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The nexus between ethnic identity and academic performance: The mediating role of learning motivation

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ABSTRACT

This study explores the direct and indirect relationships between ethnic identity, learning motivation, and academic performance among college students in Guangxi Province, China. Using a quantitative approach with an explanatory research design, data were collected through a questionnaire survey of 900 students from three regional colleges. The research hypotheses were tested using Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) with SmartPLS4 software. The results show that learning motivation fully mediates the relationship between ethnic identity and academic performance. The findings indicate that ethnic identity enhances students' learning motivation, which in turn strongly improves their academic performance. However, ethnic identity does not have a significant direct effect on academic performance. These results highlight the important role of learning motivation and suggest that strengthening ethnic identity may support academic success among ethnic minority students.

1. Introduction

In China's culturally rich and diverse landscape, numerous ethnic groups coexist harmoniously, often resulting in individuals cultivating dual ethnic identities. This phenomenon is widespread, as many individuals not only identify strongly with their specific ethnic heritage, such as Han, Tibetan, Uighur, or Zhuang but also embrace a broader identification with the Chinese nation (Tao et al., 2020). Such dual identities can empower individuals by allowing them to navigate different cultural contexts and foster a sense of belonging within their ethnic group and the larger national community.

Academic performance (AP) and achieving good grades are primary objectives across all educational levels, positively affecting learners and educational systems (Hayat et al., 2020; Mega et al., 2014). A critical area of concern in educational psychology is understanding why some students give up when faced with academic challenges while others persist and use strategies to maintain their performance. Researchers have produced many findings about factors that promote and correlate with academic success, aiming to predict and prevent dropout rates (Winne and Nesbit, 2010). There are many factors that may influence academic performance, such as one's emotions, self-regulated learning, motivation (Winne and Nesbit, 2010), and student satisfaction (Alcoba and La-Ongsri, 2024). Research also argued that students who are identified with academics are more motivated to succeed academically and thus are more likely to experience positive academic outcomes (Rodriguez, 2024). Consequently, researchers and educational psychologists have long focused on identifying the factors that influence students' academic success. Academic success is a complex phenomenon shaped by various elements, including individual characteristics, sociocultural contexts, self-efficacy, positive emotions, learning strategies, and motivational factors (Coetzee et al., 2020; Hayat et al., 2020).

Research has shown that possessing a dual ethnic identity can significantly influence an individual's psychological well-being and academic performance. Studies have primarily examined various aspects of this topic, focusing on inter-ethnic relations, the psychological health of individuals, and their ability to adapt culturally (Bakar et al., 2023; Yuan and Li, 2019). For instance, a solid connection to one's ethnic identity can provide social support and enhance self-esteem, while a national identity may

offer a sense of unity and common purpose. This interplay between identities has implications for how individuals engage with their educational environments and interact with their peers from different backgrounds. Other research pays attention to international student academic achievement through rigorous assessment activities (Namoun and Alshanqiti, 2020).

Moreover, specific motivations are crucial in shaping human behavior, particularly in educational settings. A student's learning behavior is often fueled and sustained by various types of learning motivation, which can stem from personal interests, cultural values, or aspirations for the future. This motivation is vital for academic success, as it directly influences the learning process and outcomes. When motivated, students invest more effort, engage more deeply with the material, and perform better academically. Understanding these dynamics is essential for fostering environments that support the diverse needs of students in a multicultural society.

Recognizing the importance of learning motivation, both intrinsic and extrinsic, is crucial for policies and projects to prioritize cultivation. Colleges can support this by offering mental health courses, providing psychological counseling, and fostering positive learning attitudes, self-identity, and ethnic identity among students. This approach encourages a beneficial interaction between academic performance and psychological health.

Ethnic identity (EI) is a complex and multifaceted construct about an individual's acknowledgment and identification with a specific ethnic group. It encompasses a conscious recognition of belonging to that group and reflects the attitudes, beliefs, and feelings one holds regarding that ethnic community. This concept is fundamental as it plays a vital role in shaping an individual's sense of self and can influence their social interactions and experiences.

Research shows that ethnic identity is especially significant for individuals from ethnic minority groups, as it can offer strength, resilience, and community support in navigating societal challenges and discrimination (Hasanah et al., 2023; Phinney, 1992; Phinney and Alipuria, 1990). EI development can involve exploration and commitment, impacting various aspects of life, including personal relationships, cultural practices, and social engagement. Understanding EI is crucial for appreciating the diverse experiences of individuals and the challenges they face in a multicultural society.

To accurately measure EI, the Multi-group Ethnic Identity Measure (MEIM) was developed by Phinney (1992) and has since been broadly utilized in research (Burrow-Sanchez, 2014; Sarno and Mohr, 2016; Constante et al., 2020; Thomas et al., 2022). Previous studies indicate that an individual's EI can be shaped by the distinctive characteristics of festivals and the associated tourism factors in their community (Deagon, 2008; Zeitler, 2009). Furthermore, research has shown that participation in ethnic festivals can significantly enhance participants' sense of ethnic identity (Tao et al., 2020).

Ethnic identity, which encompasses a sense of belonging and connection to one's ethnic group, plays a crucial role in various aspects of an individual's life, including academic engagement (Phinney, 1992). A solid and positive ethnic identity can foster self-worth and a sense of belonging, enhancing academic resilience and motivation. Conversely, a hostile or marginalized ethnic identity may lead to feelings of alienation and disengagement, potentially harming academic performance. However, there has been limited research on how ethnic identity influences the academic performance of minority college students and how different motivational models may mediate this influence. The specific mechanisms through which ethnic identity affects academic performance remain unclear.

Learning motivation (LM), a vital aspect of self-determination theory, offers a comprehensive framework for understanding human development and well-being with significant educational implications. It plays a crucial role in shaping students' academic engagement and outcomes. This theory posits that fulfilling students' fundamental psychological needs for autonomy, competence, and relatedness is essential for fostering intrinsic motivation—a type of motivation defined by internal satisfaction (Ryan and Deci, 2000).

Intrinsic and extrinsic motivation are constructs that can predict achievement and behaviors related to distinction. Specifically, students who are intrinsically motivated engage in learning and performance for their satisfaction. Motivation to learn is critical for students, as it drives persistence, engagement, and effort in academic contexts (Ryan and Deci, 2020). Students' interests, self-efficacy, and goals influence their reading motivation, enhancing comprehension outcomes (Gunasinghe et al., 2020; Wani and Ismail, 2024). On the other hand, a lack of motivation can lead to disengagement, procrastination, and poor academic performance.

Research indicates that intrinsically motivated students tend to persist in the face of academic challenges (Rodriguez, 2024) and ultimately achieve higher academic performance (Hsieh et al., 2021). Focusing on the link between learning motivation and academic success is essential to address the challenges students face today.

This study explores the mediating role of learning motivation in the relationship between ethnic identity and academic performance among college students in Guangxi Province, China. By situating these findings within the broader context of multicultural education globally, the study provides insights into fostering academic success among ethnic minorities across diverse settings. By examining the interactions among these three constructs, the research seeks to provide insights into the complex dynamics that influence academic success. The findings may inform effective educational strategies designed to support the

diverse needs of students in Guangxi and promote the inclusivity of different minority students. Examining these relationships will deepen students understanding of the relationship between ethnic identity and academic performance and how these direct and indirect relationships affect educational practices, ultimately directing college students themselves to pay more attention to their academic performance by focusing on their understanding level of ethnic identity and put stimulating learning motivation into practice, guiding policymakers and educators in creating inclusive learning environments that honor and integrate cultural diversity.

Therefore, the purpose of the research will employ a quantitative research design to investigate the following meaningful questions:

1. What is the relationship between ethnic identity and academic performance among college students in Guangxi Province?
2. What is the relationship between ethnic identity and learning motivation among college students in Guangxi Province?
3. What is the relationship between learning motivation and academic performance among college students in Guangxi Province?
4. Does learning motivation mediate the relationship between ethnic identity and academic performance among college students in Guangxi Province?

The questionnaire aims to study the academic performance of ethnic minority students, focusing on the role of ethnic identity and its relationship with learning motivation. This study seeks to measure how ethnic identity and motivation influence academic success. It is designed to study ethnic minority students' academic performance through ethnic identity and their relationships in improving learning motivation. This study aims to measure the influence of learning motivation on ethnic identity and academic performance.

2. Methodology

2.1. Population

This quantitative study focuses on ethnic minority college students as participants. This study selected ethnic minority students from three local colleges as respondents in Guangxi province, representing a diverse range of ethnic backgrounds. A sample size of 828 was determined to provide adequate statistical power for Structural Equation Modeling (SEM), as larger samples improve the reliability of parameter estimates and model fit. This size also ensures a diverse representation of ethnic minority groups within Guangxi Province. Participants were selected using stratified random sampling to ensure representation across various ethnic minority groups in Guangxi Province. This method was chosen to capture diverse perspectives, minimizing potential selection bias. According to Umaña-Taylor (2023), the main aim of the sample size is to know who would participate in the research. The sample size was drawn from the total population of 36,054 college students. A total of 900 surveys were distributed, and 828 sets were returned, resulting in a response rate of 92.00%. The sample includes 46.1% males and 53.9% females. In terms of age, most respondents (72.2%) are between 18 and 22 years old, while the remaining 17.8% are aged 22 and above.

2.2. Hypothesis

There are hypotheses which need to be tested:

H1: There is a significant and positive relationship between ethnic identity and academic performance.
H2: There is a significant and positive relationship between ethnic identity and learning motivation
H3: There is a significant and positive relationship between learning motivation and academic performance.
H4: Learning motivation mediates the relationship between ethnic identity and academic performance.

2.3. Measure

To develop a measurement model for the variables, the questionnaire utilizes a 5-point Likert scale to assess responses across various dimensions, ranging from 1, indicating 'Strongly Disagree,' to 5, indicating 'Strongly Agree.' For this study, modifications were made to the original questionnaire. Following the recommendations of Hair et al. (2019), a 7-point Likert scale was adopted to enhance data variability. The measurement includes 24 items distributed across three constructs to evaluate the relationships among the variables.

2.4. Data analysis

This study employs a quantitative research method. Structural Equation Modeling (SEM) quantifies the data and explores the relationships between variables. To validate the proposed factor loadings for each construct and ensure the construct validity of the measures, Confirmatory Factor Analysis (CFA) was performed (Haron et al., 2020; Nordin and Tengku Ariffin, 2016; Constante et al., 2021) by using Covariance-Based Structural Equation Modeling (CB-SEM) to evaluate the measurement model and the structural model.

Data was analyzed using IBM SPSS software (Hair et al., 2010) and SmartPLS software. Even though the study items are adapted from prior research, conducting factor analysis remains crucial (Camacho-Morles et al., 2021). The best-fit model was determined through Structural Equation Modeling (SEM). All construction and measurement items originated from the survey. Generally, a higher factor loading indicates a better fit. Typically,

loadings below 0.3 are not considered meaningful. An adequate factor loading is defined as above 0.5, ideally reaching 0.7 (Hair et al., 2010), suggesting that values lower than 0.5 should be eliminated to achieve a satisfactory model fit.

Furthermore, the goodness-of-fit measures derived from the Confirmatory Factor Analysis (CFA) were employed to assess model fit. In this stage, the model's fitness was evaluated using the probability value (p-value), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Standardized Root Mean Square Residual (SRMR). The thresholds used to assess model fit (Hair et al., 2010) recommended, are presented in Table 1.

Table 1: Level of acceptance of fitness indices

Fit index	Level of acceptance
1. Probability value	p<0.05
2. standardized root mean square residual	<0.08
3. Comparative fit index	>0.9
4. Tucker-Lewis index	>0.9

3. Findings

3.1. Assessment of the measurement model

Goodness-of-fit indices were evaluated using established thresholds (e.g., CFI > 0.90, SRMR < 0.08). Modifications were iteratively applied, ensuring that each adjustment was theoretically justified and improved the model's alignment with observed data. This approach adheres to best practices in SEM analysis as outlined by Hair et al. (2010). The results of the goodness-of-fit indices for the proposed measurement model are presented in Table 2. Some indices meet the satisfactory threshold values, with p-values falling below 0.05, while others are near the acceptable threshold levels. Nonetheless, based on the overall goodness-of-fit indices, the measurement model does not adequately fit the data. Consequently, it is essential to modify the model to enhance its goodness-of-fit.

Table 2: Goodness-of-fit (GOT) indices

GOT indices	P-value	SRMR	TLI
Initial measurement model	0.000	0.110	0.782
Final measurement model	0.000	0.059	0.885

The process of model modification involved a thorough examination of both the standardized factor loadings and the modification indices. Initial analysis revealed that certain items (e.g., EI3, EI5) had factor loadings below the threshold of 0.5, indicating poor correlation with their respective constructors. To improve the model fit and enhance its explanatory power, removing these items from further analysis is advisable. These items were removed to enhance model fit, as recommended by Hair et al. (2010). Following these adjustments, the final measurement model demonstrated improved fit indices (e.g., CFI = 0.900, SRMR = 0.059), suggesting a robust and reliable model for hypothesis testing. This step is crucial for refining the model and ensuring it accurately represents the underlying studied constructs.

Following the implementation of the model modification procedures, the fit indices for the revised model demonstrate a satisfactory level of fit, as detailed in Table 2. Of note is the significant p-value obtained during the evaluation. The CFI reaches a value of 0.900, comfortably surpassing the commonly accepted threshold of 0.9, which suggests a strong fit between the model and the observed data. Additionally, the TLI is recorded at 0.885, which, while slightly below the 0.9 benchmark, indicates proximity to an acceptable fit and suggests room for further improvement. The SRMR is calculated at 0.059, falling below the maximum threshold of 0.08, thus reinforcing the model's adequacy in terms of fitness. Collectively, these fit indices provide a positive final assessment of the model, confirming its validation and supporting its effectiveness in accurately assessing both validity and reliability within the context of the study.

3.2. Assessment of reliability and validity

According to Hair et al. (2022) and Dasgupta et al. (2022), a two-step approach was utilized for the CB-SEM analyses, the first step involved evaluating the constructs for reliability and validity to confirm the model fit. A widely accepted benchmark for solid validity and reliability indicates that construct reliability (CR) values should exceed 0.7, while the average variance extracted (AVE) should be greater than 0.5 (Hair et al., 2010).

Table 3 presents the CR values, which range from 0.848 to 0.964, indicating a high level of internal consistency across the different constructs analyzed. The AVE also fell between 0.505 and 0.770. These values demonstrate that each construct has met the necessary benchmarks for convergent validity, ensuring that the items designed to measure each construct capture the same underlying concept. Overall, these results affirm that all constructions in the study have achieved the required convergent validity and reliability criteria, confirming their effectiveness in the measurement model.

The study proceeded to evaluate discriminant validity by employing the Heterotrait-Monotrait Ratio (HTMT) criterion, adhering closely to the guidelines set forth by Ogbu and Simons (2022) and further elaborated upon by Franke and Sarstedt (2019). According to these guidelines, for a rigorous discriminant validity assessment, HTMT values should ideally remain at or below the threshold of 0.85. A more lenient threshold of 0.90 is also recognized for situations where a less stringent evaluation is acceptable.

The analysis presented in Table 4 of the study revealed that all calculated HTMT values were consistently below the more stringent threshold of 0.85. This observation led to the conclusion that the evaluated constructions were indeed distinct, thereby supporting the notion of adequate discriminant validity. In conjunction with various

other validity assessments conducted throughout the study, these findings collectively reaffirmed the robustness of the measurement model employed. Consequently, the validity and reliability of the constructions were thoroughly validated, ensuring that the research outcomes were credible and trustworthy.

Table 3: Validity and reliability of measurement model

Construct	Item	Factor loading (above 0.5)	Internal consistency reliability (above 0.6)		Convergent validity AVE (above 0.5)
			CA	CR	
Ethnic identity	EI1	0.927	0.941	0.940	0.764
	EI2	0.926			
	EI4	0.882			
	EI6	0.758			
	EI7	0.865			
Learning motivation	LM1	0.824	0.963	0.964	0.770
	LM2	0.731			
	LM3	0.771			
	LM4	0.930			
	LM5	0.933			
	LM6	0.946			
	LM7	0.916			
	LM8	0.940			
Academic performance	AP1	0.769	0.861	0.848	0.505
	AP2	0.796			
	AP5	0.589			
	AP6	0.693			
	AP7	0.696			
	AP8	0.702			

Table 4: Discriminant validity of Heterotrait-Monotrait ratio (HTMT<0.85)

Construct	AP	EI	LM
AP	-	-	-
EI	0.429	-	-
LM	0.616	0.741	-

3.3. Assessment of structure model and hypothesis testing

Following the assessment and measurement of the model, the most critical analysis involved evaluating the structural model and testing the associated hypotheses. The structural model analysis highlighted significant and insignificant relationships among the proposed paths.

This evaluation focuses on the direct effects relevant to research questions 1, 2, and 3. Three hypotheses (H1, H2, and H3) were tested to address these questions. This process entails examining the relationships between critical variables to enhance our understanding of their interdependence. Furthermore, research question 4 investigates the mediating effect, prompting an examination of hypothesis H4 to uncover which variable may indirectly influence another.

A bootstrap method was then employed with 10,000 resamples in the structural model analysis to derive path coefficients, standard errors, t-values, and p-values. Additionally, various criteria were utilized, including p-values, confidence intervals, and effect sizes, addressing the critiques presented by Hahn and Ang (2017) concerning the limitations of p-values in hypothesis significance testing.

After performing the assessment procedures, the overall test outcomes for the structural model are illustrated in Fig. 1. First, the study examines the direct effects of ethnic identity on academic performance. The R^2 value was 0.401, which suggests that the construct predictors explained 40.1% of the variance in academic performance. Notably, the relationship between ethnic identity and academic performance ($\beta_{EI \rightarrow AP}$= -0.021, $p > 0.05$) is not significant, so H1 is not supported.

Then, it examines the direct effects of ethnic identity on motivation for learning. The R^2 value was 0.479, which suggests that the construct predictors explained 47.9% of the variance in learning motivation. The relationship between ethnic identity and learning motivation ($\beta_{EI \rightarrow LM}$= 0.692, $p < 0.01$) is significant, which suggests that H2 is supported. Finally, the relationship between learning motivation and academic performance ($\beta_{LM \rightarrow AP}$= 0.647, $p < 0.01$) is significant, it suggests that H3 is supported. In short, these findings suggest that H1 is not supported, and H2 and H3 are supported.

The study explored the mediating role of learning motivation by employing a resampling technique that involves drawing samples from a single dataset (Bonilla et al., 2021). When assessing the mediating effect of learning motivation between ethnic identity and academic performance, the results revealed a significant indirect relationship via learning motivation ($\beta_{EI \rightarrow LM \rightarrow AP}$=0.448, $p<0.01$). The finding suggests that H4 was supported.

For a clearer understanding of these interactions, Table 5 presents a comprehensive summary of the methodologies and criteria applied to analyze both the direct and indirect hypotheses explored in this study.

4. Discussion and conclusion

For all four research questions, the research has four research hypotheses. Regarding questions 1 to 3, the study examined the direct effect of ethnic identity, learning motivation, and academic performance, which have three hypotheses (H1, H2, and H3). The findings revealed that hypotheses H2,

and H3 received support, suggesting a significant interplay between these variables. In contrast, hypothesis H1 was not supported, indicating that the expected direct relationship did not hold in this context. Regarding question 4, the study examined the indirect effect among variables, which has one hypothesis (H4). The analysis result revealed that hypotheses H4 were supported, of which the main question of the study was proved. A detailed presentation of the findings for all tested hypotheses can be found in Table 6 for a thorough understanding of the results and insights gained from the research. Table 6 highlighted the specific relationships and outcomes examined in the study, providing a clear overview of the data collected and analyzed.

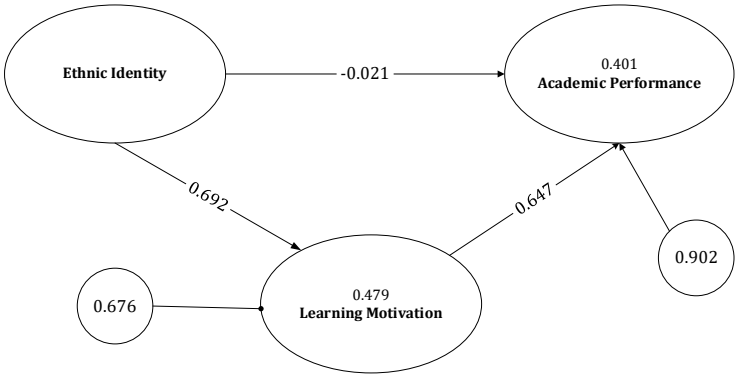

Fig. 1: The structure model

Table 5: Hypothesis testing: Direct effects

Path hypothesis variable relationship	Path coefficient beta (β)	Standard deviation (STDEV)	T-statistics (|O/STDEV|)	P-values	Decision
EI->AP	-0.021	0.040	0.521	0.602	Not supported
EI->LM	0.692	0.033	21.190	0.000	Supported
LM->AP	0.647	0.066	15.478	0.000	Supported
EI->LM->AP	0.448	0.039	11.468	0.000	Supported

Table 6: Summary of hypotheses testing results

Hypotheses	Result
H1: Ethnic identity positively affects academic performance.	Not Supported
H2: Ethnic identity positively affects learning motivation.	Supported
H3: Learning motivation positively affects academic performance.	Supported
H4: Learning motivation mediates the relationship between ethnic identity and academic performance.	Supported

This study provides valuable insights into the complex interplay between ethnic identity, learning motivation, and academic performance among Guangxi college students. The results affirmed how ethnic minority college students significantly and distinctly influence their academic performance via ethnic identity as well as resource availability. Specifically, students' ethnic identity was found to increase their learning motivation, and learning motivation also has a predominant effect on academic performance.

The findings of this study suggest that ethnic identity plays a pivotal role in shaping learning motivation among students across diverse cultural and geographical settings. While not exerting a direct and significant influence on academic performance, ethnic identity significantly impacts students' enthusiasm and engagement in the learning process, contributing to a constructive learning environment. This positive relationship between ethnic identity and learning motivation underscores its relevance not only within the specific context of Guangxi Province but also within global educational systems that cater to ethnic minority students. It contributes significantly to the existing body of knowledge regarding college students, building upon insights established in previous studies (Coetzee et al., 2020; Hayat et al., 2020). This finding prompts a deeper consideration of the factors influencing educational success; it suggests that a strong ethnic identity does not guarantee improved academic results directly. Instead, ethnic identity can directly enhance learning motivation, a critical component of academic success. Furthermore, students with a high level of cultural identity tend to actively engage with their culture, demonstrating an open and inclusive mindset (Peng and Patterson, 2022). This attitude not only helps alleviate their cultural psychological conflicts and effectively reduces the psychological gap before and after enrolment but also facilitates students to achieve more successful experiences at school, earning positive evaluations from others, and thereby enhancing their learning motivation (Oyserman and Dawson, 2024). These factors all have a significant positive impact on cultivating and improving the academic performance of ethnic minority students.

A vital outcome of this study is demonstrating that learning motivation is a mediator in the relationship between ethnic identity and academic performance. This implies that while ethnic identity itself may not directly influence students' academic achievements, it plays a crucial role in fostering

motivation to learn, which, in turn, can enhance academic outcomes. Students with strong learning motivation can enhance their self-confidence, work harder to complete learning tasks and overcome academic challenges, effectively deal with problems encountered in the learning process, and thereby demonstrate excellent academic performance (Hsieh et al., 2021). These findings underline the importance of learning motivation and the benefits of strengthening students' ethnic identity toward academic performance. These insights are particularly relevant not only in Guangxi Province but also in global educational systems striving to support ethnic minority students. For instance, similar patterns have been observed in studies conducted in North America and Europe, emphasizing the universal role of identity and motivation in academic outcomes. In essence, while one's ethnic background may not directly correlate with grades or test scores, it fosters an environment where motivation thrives, ultimately leading to better academic outcomes. Furthermore, the results demonstrate that learning motivation, in turn, substantially contributes to improved academic performance, serving as a crucial mediator in the interaction between ethnic identity and academic success. Despite the absence of a direct correlation between ethnic identity and academic performance, the data highlights a noteworthy point: respondents generally exhibit a strong sense of pride in their ethnic identity. Many expressed a commitment to maintaining and promoting their cultural heritage, suggesting that while ethnic identity may not directly drive academic achievement, it is still a significant aspect of their identity and values. This pride can foster a supportive environment that may indirectly facilitate academic success. Overall, these insights provide a nuanced perspective on the role of ethnic identity in the educational experiences of college students and how ethnic identity shapes the educational experiences of college students worldwide.

5. Limitations and future research

This study offers valuable insights into the relationship between ethnic identity, learning motivation, and academic performance; however, several limitations warrant consideration.

First, the geographical focus on Guangxi Province restricts the generalizability of the findings. The unique socio-cultural context of Guangxi may influence the observed relationships, making it challenging to extrapolate these results to other regions or countries. Future research should broaden the scope to encompass diverse geographical locations and ethnic groups, both within and outside China, enhancing the generalizability and external validity of the findings.

Second, a substantial portion of our sample (approximately half) did not identify as members of ethnic minority groups in Guangxi. This demographic heterogeneity raises questions about the interpretation of questionnaire responses related to ethnic identity and the extent to which the instrument effectively captured the experiences of all participants. Future studies might benefit from employing more nuanced measures of ethnic identity that account for this diversity, perhaps incorporating qualitative methods to complement quantitative data.

Third, the reliance on self-reported data may introduce social desirability bias, as participants might have provided responses, they deemed favorable. Additionally, the regional focus of Guangxi Province, with its unique socio-cultural characteristics, may limit the applicability of findings to broader contexts. Efforts to address these biases, such as employing mixed methods or longitudinal designs, are recommended for future research.

Lastly, the current model focused primarily on the mediating role of learning motivation, neglecting other potentially influential factors, particularly those related to a family environment. Among the various factors, current research suggests that family environment affects language learning (Li et al., 2024), and parents' beliefs stand out as a significant determinant of educational outcomes (Vu et al., 2022). A conducive family environment, characterized by positive parental beliefs and supportive parenting styles, is critical for fostering learner engagement and academic success. The absence of these variables represents a significant omission in the current model. Future studies should explicitly integrate family environment factors, such as parental beliefs, socioeconomic status, parental support in education, and the overall family environment, to provide a more comprehensive understanding of the factors influencing academic performance.

List of abbreviations

AP	Academic performance
EI	Ethnic identity
LM	Learning motivation
CFA	Confirmatory factor analysis
SEM	Structural equation modeling
CB-SEM	Covariance-based structural equation modeling
MEIM	Multi-group ethnic identity measure
SPSS	Statistical package for the social sciences
CFI	Comparative fit index
TLI	Tucker-Lewis index
SRMR	Standardized root mean square residual
CR	Composite reliability
CA	Cronbach's alpha
AVE	Average variance extracted
HTMT	Heterotrait-monotrait ratio
GOT	Goodness-of-fit
p-value	Probability value (statistical significance indicator)
R^2	Coefficient of determination (in regression/SEM models)
β	Beta coefficient (path coefficient in SEM)
STDEV	Standard deviation
T-statistics	Test statistic used in hypothesis testing

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Compliance with ethical standards

Ethical considerations

This study was conducted in accordance with the ethical guidelines of Universiti Pendidikan Sultan Idris (UPSI). All participants were informed about the purpose of the study and their participation was voluntary. Informed consent was obtained from all participants. The survey was anonymous, and the confidentiality of the data was maintained throughout the research process.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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