



The mediating effect of interpersonal competence and the moderated mediating effect of gender in the influence of Chinese university students' major identity on learning immersion

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ABSTRACT

Introduction. Contemporary Chinese university students often choose their majors under intense entrance examination pressure and external expectations, which tends to weaken their major identity and negatively affect their learning immersion. Major identity is closely associated with academic engagement and psychological well-being, and interpersonal competence has emerged as a key factor in strengthening it. This study empirically investigates the influence of major identity on learning immersion, focusing on the mediating effect of interpersonal competence and the moderated mediation effect of gender among Chinese university students.

Research methods. This study conducted a survey of 512 Chinese university students enrolled at universities across four regions in China. The measurement instruments consisted of scales assessing major identity, interpersonal competence, and learning immersion. The collected data were analyzed using SPSS 27.0 and PROCESS macro 4.3 (Model 4, and 7) to perform descriptive statistics, correlation analysis, and tests of mediation and the moderated mediation effect of gender.

Results. The results demonstrated that, First, the mean scores of major identity ($M = 3.46$), interpersonal competence ($M = 3.54$), and learning immersion ($M = 3.42$) among Chinese university students were all higher than the median value of 3. Second, major identity had a significant effect on learning immersion among Chinese university students (Total effect = .8335, 95% CI [.7787, .8882]). Third, interpersonal competence partially mediated the relationship between major identity and learning immersion (Indirect effect = .1418, 95% CI [.0910, .2039]). Fourth, gender demonstrated a moderated mediation effect in the pathway from major identity to learning immersion through interpersonal competence. The effect size was (effect = .6327, 95% CI [.4997, .7656]) for male students and (effect = .4388, 95% CI [.3769, .5006]) for female students, indicating that the influence of major identity on interpersonal competence varies depending on gender.

Conclusion. This study provides a multidimensional interpretation of the relationship between major identity and learning immersion among Chinese university students, highlighting the need for major-related counseling, interpersonal competence training, and gender-based support programs in educational settings. These implications may contribute to improving academic retention and enhancing the quality of career planning.

KEYWORDS

major identity, learning immersion, interpersonal competence, moderated mediation effect of gender, Chinese university students

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INTRODUCTION

In recent decades, international organizations such as UNESCO, the Council of Europe, and the Union of International Associations (UIA) have emphasized the pivotal role of education in promoting personal development, social integration, and the cultivation of global citizenship [1; 2]. These organizations have underscored the importance of transversal competencies, such as learner identity, social interaction, and learning immersion, and have established international standards to promote inclusive and learner-centered education [3]. Within this global trend, understanding how university students internalize their major identity and how it influences their learning behavior has emerged as a significant academic concern. In particular, research on Chinese university students, who study within a complex cultural context, can make a meaningful contribution to international educational discourse that values both quality and equity in education.

Today's university students face mounting pressure to make decisions about their major and career paths amid rapid technological advancements and an uncertain labor market. International studies indicate that major identity is closely linked to academic achievement, career maturity, and psychological well-being. When weakened by external expectations and social pressures, major identity can hinder learning engagement and increase the risk of academic disengagement and career indecision. Therefore, exploring the factors that shape major identity and learning immersion among university students is a critical and universal educational issue not only in China but around the world [4].

Major identity is understood as the psychological and emotional attitude that a student has toward their chosen field of study, and it is considered a sub-concept of ego identity. Erikson (1968) suggested that ego identity should be established during high school [5], and that it is desirable to select a university major based on this foundation. However, Chinese university students tend to choose their university and major before fully establishing their major identity, due to intense entrance examination competition and strong societal aspirations for admission to prestigious universities [6]. This tendency has been shown to negatively affect the levels of major identity and career maturity. In fact, Chinese university students demonstrate generally low levels of major identity and career maturity [7]. This suggests that, when selecting a major, Chinese university students are often influenced by external factors rather than engaging in sufficient self-exploration and career planning.

The major identity of university students has a positive effect on learning immersion [8]. Students with a high level of major identity tend to be more active in academic activities and experience greater achievement and emotional satisfaction [9], whereas those with low major identity are more likely to face academic dropout or career uncertainty [10]. When university students choose their major based on their own interests and intentions, their level of learning immersion in the major can be enhanced [11].

Learning immersion is a concept first proposed by Csikszentmihalyi (1990), referring to the optimal psychological state in which an individual is fully absorbed in a particular activity, loses track of time and self-consciousness, and experiences enjoyment from the task itself. Learning immersion strengthens learners' intrinsic motivation, leads to sustained engagement and a sense of accomplishment, and positively affects academic performance and psychological well-being [12]. This learning immersion is closely related to major identity. It has been shown that students with a high level of major identity demonstrate greater self-directed learning abilities and enhanced learning immersion, which serves as an important foundation for achieving academic goals and career development [13]. In contrast, students with low major identity are more likely to lose interest in learning, experience reduced immersion, and consequently have lower academic achievement [14].

Although there is a lack of empirical research directly demonstrating that major identity of university students influences interpersonal competence, previous studies have repeatedly identified academic and career factors as important influences on interpersonal competence. Major identity is connected to ego identity and career identity, which can play a positive role in the development of interpersonal competence [15]. Educational and counseling support that enhances the major identity of university students is also expected to help improve their interpersonal competence [16]. Interpersonal competence among university students affects learning immersion [17]. Students with high interpersonal competence tend to have greater satisfaction in interpersonal relationships

and better adaptation to university life, which in turn has a positive effect on promoting learning immersion [18]. Therefore, it is expected that the positive effect of major identity on learning immersion among university students will be mediated by interpersonal competence.

Meanwhile, the gender of university students may serve as an important moderating variable in learning immersion. According to sociocultural theory [19], gender can lead to differences in learning motivation and social interaction. Previous studies have explored differences in major identity and interpersonal competence between male and female students, but the results have been inconsistent or even contradictory [20]. Some studies have reported that female students show higher adaptation in interpersonal relationships than male students, while other studies have found that male students score higher, or that there are no significant differences according to gender [21]. This indicates that the effects of gender on interpersonal competence vary across studies, highlighting the need for further investigation into the moderated mediation effect of gender on learning immersion.

Therefore, this study aims to examine the mediating effect of interpersonal competence and the moderated mediation effect of gender in the influence of major identity on learning immersion among Chinese university students. Research that comprehensively investigates major identity, learning immersion, and interpersonal competence will provide not only academic contributions but also important implications for educational practice. In particular, by analyzing the influence of major identity on learning immersion from the perspective of the mediating effect of interpersonal competence and the moderated mediation effect of gender among Chinese university students, this study will enable a multidimensional understanding that goes beyond previous fragmented research. Furthermore, this study is expected to suggest systematic and practical measures to strengthen major identity and promote learning immersion, which can create diverse educational and social values such as reducing dropout rates, supporting career exploration, and ensuring psychological stability.

Specifically, this study seeks to answer the following research questions:

In this study, the purpose is to examine the mediating effect of interpersonal competence and the moderated mediation effect of gender in the relationship between major identity and learning immersion among Chinese university students. The specific research questions are as follows:

First, what are the levels of major identity, learning immersion, and interpersonal competence among Chinese university students?

Second, does major identity influence learning immersion among Chinese university students?

Third, does interpersonal competence mediate the relationship between major identity and learning immersion among Chinese university students?

Fourth, does gender play a moderated mediation role in the relationship between major identity and learning immersion through interpersonal competence among Chinese university students?

MATERIALS AND METHODS

Data Collection Procedures and Characteristics of the Study Sample

The participants of this study were Chinese university students enrolled in four universities located in the Guangdong region. The survey was conducted online using a non-face-to-face method from March 15 to March 25, 2025, and data from a total of 565 respondents were used for the final analysis. It is shown in the general characteristics of the study subjects (see Table 1).

In terms of gender, male students accounted for 42.12% and female students for 57.88%. Regarding academic year, freshmen made up 34.33%, sophomores 36.11%, and juniors the largest group at 29.56%. As for majors, students majoring in Business management comprised the majority at 52.75%, followed by those majoring in big data and accounting at 10.79%. With respect to residential background, students from City accounted for 38.93%, those from Rural areas 38.24%, and those from Towns 22.83%.

Table 1

Characteristics of Study Subjects (N=565)

Classification		Frequency	%
Gender	Male	238	42.12
	Female	327	57.88
	Total	565	100.00
Grade	Freshman	194	34.33
	Sophomore	204	36.11
	Junior	167	29.56
	Total	565	100.00
Major	Business management	298	52.75
	Human resource management	53	9.39
	Business administration management	50	8.84
	Finance technology application	47	8.33
	Modern logistic management	48	8.49
	Big data and accounting	61	10.79
	Others	8	1.41
	Total	565	100.00
Residence	City	220	38.93
	Town	129	22.83
	Rural area	216	38.24
	Total	565	100.00

Measurement Tools

All measurement instruments used in this study were based on a 5-point Likert scale, where higher scores indicated greater levels of major identity, interpersonal competence, and learning immersion.

The independent variable, major identity, was measured using a scale adapted and revised by Qin [22]. This scale consists of four sub-dimensions: cognitive, emotional, behavioral, and perceived fit factors. It includes a total of 24 items, such as "I am aware of the employment prospects related to my major," "I have no intention of changing my major," and "I consistently study my major-related knowledge." In this study, the analysis was conducted without dividing into sub-factors. The items were rated on a 5-point Likert scale, where higher scores indicate a more positive perception of major identity. The scale showed high internal consistency, with a Cronbach's alpha of .959.

To measure the mediating variable, interpersonal competence, this study employed the Interpersonal Competence Questionnaire developed by Buhrmester et al. [23]. The scale consists of 25 items, including statements such as "I attend gatherings with unfamiliar people to develop new relationships," "I can take the initiative to converse with classmates I want to get to know," and "Others see me as friendly and talkative." Responses were measured on a 5-point Likert scale, with higher scores indicating stronger interpersonal competence. The scale demonstrated high internal reliability, with a Cronbach's alpha of .924.

The dependent variable, learning immersion, was measured using a scale originally developed by Schaufeli and later translated and revised by Li and Huang [24]. This scale comprises three sub-dimensions: motivation, energy, and concentration. It includes a total of 17 items, such as "I feel energized when studying," "Learning is very valuable and meaningful to me," and "I study with full concentration." Responses were rated on a 5-point Likert scale, with higher scores indicating greater levels of learning immersion. The scale demonstrated excellent internal consistency, with a Cronbach's alpha of .956.

The moderating variable, gender, was measured as a nominal scale, categorized into female and male students.

Data Analysis Methods

Data analysis was conducted using SPSS Win 27.0. Reliability analysis, frequency analysis, descriptive statistics, and correlation analysis were performed. In addition, the dual mediation effects were examined using SPSS PROCESS Macro version 4.3 (Models 4 and 7).

Cronbach's alpha coefficients were calculated to assess reliability. The statistical methods applied to each research question are as follows:

First, descriptive statistics and correlation analysis were conducted to examine the general tendencies of the main variables and the relationships among them.

Second, Model 4 of the PROCESS macro proposed by Hayes [25] was used to test the mediating effect of interpersonal competence in the relationship between major identity and learning immersion among Chinese university students.

Third, Model 7 of the PROCESS macro proposed by Hayes [25] was used to examine the moderated mediation effect of gender in the pathway from major identity to learning immersion via interpersonal competence.

To test the significance of the moderated mediation effect, bootstrapping with 5,000 samples was conducted, and the confidence interval was set at 95%.

RESULTS

General Trends of Major Variables and Correlations Among Variables

The results showed that, based on a 5-point scale (see Table 2), the average score of major identity among Chinese university students was 3.460, interpersonal competence was 3.545, and learning immersion was 3.425. Considering the midpoint value of 3, the levels of major identity, interpersonal competence, and learning immersion were all above the median among Chinese university students.

To verify the normality of the major variables, the criteria suggested by Kline [26] were applied. According to Kline [26], data are considered normally distributed if the absolute value of skewness is less than 3 and the absolute value of kurtosis is less than 10. In this study, the absolute values of skewness ranged from .094 to .221, and the absolute values of kurtosis ranged from .608 to .1408, indicating that the variables satisfy the assumptions of normality.

Table 2

General Trends of Major Variables (N=565)

	Mean		Skewness		Kurtosis	
	Statistics	S.D.	Statistics	S.E.	Statistics	S.E.
Major Identity	3.460	.604	.094	.103	.870	.205
Interpersonal Competence	3.545	.5009	.221	.103	1.408	.205
Learning Engagement	3.425	.643	.173	.103	.608	.205

The results of the Pearson correlation analysis and frequency analysis are presented in the (see Table 3). Major identity and interpersonal competence showed a positive correlation ($r = .571$, $p < .001$), while major identity and learning immersion also demonstrated a positive correlation ($r = .683$, $p < .001$). In addition, interpersonal competence was positively correlated with learning

immersion ($r = .605$, $p < .001$). The overall correlation coefficient was lower than .7, so there was no problem with multicollinearity [27].

Table 3

Correlation analysis and descriptive statistics of major variables (N=565)

Variable	Major Identity	Gender	Interpersonal Competence	Learning Engagement
Major Identity	1			
Gender	-.025	1		
Interpersonal Competence	.571***	-.002	1	
Learning Engagement	.683***	.026	.605***	1

Mediating Effect of Interpersonal competence

The mediating effect of interpersonal competence in the relationship between major identity and learning immersion among Chinese university students, Model 4 of the SPSS PROCESS macro proposed by Hayes [25] was applied. The mediation effect was tested using the bootstrapping method, with a confidence level set at 95% and 5,000 resamples. The analysis results are presented in (see Figure 1 and Table 4).

The results showed that major identity had a significant positive effect on learning immersion among Chinese university students ($B = .6916$, $p < .001$). In addition, major identity significantly influenced interpersonal competence ($B = .4730$, $p < .001$), and interpersonal competence, in turn, had a significant effect on learning immersion ($B = .2999$, $p < .001$). These findings indicate that major identity significantly impacts interpersonal competence, which then significantly influences learning immersion, thereby confirming the mediating role of interpersonal competence in the relationship between major identity and learning immersion. This suggests that an increase in major identity enhances interpersonal competence, which subsequently promotes higher levels of learning immersion, and that this pathway is statistically significant.

Moreover, the total effect of major identity on learning immersion among Chinese university students was .8335. When interpersonal competence was included as a mediating variable, the direct effect decreased to .6916, indicating that interpersonal competence partially mediated the relationship between major identity and learning immersion.

Finally, to verify the significance of the mediating effect of interpersonal competence, a bootstrapping method was applied. The indirect effect was .1418, and the 95% confidence interval ranged from .0910 (lower bound) to .2039 (upper bound), with zero not included within the interval. This indicates that the mediating effect was statistically significant. Therefore, interpersonal competence was confirmed to partially mediate the relationship between major identity and learning immersion among Chinese university students.

Moderated Mediating Effect of Gender

The moderated mediation effect of gender in the relationship between major identity and learning immersion via interpersonal competence among Chinese university students, Model 7 of the SPSS PROCESS macro proposed by Hayes [25] was applied. The moderation and moderated mediation effects were tested using the bootstrapping method, with a confidence level of 95% and 5,000 resamples. Conditional effect analysis was conducted based on gender (male, female), and both the independent and moderating variables were mean-centered prior to analysis. The results are presented in (see Figure 2 and Table 5).

The analysis revealed that major identity had a significant positive effect on learning immersion ($B = .6916$, $p < .001$). In addition, interpersonal competence also had a significant effect on learning immersion ($B = .2999$, $p < .001$), indicating that higher levels of major identity were associated with increased interpersonal competence and learning immersion.

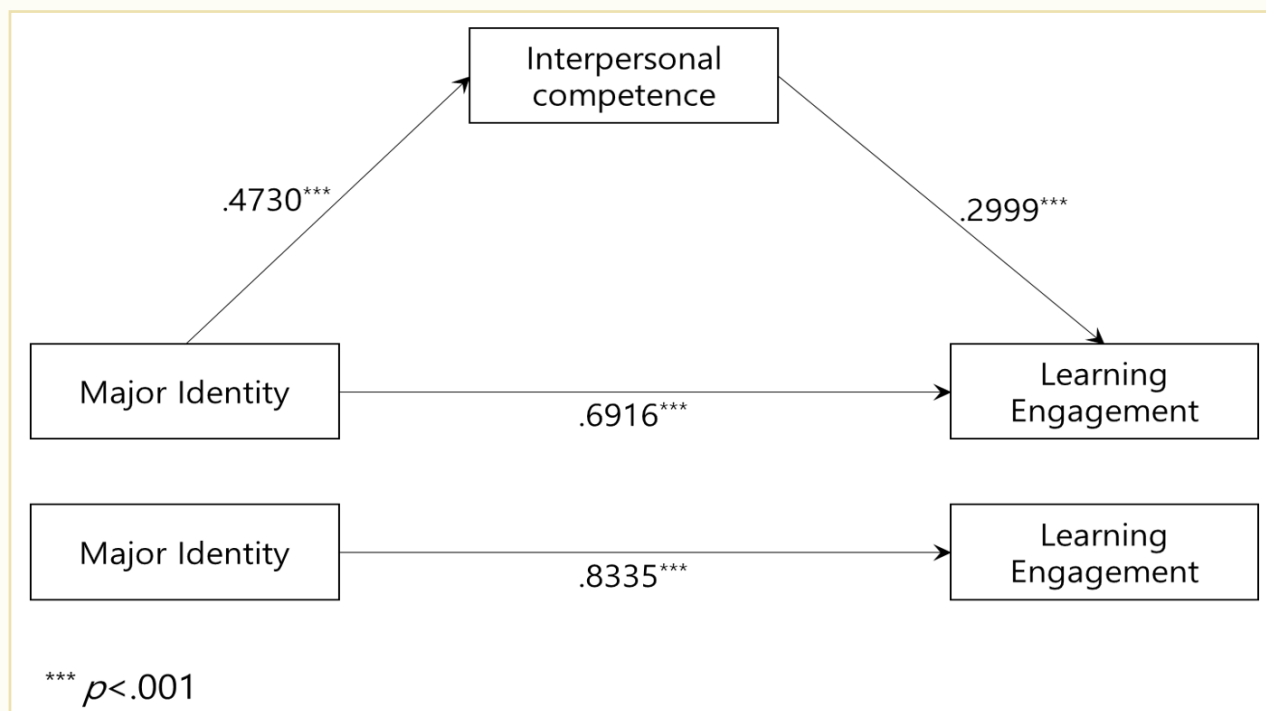


Figure 1 Statistical models for Mediating Effect of Interpersonal Competence

Table 4

The Mediating Effect of Interpersonal Competence (N=565)

Coeffect		Mediating variable model (DV: Interpersonal competence)			Dependent variable model (DV: Learning Engagement)		
		Coeffect	SE	t value	Coeffect	SE	t value
Constant		1.9088	.1007	18.9517***	-.0311	.1193	-.2609
IV	Major Identity	.4730	.0287	16.4695***	.6916	.0323	21.3971***
Mediator	Interpersonal competence				.2999	.0390	7.6880***
Model summary	R ²	.3259			.6504		
	F	272.1354***			522.7006***		

	Effect(B)	SE	LLCI*	ULCI**
Total Effect	.8335	.0279	.7787	.8882
Direct Effect	.6916	.0323	.6281	.7551
Indirect Effect	.1418	.0288	.0910	.2039

***p<.001

LLCI=bootstrap lower bound within 95% confidence interval

ULCI=bootstrap upper limit within 95% confidence interval

Moreover, major identity significantly influenced interpersonal competence ($B = .8266$, $p < .001$), and gender also showed a significant effect on interpersonal competence ($B = .6508$, $p < .05$). Notably, the interaction term between major identity and gender had a significant negative effect on interpersonal competence ($B = -.1939$, $p < .01$), confirming the presence of a moderation effect. The change in explanatory power due to the addition of the interaction term was also statistically significant ($\Delta R^2 = .0080$, $p < .01$), suggesting that gender moderates the relationship between major identity and interpersonal competence.

Finally, the conditional effect analysis showed that the influence of major identity on interpersonal competence was significant for both male and female Chinese university students. For male students, the effect size was $B = .6327$ (95% CI: .4997 to .7656), and for female students, $B = .4388$ (95% CI: .3769 to .5006). This indicates that the strength of the relationship between major identity and interpersonal competence differs by gender.

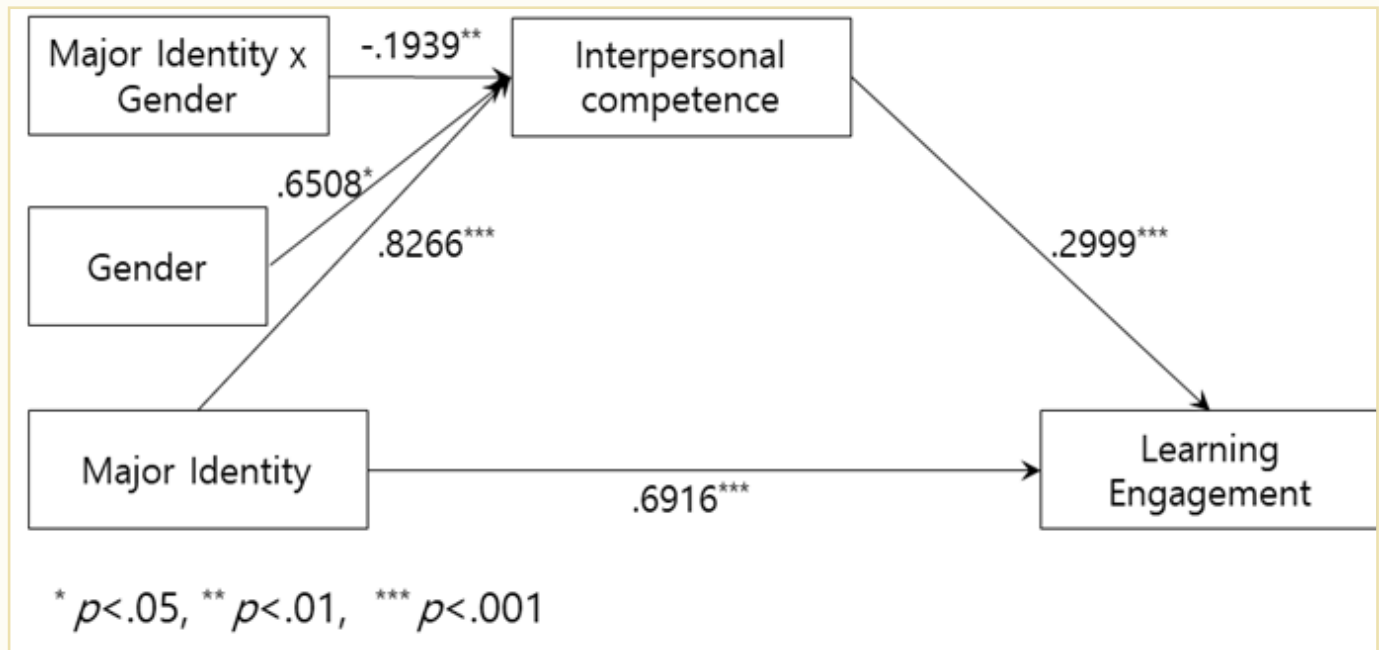


Figure 2 Statistical models for conditional indirect effects of gender

Table 5

The Moderated Mediating Effect of Gender (N=565)

Coeffect		Mediating variable model (DV: Interpersonal competence)			Dependent variable model (DV: Learning Engagement)		
		Coeffect	SE	t value	Coeffect	SE	t value
Constant	.7233	.4842	1.4940	-.0311	.1193	-.2609	
IV	Major Identity	.8266	.1390	5.9462***	.6916	.0323	21.3971***
Moderator	Gender	.6508	.2604	.0157*			
Interaction item	Major Identity × Gender	-.1939	.0747	-.2.5970**			
Highest order test	R ² change	.0080					
	F	6.7442**					
Mediator	Interpersonal competence				.2999	.0390	7.6880***
Model sum- mary	R ²	.3340			.6504		
	F	93.7905***			522.7006***		
Conditional effects of Gender							
Gender	Effect(B)	SE	t value	LLCI*	ULCI**		
Male	.6327	.0677	9.3457***	.4997	.7656		
Female	.4388	.0315	13.9282***	.3769	.5006		
*p<.05, **p<.01, ***p<.001							
LLCI=bootstrap lower bound within 95% confidence interval							
ULCI=bootstrap upper limit within 95% confidence interval							

The moderating effect of gender in the relationship between major identity and interpersonal competence among Chinese university students is illustrated in (see Figure 2). As the level of major identity increased, interpersonal competence also tended to increase. This tendency was more pronounced among male students. Specifically, in the high major identity group, the level of interpersonal competence was significantly higher for male students compared to female students, indicating a difference in the slope by gender. This finding suggests that gender moderates the relationship between major identity and interpersonal competence.

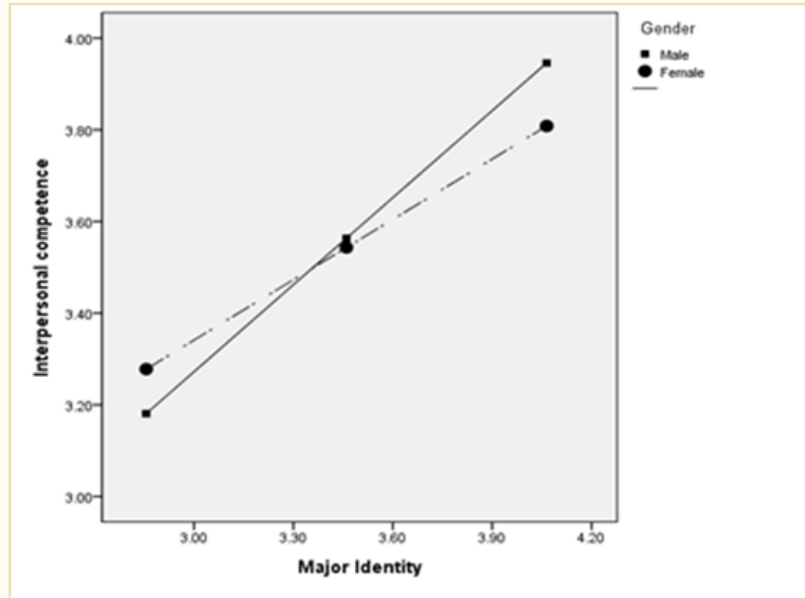


Figure 2 The moderating effect of Gender

Table 6

The Verification of Conditional Indirect Effects (N=565)

Direct Effect (Major Identity → Learning Engagement)					
Effect	SE	t value	p	LLCI	ULCI
.6916	.0323	21.3971	.000	.6281	.7551
Conditional Indirect Effect (Major Identity → Interpersonal competence → Learning Engagement)					
Gender	Effect		BootSE	BootLLCI	BootULCI
Male	.1897		.0411	.1179	.2762
Female	.1316		.0282	.0796	.1915
Index of Moderated Mediation					
Gender	Index		BootSE	BootLLCI	BootULCI
	-.0581		.0314	-.1259	-.0013
***p<.001					
LLCI=bootstrap lower bound within 95% confidence interval					
ULCI=bootstrap upper limit within 95% confidence interval					

The results of the analysis on the direct and conditional indirect effects of major identity on learning immersion among Chinese university students are presented in (see Table 6). The direct effect of major identity on learning immersion was $B = .6916$ (95% CI: .6281 to .7551), and the confidence interval did not include zero, indicating statistical significance. Furthermore, the conditional indirect effect analysis showed significant results for both genders: for male students, $B = .1897$ (95% CI: .1179 to .2762); for female students, $B = .1316$ (95% CI: .0796 to .1915). In

addition, the index of the moderated mediation effect of gender was statistically significant at $-.0581$ (95% CI: $-.1259$ to $-.0013$). This indicates that gender moderates the strength of the indirect pathway from major identity to learning immersion through interpersonal competence. Therefore, the moderated mediation effect of gender in the relationship between major identity and learning immersion via interpersonal competence was confirmed among Chinese university students.

DISCUSSION

This study examined the relationships among major identity, interpersonal competence, and learning immersion among Chinese university students, and tested the moderated mediation effect of gender in the pathway from major identity to learning immersion through interpersonal competence.

The primary findings of this study can be discussed as follows.

First, significant positive correlations were found among major identity, interpersonal competence, and learning immersion in Chinese university students. This is consistent with previous research [8; 9] suggesting that a strong sense of belonging and self-identity related to one's major enhances interpersonal competence, which in turn increases the level of learning immersion. Recent studies have further supported these findings, demonstrating that academic identity positively influences learning engagement through the mediating role of interpersonal competence [28]. These findings indicate that major identity and interpersonal competence are key variables in explaining learning immersion.

Second, the mean scores of major identity, interpersonal competence, and learning immersion among Chinese university students were all above the midpoint value of 3 on a 5-point scale. This is a little contrary to the results of previous studies [6; 7]. Recent studies have also reported that Chinese university students show positive levels of academic identity and learning engagement [29]. gender differences in the effect of academic identity on learning engagement, which is consistent with the findings of this study. This suggests that Chinese university students generally hold positive attitudes toward their academic identity, sense of belonging to their major, social competence, and engagement in learning. These findings imply that programs designed to strengthen major identity and interpersonal competence in university education settings may be effectively utilized to promote learning immersion.

Third, gender functioned as a moderating variable in the relationship between major identity and interpersonal competence among Chinese university students. Specifically, the effect of major identity on interpersonal competence was stronger among male students. However, there is also a research result that there is no significant difference according to gender in previous study [21]. This moderation effect was further supported by the analysis of the moderated mediation effect, which revealed that the strength of the indirect pathway from major identity to learning immersion via interpersonal competence differed by gender. These results are in line with recent research indicating that the impact of social competence on learning engagement can vary depending on gender [30]. This suggests that the interaction between major identity and social competence may vary depending on gender, highlighting the need for gender-sensitive approaches when developing strategies to promote learning immersion. Notably, among male students, higher levels of major identity more clearly led to increased interpersonal competence, which in turn enhanced learning immersion. This indicates that interpersonal competence may serve as a crucial facilitating pathway for male students, strengthening the link between their academic identity and learning engagement. From a practical perspective, this underscores the importance of developing gender-tailored programs.

Based on these findings, this study provides a theoretical framework for understanding how major identity, interpersonal competence, and gender interact to predict learning immersion, and offers foundational insights for designing effective educational interventions.

CONCLUSION

This study aimed to examine the mediating effect of interpersonal competence and the moderated mediation effect of gender in the relationship between major identity and learning immersion among

Chinese university students. Data were collected from four universities in the Guangdong region of China, and a total of 565 responses were used for analysis. Reliability analysis, descriptive statistics, frequency analysis, and correlation analysis were conducted using SPSS Win 27.0. Mediation and moderated mediation effects were analyzed using the SPSS PROCESS Macro version 4.2 (Models 4 and 7). The conclusions of this study are as follows:

First, the levels of major identity, interpersonal competence, and learning immersion among Chinese university students were all above the midpoint value of 3 on a 5-point scale. In addition, significant positive correlations were found among the three variables. This suggests that enhancing learning immersion requires attention not only to students' academic identity but also to their ability to form and maintain interpersonal relationships.

Second, interpersonal competence was confirmed as a mediating variable in the relationship between major identity and learning immersion. This implies that a strong sense of academic belonging and self-awareness improves students' social relational abilities, which in turn facilitate deeper engagement in learning. Therefore, promoting learning immersion should go beyond fostering understanding and interest in one's major and incorporate systematic educational approaches to develop students' social and relational competencies.

Third, the strength of the mediation effect varied by gender in the pathway from major identity to learning immersion via interpersonal competence, with male students showing a stronger indirect effect. This indicates that academic motivation and psychological engagement in learning may develop differently depending on gender. For male students in particular, interpersonal competence appears to play a more influential role in linking major identity with academic engagement. Thus, it is necessary to design gender-responsive support systems for career development and academic motivation.

These findings provide an integrative understanding of the relationship among major identity, interpersonal competence, and learning immersion, and offer practical implications for designing educational intervention strategies that take gender differences into account.

However, the study has several limitations:

First, the sample was limited to students from selected regions in China, which may restrict the generalizability of the findings to other cultural or educational contexts. Future studies should include cross-cultural comparative research encompassing diverse countries and educational systems, such as Korea, other parts of Asia, and Europe.

Second, since this study employed a cross-sectional design, it cannot establish causal relationships among variables. Future research should adopt a longitudinal design to analyze changes and causal mechanisms in major identity, interpersonal competence, and learning immersion over time.

Third, this study relied on self-reported survey data, which may be subject to social desirability bias or self-perception distortions. Future research should incorporate mixed-method approaches such as observational data, teacher assessments, and interviews to enhance the reliability and validity of the findings.

By addressing these limitations, future studies can deepen our understanding of the relationship between major identity and learning immersion and contribute to the development of more effective programs that support the academic experience of university students.

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Hai-Lan Jin: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization, Funding acquisition

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