The effect of major identity on depression among Chinese university students: A moderated mediation model

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ABSTRACT

The mechanisms and boundary conditions through which major identity affects university students' depression remain unclear. To fill this gap, the present study aimed to examine the relationship between major identity and university students' depression, revealing the mediating role of self-esteem in this relationship and the moderating role of perceived social support. A total of 436 Chinese university students participated in this study. The results showed that major identity was significantly and negatively related to depression and significantly and positively related to self-esteem. Self-esteem was significantly and negatively related to depression. Self-esteem mediated the relationship between major identity and university students' depression. Perceived social support not only moderated the relationships between major identity and university students' depression but also moderated the relationship between self-esteem and university students' depression. In addition, perceived social support moderated the mediating effect of self-esteem between major identity and university students' depression. The theoretical and practical implications of this study are discussed in depth.

1. Introduction

In the field of identity studies, scholars have extensively explored various forms of identity, including ethnic identity, national identity, and professional identity, as well as their impact on individual development (Cavdar et al., 2021; Wang et al., 2020; Zhou et al., 2025). However, there has been limited research on major identity among university students. Major identity refers to the extent to which students identify with and accept the values, norms, and goals of their majors, reflecting the degree of fit between students and their majors (Wang et al., 2023). Distinct from other forms of identity, major identity focuses primarily on students, emphasizing their identification with the major they study during their educational stage, and is typically confined to the cognitive and affective connections formed during the academic stage. Major identity is a positive psychological state that students gradually develop as they study their majors, which profoundly influences their self-efficacy, academic achievement, and employment tendency (Li & Ren, 2022; Wang et al., 2023). At the same time, this psychological state also largely affects students' mental health issues, such as depression (JI et al., 2020). However, the connection between major identity and depression among university students has not been

fully examined. It is still not clear how major identity affects depression, which highlights important research gaps that need to be filled.

In recent years, university students' depression has been widely reported globally (Milic et al., 2020; Sun et al., 2020). This problem has attracted the attention of scholars worldwide, particularly in China. A meta-analysis involving 32,694 students found that the overall prevalence of depression among Chinese university students reached 23.8 % (Lei et al., 2016). Depression is a mental disorder characterized by sadness and negative emotions (Almeida et al., 2023), with common symptoms including low mood, physical fatigue, psychological anxiety, sleep disorders, and loss of appetite (Conejero et al., 2018; Niu et al., 2023). Major identity may be an important factor influencing university students' depression. In China, an underdeveloped student career planning system and parental expectations for stable careers significantly limit students' autonomy in selecting their majors. Students compelled to choose parentally favored popular majors or unfamiliar fields often experience substantial identity conflicts and academic pressure. When students have a low sense of identity with their majors, they tend to perceive a gap between their current major and their desired one. This gap weakens students' sense of belonging to their majors, creating feelings of alienation and dissonance. As these feelings intensify,

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students' self-efficacy may decline, accompanied by an increase in academic burnout, which may ultimately lead to depression.

Meanwhile, research has found that factors such as career identity and ethnic identity were significantly and negatively associated with depression (Bae et al., 2020; Marks et al., 2023). Therefore, there may also be a strong relationship between major identity and university students' depression in China. Moreover, according to social identity theory, an individual's identification with their major and organization contributes to enhancing self-evaluation and satisfying self-esteem needs. The effect of self-esteem, as a fundamental aspect of an individual's self-evaluation, on depression has been widely studied (Kim et al., 2022). Negative self-perceptions and evaluations constitute significant components of depression. Thus, self-esteem may play a mediating role between major identity and university students' depression. Further research has demonstrated that students' perceived social support significantly increases their professional identity (Zhao et al., 2023) and self-esteem (Li et al., 2018) while effectively reducing anxiety and depression levels (Zhao et al., 2022), thus contributing to overall psychological health. Based on this logic, social support may moderate the relationship between major identity, self-esteem, and depression.

In summary, previous studies have paid limited attention to university students' major identity and the mechanisms and boundary conditions through which it influences depression. Therefore, the present study aims to examine the relationship between major identity and Chinese university students' depression and to reveal the mediating role of self-esteem between them, as well as the moderating role of perceived social support in the mediation model. This study makes important theoretical contributions. First, by focusing on university students' major identity and exploring its relationship with depression, it could contribute to the broader literature on identity and depression. Second, this study fills a critical gap in understanding how major identity, self-esteem, and perceived social support influence university students' depression. By exploring these influences, this study could offer valuable insights into strategies for alleviating university students' depression.

2. Literature review and hypotheses

2.1. Major identity and university students' depression

Major identity refers to learners' emotional acceptance and acknowledgment based on their knowledge and understanding of the major they are studying, as well as their positive outward behavior (Ji & Anqi, 2023). Major identity has a significant impact on people's emotions, thoughts, and behavior (Wang et al., 2023), but few studies have examined the effects of university students' major identity on their depression. It is well known that a high level of major identity enhances students' learning and development (Li & Ren, 2022; Wang et al., 2023). However, when students have a low level or lack of identity with their majors, they struggle to adapt to their majors and may be unable to cope effectively when facing academic challenges. This discrepancy between their ideal selves and their actual major choices, along with the frustration they experience during the learning process, can exacerbate psychological stress, thereby increasing the risk of depression. Additionally, Zhang, Sun, and Mei (2023) investigated 368 Chinese art education university students and found that professional identity was not only significantly and negatively correlated with depression but also indirectly influenced depression through academic emotions. A study by Boyd et al. (2024) demonstrated a direct and negative correlation between ethnic identity and depression among Black men. Therefore, based on the preceding analysis, the following hypothesis is proposed:

H1. : Major identity is significantly and negatively related to university students' depression.

2.2. Mediating effect of self-esteem

Self-esteem refers to an individual's subjective evaluation of their own value and competence, reflecting the extent to which an individual perceives, accepts, and respects themselves (Szcześniak et al., 2021). From the perspective of social identity theory, major identity allows students to feel connected to a particular major group, and this sense of belonging enhances their pride and self-worth in the major they are studying. When students identify with their majors, they often regard them as a core component of their self-concept, believing that their major reflects their abilities, interests, and values. This belief leads to a positive evaluation of their own choices and abilities, thereby enhancing their self-esteem. Yu et al. (2022) found that school identity was significantly and positively related to medical students' collective self-esteem. Zhao and Ngai (2022) showed that adolescents' ethnic identity was significantly and positively associated with their self-esteem. Therefore, there may be a strong correlation between university students' major identity and their self-esteem. Meanwhile, self-esteem is widely recognized as an important antecedent factor influencing university students' depression (Ho et al., 2023; Jiang & Zhang, 2023; Zhang, Peng, et al., 2023). Students with high self-esteem tend to evaluate their values and abilities positively, perceive themselves more favorably, and cope more effectively with stress and challenges, leading to fewer negative emotions. In contrast, students with low self-esteem are more likely to engage in self-skepticism and negative self-appraisal, which increases the risk of depression. Xiao and Zheng (2022) found that self-esteem not only significantly and negatively affected depression among Chinese junior high school students but also mediated the association between parental phubbing and depression. Landa-Blanco et al. (2024) showed that self-esteem was significantly and negatively associated with university students' depression. Therefore, based on the above analysis, the following hypotheses are proposed:

H2a. : Major identity is significantly and positively related to university students' self-esteem.

H2b. : Self-esteem is significantly and negatively related to university students' depression.

H2c. : Self-esteem mediates the relationship between major identity and university students' depression.

2.3. Moderating effect of perceived social support

Social support refers to specialized help, support, and resources given by others. Perceived social support can be defined as an individual's expectations and evaluations of social support, including beliefs about the possibility of receiving such support (Barrera Jr, 1986). When university students perceive more support from teachers, parents, and friends, they access valuable resources, including self-efficacy (Jia & Wang, 2024) and psychological resilience (Hou et al., 2024), to cope with the problems and challenges they face in their studies and lives. Therefore, social support contributes to enhancing students' sense of identity and positive self-evaluation (Peng et al., 2025) while reducing negative emotions (Yang et al., 2023) by providing emotional support, practical help, and positive feedback. Research showed that social support significantly and positively affected students' professional identity (Sun et al., 2024) and self-esteem (Shu et al., 2022), while significantly and negatively affecting their depression (Yichen & Chuntian, 2024). From this perspective, social support largely strengthens the positive relationship between university students' major identity and self-esteem while weakening the negative relationship between major identity, self-esteem, and their depression. Furthermore, in a study involving 512 Chinese undergraduate music students, Jiang and Zhu (2024) found that peer relationships positively moderated the relationship between professional identity and psychological resilience. Huang et al. (2022) showed that peer relationships positively moderated

the negative relationship between self-esteem and adolescent depression. Therefore, based on the above analysis, the following hypotheses are proposed:

H3a. : Perceived social support moderates the relationship between major identity and university students' depression.

H3b. : Perceived social support moderates the relationship between major identity and university students' self-esteem.

H3c. : Perceived social support moderates the relationship between self-esteem and university students' depression.

H3d. : Perceived social support moderates the mediating effect of self-esteem on the relationship between major identity and university students' depression.

Based on the above hypotheses, this study proposes a research framework (see Fig. 1).

3. Method

3.1. Participants

The questionnaires were distributed to university students via an online platform using random sampling. Before the formal distribution of the questionnaire, the study calculated the required sample size using G*Power 3.1.9.7 software to ensure the scientific and statistical validity of the findings. Specifically, a two-tailed test was selected for the analysis, the F-test was chosen for the test family, the effect size (f^2) was set at 0.15, the significance level (α) at 0.05, the statistical power (1-β) at 0.95, and the number of predictors was 14, including interaction terms for major identity, self-esteem, and perceived social support, as well as control variables (gender, age, and grade). The results indicated that a minimum sample size of 194 was necessary to meet the statistical requirements for this study.

The participants in this study were Chinese university students studying in China without restrictions on gender, age, or grade to enhance representativeness and generalizability. To enhance data accuracy and validity, a rigorous questionnaire screening process was implemented. During data collection, questionnaires with substantial missing data were excluded. Response patterns were then examined, and participants who consistently selected the same option across multiple questions or provided illogical responses were classified as low-quality data and removed. Additionally, to prevent careless responses, a completion time threshold was established. Questionnaires completed in an implausibly short time (e.g., less than two minutes) were considered

invalid and excluded.

A total of 441 university students completed the questionnaire voluntarily and anonymously with informed consent. After screening, 436 valid questionnaires were collected, resulting in an effective recovery rate of 98.87 %. The sample consisted of 64 (14.68 %) males and 372 (85.32 %) females. Among the participants, 238 (54.59 %) were aged between 18 and 20, 107 (24.54 %) were aged between 20 and 22, 42 (9.63 %) were aged between 22 and 24, and 49 (11.24 %) were aged between 24 and 26. In terms of academic year, there were 74 freshmen (16.97 %), 269 sophomores (61.70 %), 63 juniors (14.45 %), and 30 seniors (6.88 %).

3.2. Measures

3.2.1. Major identity

Major identity was measured using the Professional Identity Scale developed by Lammers et al. (2013). The wording of the scale's questions was modified to ensure cultural appropriateness in the Chinese context. The scale comprises four items, such as "My values are very similar to my major values," "I see my major problems as my problems," and "I find it easy to identify with my major." The scale was scored on a 5-point Likert scale, ranging from "1 = completely disagree" to "5 = completely agree," with higher scores indicating higher levels of major identity. The results of the validated factor analysis showed that $\chi^2/df = 1.91$, RFI = 0.98, TLI = 0.99, and RMSEA = 0.05. In addition, the Cronbach's alpha for the scale was 0.82, indicating good validity and reliability.

3.2.2. Depression

The depression scale developed by Andresen et al. (1994) was used to assess depression among Chinese university students. The scale comprises 10 items, including statements such as "I can't concentrate on things," "I feel depressed from time to time," and "I feel lonely." The scale was scored on a 5-point Likert scale, ranging from "1 = completely disagree" to "5 = completely agree," with higher scores indicating higher levels of depression. The results of the validated factor analysis showed that $\chi^2/df = 2.61$, RFI = 0.95, TLI = 0.97, and RMSEA = 0.06. In addition, the Cronbach's alpha for the scale was 0.92, indicating good validity and reliability.

3.2.3. Self-esteem

The self-esteem was assessed using the Self-Esteem Scale developed by Rosenberg (1965). The scale comprises 10 items, such as "I feel that I have a lot of good qualities," "I am positive about myself," "Overall, I am satisfied with myself," and "I can do things as well as many people can
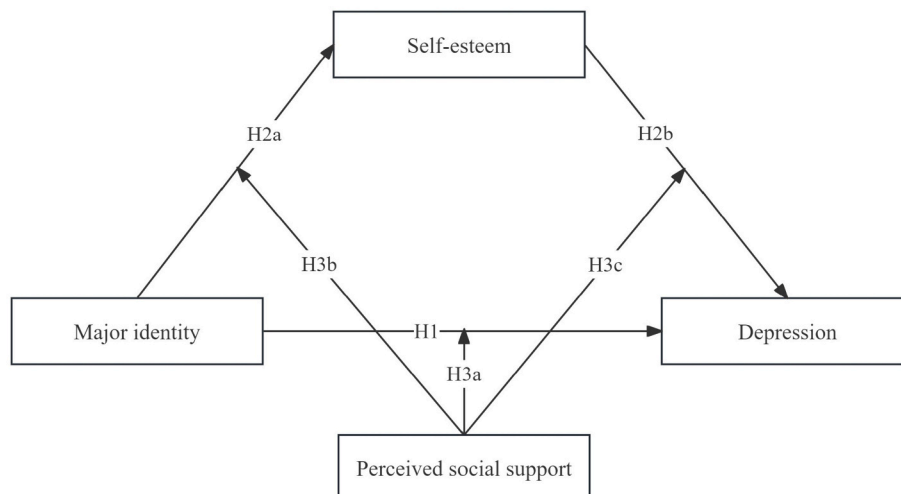

Fig. 1. Research framework.

do them." In the original scale, the eighth item was reverse-scored. However, due to cultural differences between China and Western countries, Lumei (2006) suggested assessing it positively in the Chinese cultural context. Consequently, the item was scored positively in this study. The scale was scored on a 5-point Likert scale, ranging from "1 = completely disagree" to "5 = completely agree," with higher scores indicating higher levels of self-esteem. The results of the validated factor analysis showed that $\chi^2/df = 3.00$, RFI = 0.93, TLI = 0.95, and RMSEA = 0.07. In addition, the Cronbach's alpha for the scale was 0.87, indicating good validity and reliability.

3.2.4. Perceived social support

University students' perceived social support was measured using the Chinese version of the Perceived Social Support Scale (Wang et al., 1999), revised by Qianjin Jiang, based on the study by Zimet et al. (1990). The scale comprises 12 items divided into three dimensions: family support, friend support, and other people's support. Family support items include statements such as "I can get emotional help and support from my family when I need it" and "I can talk about my problems with my family members." Friend support items include statements such as "I can rely on my friends when things get difficult" and "My friends try to help me." Other people's support items include statements such as "There are people in my life, such as relatives, teachers, and classmates, who care about my feelings" and "There are people, such as relatives, teachers, and classmates, who can provide me with real comfort when I am in trouble." The scale was scored on a 5-point Likert scale, ranging from "1 = completely disagree" to "5 = completely agree," with higher scores indicating higher levels of perceived social support. The results of the validated factor analysis showed that $\chi^2/df = 2.53$, RFI = 0.96, TLI = 0.98, and RMSEA = 0.06. In addition, the Cronbach's alpha for the scale was 0.96, indicating good validity and reliability.

3.2.5. Control variables

Referring to relevant studies, gender, age, and grade were added as control variables to better understand the processes by which major identity influences university students' depression.

3.3. Data analysis

The study adopted a cross-sectional research design, and data were analyzed using SPSS 24.0 and AMOS 23.0. First, AMOS 23.0 was utilized to test the data for common method bias issues. Second, descriptive and correlational statistical analyses were conducted using SPSS 24.0. Third, Model 4 of the PROCESS macro program, developed by Hayes (2017) for SPSS 24.0, was employed to examine the mediating role of self-esteem between major identity and depression. The model focused on major identity as the independent variable, depression among university students as the dependent variable, self-esteem as the mediator variable, and included gender, age, and grade as control variables. The significance of the mediator was assessed, and the overall impact value, direct effect value, and indirect effect value were calculated using the bias-corrected percentile Bootstrap approach. Self-esteem was deemed to play a mediating role when the 95 % confidence interval (CI) did not include zero. Finally, Model 59 of PROCESS was used to test the moderating role of perceived social support in the mediation model.

4. Results

4.1. Common method bias tests

To mitigate the potential for common method bias in the research data, procedures such as anonymization were implemented to manage the survey process. Confirmatory factor analysis was also employed to evaluate the presence of common method bias across all items. Specifically, the common factor was fixed at 1, and the findings indicated the

following: NFI = 0.80, RFI = 0.79, IFI = 0.84, TLI = 0.83, CFI = 0.84, and RMSEA = 0.08. Therefore, no significant common method bias was observed in this study.

4.2. Descriptive statistics and correlations

The results of descriptive statistics and correlation analysis are presented in Table 1. Major identity was significantly and negatively correlated with university students' depression ($r = -0.77$, $p < 0.001$) and was significantly and positively correlated with self-esteem ($r = 0.71$, $p < 0.001$). Self-esteem was significantly and negatively correlated with university students' depression ($r = -0.76$, $p < 0.001$). These findings offer preliminary support for the hypotheses and warrant further investigation.

4.3. The mediating role of self-esteem

This study employed Model 4 from SPSS macro program PROCESS to test the mediating role of self-esteem on major identity and depression. The independent variable was major identity, the dependent variable was depression, self-esteem served as a mediator, and the control variables were gender, age, and grade. Table 2 shows that major identity significantly and negatively affected depression ($\beta = -0.69$, $p < 0.001$). Major identity significantly and positively influenced self-esteem ($\beta = 0.55$, $p < 0.001$). Self-esteem significantly and negatively affected depression ($\beta = -0.48$, $p < 0.001$). Thus, hypotheses H1, H2a, and H2b were supported. The mediation effect of self-esteem was assessed using the bias-corrected percentile Bootstrap method with 5000 sample repetitions. In Table 3, the direct impact of major identity on depression was -0.44, with a 95 % CI excluding 0. Moreover, the mediating effect of self-esteem between major identity and depression was -0.26, with a 95 % CI excluding 0. Therefore, Hypothesis H2c was confirmed. The specific pathways through which major identity influences depression are illustrated in Fig. 2.

4.4. The moderating role of perceived social support

Model 59 in the PROCESS macro program was utilized to test the moderating role of perceived social support in the mediation model. The independent variable was major identity, the dependent variable was depression, self-esteem served as the mediator variable, perceived social support was the moderator variable, and gender, age, and grade were included as control variables. In Table 4, it is observed that the product term of major identity and perceived social support was not a significant predictor of self-esteem ($\beta = 0.01$, $p > 0.05$). The product term between major identity and perceived social support significantly influenced depression ($\beta = 0.10$, $p < 0.05$). This product term between self-esteem and perceived social support also significantly influenced depression ($\beta = 0.12$, $p < 0.01$). In addition, as shown in Table 5, perceived social support moderated the mediating effect of self-esteem between major identity and university students' depression. Consequently, hypotheses H3a, H3c, and H3d were supported, while H3b was not.

A simple slope analysis was conducted to examine the moderating effect of perceived social support. Fig. 3 illustrates that major identity

Table 1
Descriptive statistics and correlations analysis for the variables.

Variable	M	SD	1	2	3	4
1 = Major identity	3.43	0.91	1			
2 = Depression	2.28	0.96	−0.77***	1		
3 = Self-esteem	3.40	0.76	0.71***	−0.76***	1	
4 = Perceived social support	3.61	0.91	0.74***	−0.79***	0.77***	1

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ (two-tailed); M: mean; SD: standard deviation.

Table 2
Test of the mediating effect of self-esteem.

Outcome variables	Independent variables	R	R^2	F	β	SE	t	P
Depression		0.80	0.65	195.92***				
	Gender				−0.15	0.08	−1.86	0.064
	Age				0.09	0.04	2.53*	0.012
	Grade				0.21	0.05	3.92***	0.000
	Major identity				−0.69	0.04	−19.50***	0.000
Self-esteem		0.73	0.53	121.17***				
	Gender				0.09	0.07	1.28	0.200
	Age				−0.07	0.03	−2.03*	0.043
	Grade				−0.07	0.05	−1.41	0.159
	Major identity				0.55	0.03	16.77***	0.000
Depression		0.84	0.71	212.76***				
	Gender				−0.10	0.07	−1.44	0.150
	Age				0.06	0.03	1.82	0.070
	Grade				0.17	0.05	3.65***	0.000
	Major identity				−0.44	0.04	−10.53***	0.000
	Self-esteem				−0.48	0.05	−10.00***	0.000

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ (two-tailed).

Table 3
Total, direct, and mediation effects of self-esteem.

Path	Effect	SE	Bias-corrected 95%CI		Ratio
			Lower	Upper	
Total effect	−0.70	0.04	−0.78	−0.61	
MI → DE	−0.44	0.05	−0.53	−0.34	62.86 %
MI → SE → DE	−0.26	0.03	−0.33	−0.20	37.14 %

MI: major identity; SE: self-esteem; DE: depression.
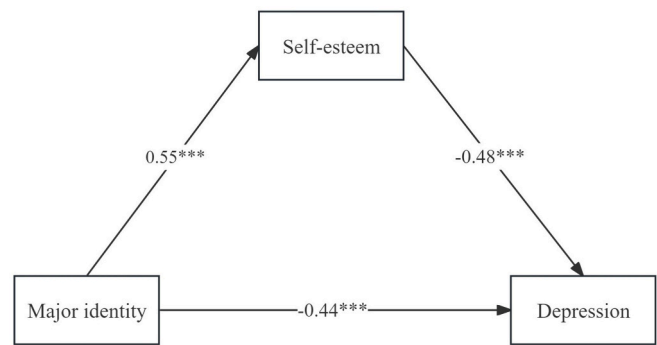

Fig. 2. The effect of major identity on depression through self-esteem.

had a stronger negative relationship with depression among students who reported low levels of perceived social support (simple slope = −0.38, $t = −6.83$, $p < 0.001$). In contrast, for students who reported high perceived social support, the negative relationship between major identity and depression was weaker (simple slope = −0.19, $t = −3.35$, $p < 0.001$), indicating that perceived social support mitigated the negative relationship between major identity and depression. Similarly, Fig. 4 demonstrates that self-esteem had a stronger negative relationship with depression among students who reported low perceived social support (simple slope = −0.41, $t = −6.58$, $p < 0.001$). Among students who reported high perceived social support, self-esteem had a weaker negative relationship with depression (simple slope = −0.18, $t = −2.64$, $p < 0.001$), indicating that perceived social support attenuated the negative relationship between self-esteem and depression.

5. Discussion

Previous research has rarely examined the mechanisms and boundary conditions by which major identity influences university students' depression. To fill this gap, this study employed social identity theory to develop a moderated mediation model, focusing on revealing the mediating role of self-esteem between major identity and university students' depression, as well as the moderating role of perceived social support in the mediation model. The findings are discussed in greater detail to offer insights for future research.

First, the results showed that major identity was significantly and negatively correlated with university students' depression. This indicates that a higher level of major identity among university students correlates with a lower likelihood of experiencing depression. This finding aligns with previous similar studies (Wakefield et al., 2020). For instance, a study of 1369 Chinese students by Tong et al. (2019) found a significant negative correlation between school identity and depression. Furthermore, Bae et al. (2020) demonstrated that career identity significantly negatively impacts depression among Vietnamese students. Indeed, students with a strong major identity typically report higher satisfaction and confidence in their studies, along with elevated future expectations (Wang et al., 2023). However, unlike in Western education systems, China's Gaokao system places greater influence on students' major choices from parents and teachers rather than their own preferences. Moreover, the absence of personalized career planning guidance and a rigid major-switching system—where only high-achieving students are eligible to change majors—restrict students' ability to align their major selection with their career interests. These factors contribute to a weak sense of major identity among many students. Students who lack interest in or dislike their majors are likely to experience self-doubt and a decline in motivation to learn. Such negativity may result in emotional exhaustion, thereby exacerbating depressive symptoms. Moreover, a lack of major identity may lead to students actively alienating themselves from their academic community and diminishing interactions with teachers and peers, resulting in missed support and guidance, which exacerbates psychological distress and cognitive biases, increasing the risk of psychological problems. In conclusion, these results offer empirical evidence for the negative relationship between major identity and depression among university students, thereby contributing valuable insights for related research.

Second, the results indicated that self-esteem mediated the relationship between major identity and university students' depression. This implies that major identity not only directly affects university students' depression but also indirectly influences it through the enhancement of self-esteem. Specifically, this finding showed a significant positive correlation between major identity and self-esteem. This is consistent with previous similar studies (Hui et al., 2024; Wu et al., 2023), which indicate that as university students' major identity increases, so does their self-esteem. A high level of major identity enables students to better recognize the value and significance of their chosen majors and actively integrate into the academic community. This

Table 4
Test of the moderating effect of perceived social support.

Outcome variables	Independent variables	R	R²	F	β	SE	t	P
Self-esteem		0.80	0.64	128.67***				
	Gender				0.07	0.06	1.08	0.283
	Age				0.02	0.03	0.69	0.489
	Grade				−0.04	0.04	−0.97	0.334
	Major identity				0.25	0.04	6.56***	0.000
	Perceived social support				0.46	0.04	11.09***	0.000
	Major identity				0.01	0.03	0.33	0.741
	×							
	Perceived social support							
Depression		0.87	0.76	165.59***				
	Gender				−0.06	0.07	−0.95	0.342
	Age				−0.04	0.03	−1.34	0.180
	Grade				0.12	0.04	2.75**	0.006
	Major identity				−0.29	0.04	−6.79***	0.000
	Self-esteem				−0.30	0.05	−5.87***	0.000
	Perceived social support				−0.24	0.05	−4.97***	0.000
	Major identity				0.10	0.04	2.51*	0.013
	×							
	Perceived social support							
	Self-esteem				0.12	0.05	2.68**	0.008
	×							
	Perceived social support							

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ (two-tailed).

Table 5
The mediating effect at different levels of perceived social support.

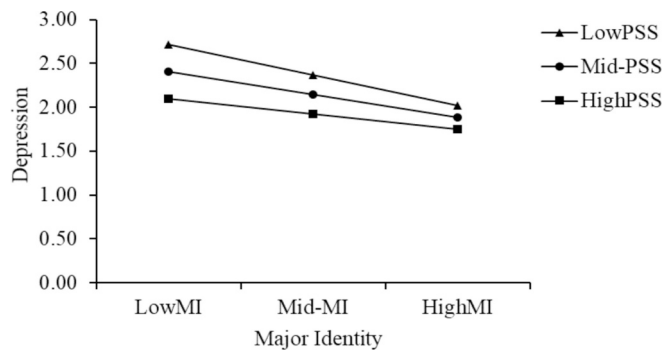| Perceived social support		Effect	BootSE	BootLLCI	BootULCI
The moderated mediation effect	E1(M − 1SD)	−0.10	0.02	−0.15	−0.06
	E2(M)	−0.07	0.02	−0.12	−0.04
	E3(M + 1SD)	−0.05	0.02	−0.10	−0.01

Fig. 3. Perceived social support as a moderator in the relationship between major identity and depression. MI: Major identity, PSS: perceived social support.

integration not only fosters a strong sense of belonging and purpose but also enhances students' self-assessment abilities, thereby effectively increasing their self-esteem. Moreover, the results showed that self-esteem was also significantly and negatively related to university students' depression (Gao et al., 2022; Ho et al., 2023). This finding aligns with previous research. By enhancing self-esteem, university students are better able to adopt effective emotion regulation strategies (Fernandes et al., 2022), thereby reducing the psychological burden caused by negative cognitions such as self-depreciation and self-doubt. In conclusion, this study not only empirically supports the positive relationship between major identity and self-esteem but also highlights the crucial role of self-esteem in the mechanism through which major identity influences university students' depression.

Finally, the results demonstrated that perceived social support not

only moderated the relationship between major identity and university students' depression but also moderated the relationship between self-esteem and university students' depression. This finding is consistent with the initial research hypothesis, suggesting that perceived social support significantly weakens the negative relationship between major identity and depression, as well as the negative relationship between self-esteem and depression. Social support, an important resource, plays a crucial role in university students' academic and personal lives (Wang et al., 2014), particularly when facing academic pressures and psychological challenges. When students receive support and encouragement from teachers, family members, and peers during major selection and study, they gain not only problem-solving strategies and helpful guidance but also emotional comfort and support. This support helps students enhance their self-confidence and motivation to learn, thereby more effectively mitigating academic burnout (Ye et al., 2021) and depression. Moreover, perceived social support also helps university students maintain a positive self-evaluation and improve their self-esteem (Jiang & Zhang, 2023; Shu et al., 2022). Therefore, compared to low social support, high social support mitigates the negative effects of low major identity and low self-esteem, reducing depression among university students. Although a negative correlation still exists between major identity, self-esteem, and university students' depression in the context of high social support, its strength is diminished, suggesting that perceived social support plays a crucial role in the pathway through which major identity influences university students' depression.

6. Implications and limitations

This study presents significant practical implications. First, to mitigate student depression, schools should implement strategies to strengthen students' identification with their chosen majors. For instance, students should develop a comprehensive understanding of their majors, including detailed program information, to grasp their academic content, assess career prospects, and explore employment opportunities. Establishing a professional tutorial system and counseling services would enable trained teachers to provide students with specialized knowledge and guidance on academic learning and career planning. Furthermore, establishing a platform for professional internships is essential, as it offers students valuable practical experience and cultivates their interest in the profession. Second, schools should adopt targeted measures to enhance students' self-esteem. Teachers should
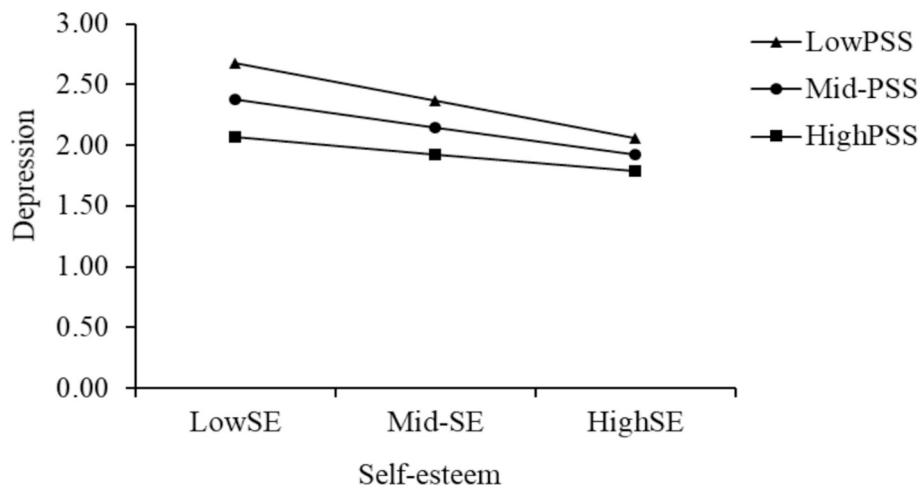
Fig. 4. Perceived social support as a moderator in the relationship between self-esteem and depression. SE: Self-esteem, PSS: perceived social support.

provide timely feedback on students' academic performance and offer positive reinforcement to strengthen their self-esteem and self-efficacy. Additionally, students should be encouraged to engage in cooperative learning to facilitate knowledge sharing, collaborative problem-solving, and the development of mutual trust and respect among peers.

This study has several limitations. First, the use of a cross-sectional research design to examine the relationships between major identity, self-esteem, perceived social support, and depression precludes the determination of causal relationships. It is therefore recommended that future research explore these relationships using experimental or longitudinal designs. Second, although it has been demonstrated that this study does not suffer from significant common method bias, such bias may still influence the findings due to the reliance on self-reported data from university students. Future research could address this limitation by incorporating longitudinal data collection to enhance the validity of the findings. Finally, this study focused on the effects of major identity on university students' depression within the Chinese context. It is recommended that future research validate these findings in other cultural contexts and conduct cross-cultural analyses.

7. Conclusions

First, major identity was significantly and negatively related to university students' depression. Second, self-esteem mediated the relationship between major identity and university students' depression. Third, perceived social support moderated the relationship between major identity and university students' depression. Fourth, perceived

social support moderated the relationship between self-esteem and university students' depression. Finally, perceived social support moderated the mediating effect of self-esteem between major identity and university students' depression.

CRediT authorship contribution statement

Hui Bai: Writing – review & editing, Writing – original draft, Validation, Software, Investigation, Formal analysis, Conceptualization. **Guangqiang Wang:** Writing – review & editing, Writing – original draft, Software, Formal analysis, Conceptualization. **Yangbang Hu:** Writing – review & editing, Validation, Supervision.

Ethical approval

All procedures performed in studies involving human participants were in accordance with institutional and/or national research council ethical standards.

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Declaration of competing interest

The authors declare that there are no potential conflicts of interest regarding the research, authorship, and/or publication of this article.

Appendix A. STROBE statement

	Item No	Description
Title and abstract	1	The effect of major identity on depression among Chinese university students: a moderated mediation model
		A cross-sectional research design was used to examine the relationship between major identity and depression, the mediating role of self-esteem, and the moderating role of perceived social support.
Introduction		
Background/rationale	2	The study explores how major identity influences depression among Chinese university students, with self-esteem as a mediator and perceived social support as a moderator.
Objectives	3	The study aims to examine the relationship between major identity and depression, the mediating role of self-esteem, and the moderating role of perceived social support.
Methods		

(continued)

	Item No	Description
Study design	4	The study employs a cross-sectional design to investigate the proposed relationships between major identity, self-esteem, depression, and perceived social support.
Participants	5	The participants were Chinese university students selected via random sampling. A total of 436 valid responses were collected, with an effective recovery rate of 98.87 %. The participants were students of various academic years.
Variables	6	Major identity (independent variable), depression (dependent variable), self-esteem (mediator), and perceived social support (moderator) are defined.
Data sources/ measurement	7	Self-report questionnaires were used for data collection on major identity, depression, self-esteem, and perceived social support. The scales used are validated, with good reliability scores.
Bias	8	Common method bias was assessed using AMOS 23.0. The survey process included anonymization to reduce bias, and appropriate validation techniques were applied to scales.
Study size	9	The required sample size was calculated using G*Power software with a statistical power of 0.95, resulting in a minimum sample size of 129, and 436 students were included in the final analysis.
Quantitative variables	10	Quantitative variables (major identity, depression, self-esteem) were analyzed using descriptive statistics and correlational analysis. Mediation and moderation effects were tested using PROCESS macro.
Statistical methods	11	SPSS 24.0 was used for descriptive and correlational analysis. Model 4 of PROCESS tested the mediation effect, and Model 59 tested the moderation effect, adjusting for control variables (gender, age, grade).
Results		
Main results	12	Major identity is significantly and negatively related to university students' depression ($r = -0.77$, $p < 0.001$). Self-esteem mediates the relationship between major identity and university students' depression (The mediating effect of self-esteem between major identity and depression was -0.26, with a 95 % CI excluding 0.). Perceived social support moderates the relationship between major identity and university students' depression (The product term between major identity and perceived social support significantly influenced depression ($\beta = 0.10$, $p < 0.05$)). Perceived social support moderates the relationship between self-esteem and university students' depression (This product term between self-esteem and perceived social support significantly influenced depression ($\beta = 0.12$, $p < 0.01$)). Perceived social support moderates the mediating effect of self-esteem on the relationship between major identity and university students' depression.
Discussion		
Explanation of results	13	Major identity is significantly and negatively related to university students' depression. This indicates that a higher level of major identity among university students correlates with a lower likelihood of experiencing depression. Self-esteem mediates the relationship between major identity and university students' depression. This implies that major identity not only directly affects university students' depression, but also indirectly through self-esteem. Perceived social support weakens the relationship between major identity and university students' depression. Perceived social support weakens the relationship between self-esteem and university students' depression.
Limitations	14	Limitations include the cross-sectional design, self-reported data, and the focus on Chinese university students, which may affect generalizability.
Interpretation	15	The study discusses the significant findings while acknowledging its limitations and the need for future longitudinal studies.

Data availability

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

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