction diagram. *Note*: Under high academic isolation, parental support was more effective at reducing burnout among female students, whereas under low academic isolation, its protective effect was more pronounced among male students.

academic coping. University settings that provide supportive structures (e.g., mentoring systems) may help students build academic skills and confidence (Zhang et al., 2025), facilitating a smoother transition from collective learning to independent learning (Li, 2022). In such contexts, parental support may synergize with institutional resources to reduce burnout. Moreover, flexible institutional arrangements may be particularly important for students balancing substantial family responsibilities, helping them to sustain academic participation and engagement (Yuebo et al., 2023). Conversely, high academic isolation may reflect difficulties in adjustment and a perceived lack of academic support within the university environment (Worsley et al., 2021), potentially exacerbated by the absence of mentoring or other supportive institutional resources (Crawford et al., 2024). Under such conditions, PSS may be less effective because it is constrained by distance, limited opportunities for academic co-regulation, or a reduced fit between the support provided and the academic demands faced by students. From a loneliness-focused perspective, high academic isolation may involve a heightened sense of being "on one's own" in the learning environment, which can undermine the students' ability to perceive and utilize available support, even when such support nominally increases (Hawkley and Cacioppo, 2010; Wilbraham et al., 2024). Importantly, for students from single-parent or socioeconomically vulnerable families, limited parental support may reflect structural constraints rather than unwillingness (Zhang, 2020). Taken together, these findings suggest the stress-buffering hypothesis may have limitations in explaining support processes under high academic isolation (Cohen and Wills, 1985). Furthermore, they highlight high academic isolation as a salient risk context that warrants targeted attention in higher education practice and policy.

The results for H2 indicate that the moderating effect of academic isolation on the association between PSS and academic burnout differs by gender. Specifically, under high academic isolation, increases in PSS were associated with a more pronounced reduction in academic burnout among female students than among male students. This pattern is consistent with social role theory, which suggests that masculine norms may discourage help-seeking from parents under high-stress conditions, thereby weakening the protective effect of PSS for male students. In contrast, although Chinese parents may invest fewer achievement-related resources in daughters due to a preference to support the achievements of males (Fei and Li, 2025), women socialized under traditional gender norms that emphasize emotional connectedness may be more likely to perceive and access PSS as a meaningful resource. This interpretation also aligns with evidence that women may respond to social expectations by relying more on relational resources (Koenig and Eagly, 2014; Liu et al., 2021; Zhang et al., 2018), and may be more inclined to adopt interpersonal strategies such as seeking the support of others when regulating emotions (Zhao et al., 2023). However, under low academic isolation, increases in PSS predicted a steeper decline in academic burnout among male students than among female students. This suggests that when parental support is readily available and the learning context is more favorable (i.e., lower isolation), male students are better able to translate PSS into effective emotional resources, resulting in a greater reduction in burnout. In contrast, the magnitude of burnout reduction among female students was comparatively smaller under low isolation. Taken together, these findings demonstrate that PSS is generally protective against academic burnout, but its protective association is jointly determined by academic isolation and gender, with

the effect being stronger for females under high academic isolation, but stronger for males under low academic isolation. This gender-differentiated pattern highlights how academic isolation affects the "PSS–academic burnout" association differently across male and female student groups.

4.1 Theoretical Implications

Drawing on the stress-buffering hypothesis (Cohen and Wills, 1985), we first posited that PSS would protect students against academic burnout. The results showed that this protective association was stronger under low academic isolation and weaker under high academic isolation. One plausible explanation is that students experiencing high academic isolation are often struggling to adapt to the shift toward independent learning and may feel that "no one can help" with academic difficulties experienced in the university environment. In such circumstances, parental support may be constrained by physical distance and limited opportunities to discuss specific academic problems, reducing the capacity to address the students' immediate learning challenges and thus weakening the burnout-alleviating effect of PSS. To account for this discrepancy, we draw on the loneliness theory (Hawkley and Cacioppo, 2010), which suggests that isolation can undermine the sense that one has "someone to rely on", thereby diminishing the practical utility of available support. Collectively, these findings refine the boundary conditions of the stress-buffering hypothesis. In addition, they highlight that when academic isolation is conceptualized as a stress context, buffering processes should be interpreted alongside institutional support structures and the students' adjustment to independent learning.

Building on the above moderating pattern and integrating gender role norms emphasized in social role theory (Fei and Li, 2025; Koenig and Eagly, 2014), we also examined whether this moderation differs by gender. Our findings indicate that under high academic isolation, increases in PSS were associated with a steeper decline in academic burnout among female students than among male students, whereas the pattern was reversed under low academic isolation. This gender-differentiated moderation extends the stress-buffering framework by demonstrating that buffering may operate differently across male and female student groups, highlighting the value of incorporating a gender lens in support–stress research in educational contexts. Future studies on isolation in education may build upon the present moderation model to clarify the role of academic isolation and its gender implications in shaping students' burnout risk and support processes.

4.2. Practical Implications

The present findings show that under high academic isolation, increases in PSS were associated with a more pronounced decline in academic burnout among female students than among male students, whereas under low academic isolation, this pattern was reversed. Such gender-asymmetric patterns are unlikely to reflect gender per se, but could instead be shaped by multiple sociocultural forces, including culturally embedded role norms and gendered expectations. For example, within Confucian-influenced traditions, boys are often expected from an early age to "succeed and provide for the family", whereas girls are more frequently associated with caregiving and family dedication. Such norms may contribute to daughters receiving fewer parental support resources than sons (Fei and Li, 2025). Accordingly, Chinese universities should adopt gender-sensitive strategies to mitigate academic burnout. Institutions should be attentive to identifying female students who may be at risk, while ensuring they have access to parental support where possible. Furthermore, universities should provide structured institutional support—such as mentoring systems (e.g., peer mentoring)—to help female students develop self-directed learning skills and gradually strengthen academic autonomy (Xu et al., 2023). For male students, masculine role norms may discourage help-seeking in stressful situations, leading them to rely more on independent problem-solving and less on parental support. While respecting these role expectations, universities should also create environments that foster adaptive autonomy and facilitate help engagement. For instance, they could use peer mentoring to support male students coping with academic difficulties associated with high academic isolation (Yu et al., 2023). Universities should also promote gender equality by deconstructing traditional gender-role expectations that constrain students from seeking help and developing autonomy. Normalizing help-seeking engagement and self-directed learning for all students, regardless of gender, and may prevent institutional support from inadvertently reinforcing stereotypes.

4.3 Limitations and Future Directions

This study has several limitations. First, because it employed a cross-sectional design, no causal inferences can be drawn. Although the three-way interaction reached statistical significance, the explained variance increased only modestly from $R^2 = 0.296$ to $R^2 = 0.315$ ($\Delta R^2 \approx 0.019$), indicating a small effect size. This suggests that gender plays a statistically detectable but limited moderating role in the proposed model. One possible interpretation is that gender role differentiation within the Confucian-influenced cultural context of Shandong is still present, but its influence is diminishing. Future research could compare undergraduates in Shandong with those from other provinces where Confucian cultural traditions are less salient. This should help to determine the generalizability of gender role norms and their implications for support processes.

Second, because the online survey was distributed uniformly through class-based group channels, some students may have responded primarily to obtain the incentive, contributing to a relatively high proportion of inattentive responses. In future studies, data quality may be improved

by adopting offline administration procedures and incentive designs that reduce satisficing.

Third, academic burnout may be one reason why Chinese university students are at risk for course avoidance and dropout. Future research could incorporate behavioral outcomes such as class absenteeism and withdrawal intentions (or actual dropout) to extend the model and strengthen its practical relevance.

Fourth, this study did not control for potentially important covariates such as academic major/discipline and family socioeconomic status, which may affect the robustness of the observed relationships. Inclusion of these factors in future work may improve model precision and explanatory power.

Fifth, because there is no established instrument to specifically measure academic isolation, this study used an academic-context instruction aligned with the conceptual definition of academic isolation, and adapted four items from the Isolation subscale of Neff's (2003) measure. Future research should further develop and validate a dedicated scale for academic isolation, building on these items and refining them for academic contexts.

Finally, when examining PSS, this study did not consider the heterogeneity of family structures (e.g., heterosexual two-parent families, single-parent families, grandparent-led households, or families with two male or two female parents). Future studies should more explicitly examine diverse sources and configurations of PSS to better capture the plurality of family realities.

5. Conclusions

This study found that academic isolation moderates the association between PSS and academic burnout among Chinese undergraduate students, and that this moderating effect differs by gender. Specifically, under high academic isolation, the protective effect of PSS against academic burnout was notably stronger for female students than for male students. In contrast, under low academic isolation, the protective effect of PSS was stronger for male students than for female students. Practically, universities should adopt gender-sensitive and context-responsive strategies to address academic burnout. For female students, institutions should be sufficiently attentive to identify those at risk, ensure access to parental support where possible, and assist students in gradually developing academic autonomy. For male students, universities should respect masculine role norms while creating an environment that fosters adaptive autonomy and supports effective coping in academic contexts.

Availability of Data and Materials

The data and materials used in this study are available from the corresponding author on request.

Author Contributions

HY: Conceptualization, data curation, software, investigation, formal analysis, methodology, validation, resources, visualization, writing–original draft, writing–review and editing. DY: Conceptualization, project administration, supervision, writing–review and editing. Both authors read and approved the final manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

As this study used anonymous questionnaires, formal ethical approval was not required, in accordance with the relevant Chinese regulation: https://www.gov.cn/zhengce/zhengceku/2023-02/28/content_5743658.htm. All methods in our study followed the guidelines and regulations of the Declaration of Helsinki. All participants voluntarily signed the informed consent form.

Acknowledgment

Not applicable.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflicts of interest.

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