

Family Support and Sports Participation Motivation among Chinese University Students: The Mediating Role of Peer Friendship Quality Authors

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Abstract: Family support has been consistently identified as a significant social correlate of physical activity participation among adolescents and young adults. However, the associations among family support, peer friendship quality, and sports participation motivation remain insufficiently examined in Chinese university populations—a context characterized by prolonged, high-density peer interactions within collective dormitory settings. This study investigated the direct and indirect associations among family support, peer friendship quality, and sports participation motivation in Chinese university students. A cross-sectional survey was conducted with 300 non-physical education undergraduate students aged 18–22 years from Jinan University, China. Family support was measured using a revised version of the Parental Exercise Support Scale, peer friendship quality was assessed using the Sport Friendship Quality Scale, and sports participation motivation was measured using the Shortened Version of the Exercise Motivation Scale. Confirmatory factor analysis was performed to evaluate the measurement model, and mediation analysis was conducted using the PROCESS macro (Model 4) with bias-corrected bootstrapping procedures (5,000 resamples). Family support showed a significant association with peer friendship quality ($B = 0.455$, $SE = 0.054$, $p < 0.001$) and sports participation motivation ($B = 0.357$, $SE = 0.065$, $p < 0.001$). In the mediation model, peer friendship quality was significantly associated with sports participation motivation ($B = 0.397$, $SE = 0.074$, $p < 0.001$), and the direct association between family support and sports participation motivation remained significant ($B = 0.176$, $SE = 0.070$, $p = 0.013$). The indirect pathway from family support to sports participation motivation via peer friendship quality was also significant ($B = 0.181$, 95% bootstrap CI = [0.104, 0.276]), accounting for approximately 50.6% of the total statistical association, indicating a partial mediation pattern. Family support appears to function not only as a direct correlate of sports participation motivation but also as a social resource that is indirectly associated with motivation through peer friendship quality among Chinese university students. The findings indicate that peer friendship quality partially accounts for the positive association between family support and sports participation motivation in this population. Promoting coordinated family–peer support environments in higher education settings may support students' motivation for physical activity.

1. Introduction

The university years represent a critical developmental period during which young adults experience substantial academic, psychological, and social transitions. During this stage, students are required to adapt to increased academic demands, establish new interpersonal relationships, and manage greater autonomy within relatively unstructured environments. At the same time, the transition from secondary education to university often coincides with a decline in structured physical activity (PA), making sustained participation increasingly dependent on individual motivation and social support. Consequently, insufficient sports participation motivation (SPM) has become a growing concern among university students [1, 2] particularly in China, where national initiatives such as Healthy China emphasize the importance of regular PA for promoting lifelong health and well-being.

Chinese university students represent a distinctive population whose PA behaviors are situated within by unique sociocultural and institutional contexts. Most students live in collective dormitory environments and maintain frequent interactions with peers while continuing to rely on their families for emotional and financial support. As a result, both family and peer environments may play important roles in supporting students' motivation toward sports participation. Identifying the social factors that facilitate SPM is therefore important for understanding PA behavior and promoting student health in higher education settings.

Family support (FS) has been widely recognized as an important correlate of PA participation and motivation. In the sports context, FS generally refers to the emotional, material, and informational resources provided by parents to encourage sports participation [3-5]. According to Social Learning Theory [6, 7], parents serve as important role models whose attitudes and behaviors guide children's health-related beliefs and behavioral choices through observation and reinforcement. Previous studies have consistently demonstrated positive associations between parental support and PA-related outcomes. International evidence suggests that parental encouragement, financial support, and behavioral modeling contribute to sustained sports participation and stronger exercise motivation among adolescents and young adults [8-10]. Similar findings have been reported in China, where family exercise habits and parental support are positively associated with students' PA participation and motivation [11-13].

In addition to family influences, peer relationships become increasingly important during the university years. As students spend substantial time interacting with classmates and roommates, peer friendship quality (PFQ) may play an important role in maintaining health behaviors and motivational outcomes. PFQ refers to the degree of trust, emotional support, understanding, and companionship experienced within peer relationships [14]. Previous studies have shown that high-quality friendships are associated with positive psychological adjustment, stronger social support, and greater participation in sports and physical activity [15-17]. Research conducted in sports settings further indicates that positive peer relationships are associated with stronger sports motivation and behavioral engagement among adolescents [18]. In addition, peer influence and social support have been identified as important factors promoting sustained participation in physical activity [16, 19].

Importantly, family and peer systems are not independent. Developmental research suggests that supportive family environments contribute to the development of social competence and interpersonal skills, which facilitate the formation of high-quality peer relationships [20, 21]. Students who receive greater parental support may therefore be more likely to establish positive friendships, which in turn may promote stronger sports participation motivation. High-quality friendships may provide emotional reinforcement, social belonging, and opportunities for shared sports experiences, all of which are positively associated with sustained motivational engagement in

physical activity. From this perspective, PFQ may represent an important pathway linking FS and SPM. However, although the relationships among family support, peer relationships, and physical activity have been documented separately, limited research has examined PFQ as a mediator between FS and SPM among Chinese university students. Unlike the more independent living arrangements documented in much of the existing research, the Chinese collegiate context—in which students maintain close and sustained proximity to peers while continuing to rely on their families—may offer a distinct setting for examining the associations among family support, peer friendship quality, and sports participation motivation.

Therefore, the present study aimed to investigate the relationships among family support, peer friendship quality, and sports participation motivation among Chinese university students residing in on-campus collective dormitories. Specifically, this study examined whether family support was associated with sports participation motivation directly, indirectly through peer friendship quality, or both.

2. Materials and Methods

2.1 Research Design and Hypotheses

This study employed a cross-sectional, quantitative design to test the theoretically grounded relationships among family support, peer friendship quality, and sports participation motivation. Based on previous theoretical and empirical evidence, the proposed model assumes that family support influences sports participation motivation both directly and indirectly through peer friendship quality (Figure 1).

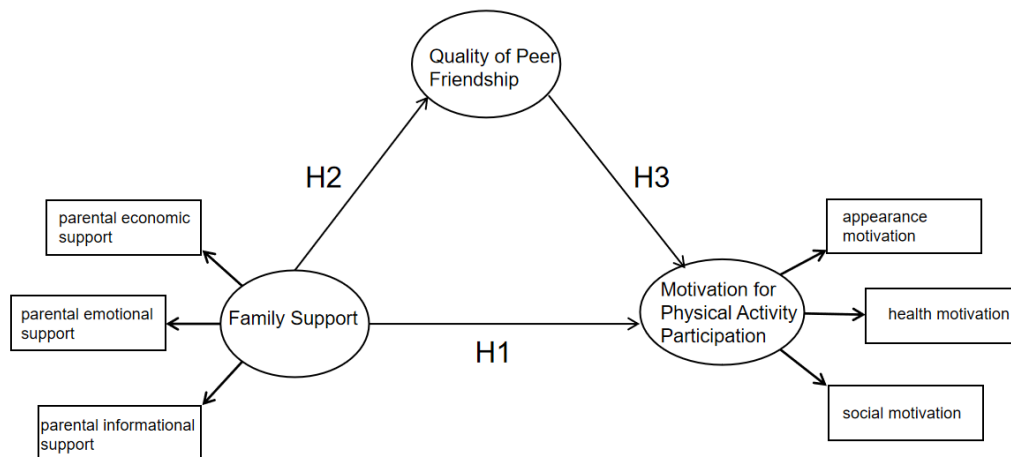


Figure 1. Hypothesized model of the relationships among family support, peer friendship quality, and sports participation motivation.

Accordingly, the following hypotheses were proposed:

H1: Family support positively predicts sports participation motivation among Chinese university students.

H2: Family support positively predicts peer friendship quality among Chinese university students.

H3: Peer friendship quality positively predicts sports participation motivation among Chinese university students.

2.2 Procedure and Participants

This study was reviewed and approved by the Ethics Committee of Jinan University (Approval No. JNUECKY-20260325-059). All procedures adhered to the ethical principles of the Declaration of Helsinki, and data collection commenced only after ethical approval was obtained. The participants were undergraduate students enrolled at Jinan University in Guangzhou, China.

Data were collected using a convenience sampling strategy. Recruitment involved a combination of offline questionnaire distribution during public physical education classes and online survey dissemination across various faculties and academic years to enhance sample diversity. Before beginning the survey, participants were provided with an information sheet outlining the purpose of the study, the voluntary nature of participation, and the assurance of anonymity and confidentiality. Participants provided informed consent before accessing the questionnaire. The survey took approximately 15 – 20 min to complete and included validated instruments for measuring family support (FS), peer friendship quality (PFQ), and sports participation motivation (SPM). Participants were informed that they could withdraw at any point without penalty, and no incentives were offered.

Eligible participants were undergraduate students aged 18 – 22 years. Students majoring in physical education or sports-related disciplines were excluded based on self-reported academic majors to prevent systematic bias related to professional training backgrounds. To empirically verify the contextual assumption of daily peer proximity, a mandatory screening question ("Do you currently reside in a collective on-campus university dormitory?") was embedded in the survey. Only students who selected 'Yes' were permitted to proceed, ensuring the entire analytic sample resided in on-campus collective dormitories. Prior to the main survey, a pilot study was conducted with 100 undergraduate students to evaluate item clarity, response format, and completion time. Minor revisions were made based on feedback, and all participants involved in this pilot phase were excluded from the final analytical sample.

Table 1 General Characteristics of the Participants (n=300)

Characteristic	Category	n	%
Gender	Male	134	44.7
	Female	166	55.3
Academic year	First year	87	29.0
	Second year	92	30.7
	Third year	68	22.7
	Fourth year	53	17.7
Academic major	Humanities and social sciences	90	30.0
	Engineering	122	40.7
	Natural sciences	88	29.3

A total of 318 undergraduate students initially participated in the survey. Incomplete responses were defined as questionnaires with missing data on any of the main study variables (family support, peer friendship quality, or sports participation motivation). Inattentive responses were screened using predefined data-quality criteria, including an embedded attention-check item (a simple arithmetic question), uniform response patterns across Likert-type items, and logical inconsistencies. These criteria were applied to reduce the influence of careless or insufficient-effort responding.

After excluding 18 incomplete or inattentive responses based on these criteria, the final analytic sample comprised 300 students (134 male, 44.7%; 166 female, 55.3%).

Furthermore, an a priori power analysis was conducted using G*Power 3.1.9.7 to determine the required sample size for the multiple linear regression models underlying the mediation analysis (fixed model, R^2 deviation from zero). Assuming a medium effect size ($f^2 = 0.15$), an alpha level of 0.05, a power of 0.95, and a maximum of three predictors, the minimum required sample size was calculated to be 119. Therefore, the final analytic sample of 300 students was more than adequate to ensure robust statistical power for the current study.

With respect to academic year, 87 participants (29.0%) were first-year students, 92 (30.7%) were second-year students, 68 (22.7%) were third-year students, and 53 (17.7%) were fourth-year students. Regarding academic major, 90 students (30.0%) were enrolled in humanities and social sciences, 122 (40.7%) in engineering, and 88 (29.3%) in natural sciences. Detailed demographic characteristics of the participants are presented in Table 1.

2.3 Measures

2.3.1 Measurement of Family Support

Family support was measured using a revised version of the Parental Exercise Support Scale adapted from Marcus and Forsyth [22] and the parental support classification proposed by Beets et al.[9]. The scale conceptualizes parental support as a multidimensional construct comprising three dimensions: economic support (3 items; e.g., "Parents pay for my sports training"), emotional support (3 items; e.g., "Parents praise me for participating in sports"), and informational support (4 items; e.g., "My parents discuss sports with me"). All items are rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), with higher scores indicating greater perceived family support. In the present study, an overall family support score was calculated by averaging all 10 items.

2.3.2 Measurement of Peer Friendship Quality

Peer friendship quality was assessed using the Sport Friendship Quality Scale (SFQS) developed by Weiss and Smith [23] and adapted into Chinese by Zhu et al. [18]. The adapted scale comprises 15 items across four dimensions: intimacy and support (6 items; e.g., "We are honest with each other and can speak directly"), commonality and interaction (4 items; e.g., "My friends and I have common interests and viewpoints"), conflict resolution (3 items; e.g., "We may have conflicts, but we can understand each other"), and instrumental support (2 items; e.g., "Friends provide me with sports-related suggestions"). All items are rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), with higher scores indicating higher-quality peer friendships. In the present study, an overall peer friendship quality score was calculated by averaging all 15 items.

2.3.3 Measurement of Sports Participation Motivation

Sports participation motivation was measured using the Shortened Version of the Exercise Motivation Scale revised by Chen and Li [24]. The scale comprises 9 items across three dimensions: appearance motivation (3 items; e.g., "I want to control my weight"), health motivation (3 items; e.g., "I want to have a strong physique"), and social motivation (3 items; e.g., "I want to meet and make new friends"). All items are rated on a 5-point Likert scale (1 = none, 5 = very strong), with higher scores indicating stronger motivation for exercise. In the present study, an overall sports participation motivation score was calculated by averaging all 9 items.

2.4 Data Analysis

All statistical analyses were conducted using SPSS (Version 26.0), AMOS (Version 24.0), and the PROCESS macro for SPSS [25]. Descriptive statistics (mean, standard deviation, skewness, and kurtosis) were computed to examine data distribution and variable characteristics. Normality was evaluated according to the criteria of absolute skewness ≤ 3 and kurtosis ≤ 7 . Internal consistency reliability was assessed using Cronbach's α . Pearson's correlation analysis was conducted to examine the associations among family support, peer friendship quality, and sports participation motivation.

Confirmatory factor analysis (CFA) using maximum likelihood estimation was conducted in AMOS to evaluate the measurement model. Model fit was evaluated using χ^2/df , GFI, AGFI, CFI, NFI, TLI, RMSEA with 90% confidence intervals, and SRMR. Convergent and discriminant validity were examined through average variance extracted (AVE) and composite reliability (CR).

Mediation analysis was performed using the PROCESS macro with 5,000 bias-corrected bootstrap samples. In this analysis, family support served as the independent variable (X), peer friendship quality as the mediator (M), and sports participation motivation as the outcome variable (Y). All three constructs were operationalized as manifest composite variables (i.e., mean scores of their respective items). Indirect effects were examined using bias-corrected bootstrapping, and statistical significance was evaluated based on 95% confidence intervals that did not include zero.

Given the relatively large number of items (34 items) compared to the sample size (N=300), item parceling was employed for the CFA. This technique was selected to maintain an optimal sample-size-to-parameter ratio, reduce idiosyncratic measurement error, and ensure the stability of the subsequent mediation estimation, rather than to mask underlying multidimensionality.

3. Results

3.1 Preliminary Analyses

Prior to formal data analysis, a preliminary psychometric evaluation of the scales was conducted to ensure the reliability, structural integrity, and validity of the measurement instruments within the target demographic. This was followed by rigorous diagnostic testing to assess the potential presence of common method bias (CMB).

3.1.1 Pilot Test and Reliability Evaluation

The scales used in this study were adapted from well-established instruments in the field of sports psychology. To verify the clarity of items, response format, and psychometric properties prior to the formal survey, a pilot test was conducted with a convenience sample of 100 non-physical education (non-PE) undergraduate students aged 18 – 22 years, consistent with the eligibility criteria of the formal study.

Reliability was tested using Cronbach's alpha coefficient. The overall Cronbach's alpha for the total scale (34 items across three constructs) was 0.893, which exceeded the conventional threshold of 0.70, indicating excellent internal consistency of the instruments. The item-level reliability statistics are presented in Table 2.

Table 2 Reliability Statistics of the Pilot Test

Index	Value
Cronbach's Alpha	0.893
Number of Items	34
Valid Cases (N)	100

3.1.2 Content Validity Evaluation

Content validity was evaluated via expert consultation. Five experts and scholars in the field of sports science were invited to rate the structure, content, and overall appropriateness of the scale. A 5-point Likert rating system was used. Based on the expert evaluation, the Item-Level Content Validity Index (I-CVI) ranged from 0.80 to 1.00, and the Scale-Level Content Validity Index (S-CVI/Ave) was 0.87, indicating excellent content validity. Furthermore, Kendall's Coefficient of Concordance (Kendall's W) was calculated to assess inter-rater reliability among the five experts. The analysis yielded a value of 0.384 ($p = 0.038$), indicating a statistically significant and moderate level of agreement. Collectively, these results confirm that the measurement instruments possess strong content validity and are highly relevant to the target demographic. The detailed expert validity evaluation results are presented in Table 3.

Table 3 Expert Validity Evaluation Results

Assessment dimension	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Number of experts with score ≥ 4	I-CVI
Structure	4	4	4	4	4	5	1.00
Content	4	3	4	4	5	4	0.80
Overall	3	4	4	5	4	4	0.80

Notes: A 5-point Likert scale was adopted for expert evaluation: 1 = completely unreasonable, 2 = relatively unreasonable, 3 = average, 4 = relatively reasonable, 5 = very reasonable. I-CVI = Item-level Content Validity Index, calculated as the ratio of the number of experts who gave a score ≥ 4 to the total number of experts. Strictly speaking, the index presented here is the dimension-level Scale-level Content Validity Index (S-CVI).

3.1.3 Structural Validity and Common Method Bias Testing

Structural validity was confirmed via exploratory factor analysis (EFA), which yielded a satisfactory KMO value of 0.844 and a significant Bartlett's Test of Sphericity ($\chi^2 = 4167.581$, $p < 0.001$). To mitigate potential common method bias (CMB), procedural controls such as anonymous responding were implemented. Statistically, Harman's single-factor test indicated that the first factor accounted for only 25.96% of the variance, and a single-factor CFA exhibited poor fit ($\chi^2/df = 6.514$, CFI = 0.842, RMSEA = 0.150). However, these post-hoc tests are insufficient to definitively rule out CMB, which remains an inherent limitation of this cross-sectional study.

3.2 Descriptive Statistics and Bivariate Correlations

Descriptive statistics (mean, standard deviation) and bivariate correlations for the three core constructs (family support, peer friendship quality, sports participation motivation) are presented in Table 4. Skewness and kurtosis values for all variables were within acceptable ranges (± 3 for

skewness and ± 7 for kurtosis), indicating that the assumption of normality was satisfied for subsequent parametric analyses.

Table 4 Descriptive Statistics and Correlations (n = 300)

Variable	Mean	SD	1	2	3
1. Family Support	3.61	0.53	1		
2. Peer Friendship Quality	3.92	0.507	0.478**	1	
3. Sports Participation Motivation	4.14	0.57	0.331**	0.429**	1

Note: **p < 0.01.

Bivariate correlation analysis revealed significant positive associations among all three constructs. Family support was positively correlated with peer friendship quality ($r = 0.478$, $p < 0.01$) and sports participation motivation ($r = 0.331$, $p < 0.01$). Peer friendship quality was also positively correlated with sports participation motivation ($r = 0.429$, $p < 0.01$). All correlation coefficients were below 0.80, suggesting that multicollinearity was not a concern in subsequent analyses.

3.3 Measurement Model Validation via Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) using AMOS 24.0 was conducted to evaluate the hypothesized three-factor measurement model, comprising family support (FS), peer friendship quality (PFQ), and sports participation motivation (SPM). As a sensitivity analysis to justify the measurement approach, an initial item-level CFA was evaluated. However, the unparceled model exhibited suboptimal global fit, primarily driven by low and non-significant standardized loadings of specific items within the informational support dimension.

Therefore, to preserve the theoretical multidimensionality of the established scales without resorting to extensive item deletion, item parceling was subsequently applied for all constructs. Given the relatively large number of items (34 items) compared to the sample size ($N = 300$), items within each theoretical sub-dimension were averaged to form parcels as indicators for the latent variables. This statistically justified approach (Little et al., 2002) was explicitly adopted to maintain an optimal sample-size-to-parameter ratio, reduce idiosyncratic measurement error, and ensure the stability of the subsequent mediation estimation, rather than to artificially inflate model fit or mask underlying multidimensionality.

Standardized factor loadings for all indicators are presented in Table 5. All factor loadings were statistically significant ($p < 0.001$). For PFQ, standardized factor loadings ranged from 0.683 to 0.934, demonstrating strong relationships between the parcels and the latent construct. For SPM, factor loadings ranged from 0.630 to 0.703, indicating moderate-to-strong associations between the indicators and the latent construct. For FS, the standardized factor loadings for parental economic support (0.725) and parental emotional support (0.620) were within the acceptable range, while the informational support indicator exhibited a relatively low standardized factor loading (Std. Est. = 0.407). Rather than indicating a measurement failure, this finding may reflect meaningful cultural differences in how family sports support is perceived and expressed among Chinese university students. In the Chinese cultural context, where academic achievement is often prioritized and direct parental involvement in sports may be less normative than in Western settings, informational support (operationalized as parents discussing sports or providing sports-related advice) may not be as salient or systematically provided. Consequently, this item was retained in the measurement model, with its lower loading acknowledged as a culturally informative pattern rather than a purely psychometric artifact.

Table 5 Standardized Factor Loadings for the Measurement Model

Latent Variable	Observed Indicator (Subscale)	Cronbach's α	Standardized Factor Loading	SMC
Family Support	Parental Economic Support	0.679	0.725	0.525
	Parental Emotional Support	0.832	0.620	0.385
	Parental Informational Support	0.660	0.407	0.166
Peer Friendship Quality	Friendship Intimacy	0.780	0.934	0.872
	Instrumental Support	0.583	0.683	0.467
	Conflict Management	0.670	0.906	0.821
	Interaction Support	0.681	0.754	0.568
Sports Participation Motivation	Appearance Motivation	0.748	0.703	0.494
	Health Motivation	0.787	0.701	0.491
	Social Motivation	0.803	0.630	0.397

Note: All factor loadings are statistically significant at $p < 0.001$. SMC = squared multiple correlation.

The overall fit indices for the three-factor measurement model are presented in Table 6. The model demonstrated acceptable fit to the data: $\chi^2 = 74.750$, $df = 32$, $p < 0.001$, $\chi^2/df = 2.336$, GFI = 0.938, AGFI = 0.893, CFI = 0.957, TLI = 0.939, RMSEA = 0.074 (90% CI [0.052, 0.096]), SRMR = 0.057. Most fit indices met commonly accepted thresholds, suggesting that the three-factor structure was generally supported at the global model level. The significant chi-square value is consistent with expectations for larger sample sizes, and the AGFI value was only slightly below the 0.90 threshold (within the acceptable range of ≥ 0.85), indicating that the overall model fit was adequate.

Table 6 Model Fit Indices of the Three-Factor Measurement Model

Fit Index	Recommended Criterion	Observed Value
χ^2/df	< 3.00	2.336
GFI	> 0.90	0.938
AGFI	≥ 0.85 (acceptable)	0.893
SRMR	< 0.08	0.057
RMSEA (90% CI)	< 0.08	0.074 [0.052, 0.096]
CFI	> 0.90	0.957
TLI	> 0.90	0.939
NFI	> 0.90	0.927

Convergent and discriminant validity were assessed using composite reliability (CR), average variance extracted (AVE), maximum shared squared variance (MSV), and average shared squared variance (ASV), with results presented in Table 7. PFQ demonstrated strong convergent validity (CR = 0.894, AVE = 0.682), and SPM showed acceptable composite reliability (CR = 0.719), with

its AVE (0.461) slightly below the conventional threshold of 0.50 but within the acceptable range for established scales. In contrast, FS showed relatively modest convergent validity (CR = 0.587, AVE = 0.332), which may be attributed to the multidimensional nature of the construct and contextual variability in how different forms of support are perceived by Chinese university students. Discriminant validity was supported for PFQ and SPM, as their AVE values exceeded both MSV and ASV. For FS, the AVE value was slightly lower than its MSV, suggesting limited discriminant validity for this construct in the present sample.

Table 7 Convergent and Discriminant Validity of the Measurement Model

Construct	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)	Maximum Shared Variance (MSV)	Average Shared Variance (ASV)
Family Support	0.731	0.587	0.332	0.365	0.272
Peer Friendship Quality	0.897	0.894	0.682	0.365	0.321
Sports Participation Motivation	0.836	0.719	0.461	0.278	0.228

Note: Cronbach's α = internal consistency reliability for the main scale; CR = composite reliability; AVE = average variance extracted; MSV = maximum shared squared variance; ASV = average shared squared variance.

In a structural equation modeling (SEM) framework, unbiased and stable estimation of structural path coefficients relies on robust measurement properties of all latent constructs. While the global fit of the three-factor measurement model was acceptable, the FS construct exhibited suboptimal psychometric properties at the indicator level, including modest convergent validity and limited discriminant validity. Forcing a weakly identified latent FS construct into a full latent variable SEM could introduce bias and instability into the estimation of structural path coefficients, potentially compromising the robustness of the core mediation effect findings.

To ensure the rigor and robustness of the core hypothesis testing, a more conservative and empirically justified approach was adopted. All three focal constructs were operationalized as manifest composite variables (i.e., mean scores of their respective items), and the mediation model was tested using the PROCESS macro (Model 4; Hayes, 2013) with 5,000 bias-corrected bootstrap resamples. This manifest variable path analytic approach is widely used in social science research, circumvents the estimation complications associated with a weakly identified latent construct, prioritizes the stability of statistical inference, and ensures that the reported mediation effects are not artifacts of measurement misspecification.

Notably, the informational support item was retained in the computation of the FS composite score. Its retention is theoretically and culturally motivated: rather than representing a mere measurement flaw, the modest factor loading of this item is interpreted as preliminary evidence that informational support, as conventionally operationalized in Western instruments, may not be uniformly salient among Chinese university students. This finding constitutes an exploratory contribution of the present study and points to the need for culturally tailored scale development in future research.

3.4 Mediation Model Testing and Hypothesis Validation

Mediation effect analysis was conducted to examine the direct and indirect associations among FS, PFQ, and SPM, using Model 4 of the PROCESS macro for SPSS with 5,000 bias-corrected

bootstrap resamples. Gender and academic year were included as control variables in all analyses. The results of the regression analyses for the mediation model are presented in Table 8, and the bootstrap results for the direct and indirect effects are presented in Table 9.

Table 8 Regression Analysis Results for the Mediation Model

Outcome Variable	Predictor Variable	Unstandardized B	SE	t	R ²	F
Peer Friendship Quality	Family Support	0.455	0.054	8.495* **	0.228	72.164***
Sports Participation Motivation	Family Support	0.176	0.070	2.513*	0.205	31.318***
	Peer Friendship Quality	0.397	0.074	5.392* **		
Sports Participation Motivation	Family Support (Total Association)	0.357	0.065	5.486* **	0.110	30.097***

Note: * $p < 0.05$, *** $p < 0.001$. Gender and academic year were controlled in all regression models.

As detailed in Table 8, the total association between FS and SPM was significant and positive ($B = 0.357$, $SE = 0.065$, $*p < .001$), supporting H1. Furthermore, FS demonstrated a significant positive association with the mediator, PFQ ($B = 0.455$, $SE = 0.054$, $*p < .001$), supporting H2. When both FS and PFQ were entered into the model, PFQ was positively associated with SPM ($B = 0.397$, $SE = 0.074$, $*p < .001$), supporting H3. Simultaneously, the direct association between FS and SPM remained statistically significant ($B = 0.176$, $SE = 0.070$, $*p = .013$).

Regarding the indirect pathway, bias-corrected bootstrapping confirmed a significant indirect association from FS to SPM via PFQ ($B = 0.181$, $Boot SE = 0.043$), as the 95% confidence interval did not include zero [0.104, 0.276] (see Table 9). The indirect association accounted for approximately 50.6% of the total association, while the direct association accounted for 49.4%. This pattern indicates that PFQ partially accounts for the association between family support and sports participation motivation among Chinese non-PE undergraduate students.

Table 9 Bootstrap Results for Direct and Indirect Effects

Effect Path	Unstandardized B	Boot SE	95% Bootstrap CI	Effect Ratio
Total Effect of FS on SPM	0.357	0.065	[0.229, 0.485]	100%
Direct Effect of FS on SPM	0.176	0.070	[0.038, 0.314]	49.39%
Indirect Effect of FS on SPM via PFQ	0.181	0.043	[0.104, 0.276]	50.61%

Note: Unstandardized coefficients (B) are reported. CI = confidence interval. 5,000 bias-corrected bootstrap resamples were used

4. Discussion

The present study investigated the structural associations among family support (FS), peer friendship quality (PFQ), and sports participation motivation (SPM) among Chinese university students, with a specific focus on the mediating role of PFQ in the FS-SPM association. Consistent with the core tenets of Bandura's Social Learning Theory and the Social Ecological Model, the

findings revealed that FS was positively associated with both PFQ and SPM, and that PFQ partially accounted for the statistical association between FS and SPM, accounting for approximately 50.6% of the total effect. This pattern of results indicates that family and peer environments, as the two most proximal social contexts associated with health behaviors during emerging adulthood, are not independent but interconnected in their associations with university students' motivational tendencies toward physical activity.

For Chinese university students—a population uniquely characterized by prolonged financial and emotional dependence on their families alongside deep, daily embeddedness in peer-centered collective dormitory environments—this dual social system appears to be particularly salient to SPM. Specifically, the findings suggest that FS may function not only as a direct environmental correlate of SPM, but also as a foundational social resource that is empirically associated with the interpersonal confidence and adaptive social skills that facilitate high-quality peer friendships. Within this structural framework, high-quality peer relationships are further linked to stronger SPM, a pathway theoretically supported by shared movement experiences, emotional reinforcement, and social connection in physical activity settings. This finding extends prior research that has predominantly examined family and peer influences in isolation, providing empirical support for an integrated family-peer dual-system framework for understanding youth sports motivation in specific higher education contexts.

One of the most notable findings of the present study pertains to the psychometric properties of the FS construct in the Chinese university context. Confirmatory factor analysis revealed that the informational support dimension exhibited a relatively low standardized factor loading (Std. Est. = 0.407), and the overall FS construct demonstrated suboptimal convergent validity (AVE = 0.332). Importantly, while this pattern may reflect measurement limitations of the current instrument, it may also offer exploratory insights into potential contextual variation in how sports-related FS is perceived and expressed by Chinese university students.

In the Chinese higher education context, One possible interpretation is that university students may increasingly obtain sports-related information from a variety of sources outside the family, including peers, digital media, and campus-based resources. In contrast, parental informational input around sports may be perceived as less salient, less systematically provided, or less aligned with students' evolving interests and needs, particularly in a cultural context where academic achievement is often prioritized over sports participation in parent-child interactions. This may partly explain why the informational support items, which were derived from Western theoretical frameworks, did not cohere strongly with the economic and emotional support dimensions in this sample. This observation is consistent with growing calls for culturally situated scale development and suggests that the applicability of existing multidimensional family support frameworks may warrant further examination in Chinese university settings. However, given the absence of a cross-cultural control group and formal measurement invariance testing in the present study, these interpretations regarding cultural specificity remain strictly exploratory. Critically, this measurement insight informed the methodological decision to operationalize FS as a manifest composite variable in the primary mediation analysis, a choice that prioritized the robustness and stability of the core mediation findings over the theoretical elegance of a full latent variable structural equation model.

This study makes three focused contributions to the existing literature on youth sports participation motivation. First, it contributes to the literature by systematically examining the mediating role of PFQ—a holistic construct encompassing mutual trust, emotional intimacy, and long-term companionship—in the association between FS and SPM among Chinese university students. While prior research has documented independent links between family support, peer factors, and sports-related outcomes, few studies have elaborated the synergistic associational

patterns between these two core social domains in a university setting. The present findings suggest that PFQ may represent an important relational pathway linking FS and SPM, providing a more nuanced understanding of how social environments are associated with motivational outcomes during the transition to adulthood. Second, the study provides preliminary empirical evidence regarding the measurement performance of the FS construct within a specific Chinese university sample. The modest psychometric performance of the informational support dimension indicates that not all theoretically derived dimensions of FS are equally salient among Chinese university students.

Third, by situating the analysis within the dual embeddedness context of Chinese university students—who remain financially and emotionally connected to their families while being deeply integrated into peer-centered dormitory environments—this study provides context-specific evidence that complements existing research predominantly based on Western university populations. The findings suggest that the relative salience of different forms of family support, as well as the interplay between family and peer systems, may vary across sociocultural and institutional settings, pointing to important boundary conditions for existing theoretical frameworks of youth sports motivation. However, given the single-institution sample and the absence of cross-cultural comparison groups, these context-specific insights should be interpreted as exploratory rather than definitive.

The present findings offer several practical implications for promoting SPM and physical activity engagement in higher education settings.

First, at the family level, the results suggest that parents may support their children's sports participation by prioritizing emotional encouragement and appropriate material support, as these dimensions of FS were most strongly associated with adaptive outcomes in this study. In contrast, sports-related informational guidance alone may be less effective if it is not aligned with students' actual needs, interests, and peer contexts. Universities may consider developing targeted guidance for parents on how to support their children's physical activity in ways that complement their peer-centered campus experiences.

Second, at the campus level, universities may benefit from prioritizing the creation of accessible, low-pressure opportunities for positive peer interaction in sports-related settings. For example, organizing recreational group-based physical activities, student-led sports clubs, and non-competitive intramural programs can help facilitate positive peer associations around movement, which in turn may be linked to greater SPM. Such initiatives are particularly relevant in the Chinese university context, where collective dormitory living creates sustained opportunities for peer interaction, and may serve as a valuable complement to formal physical education programming in supporting motivational outcomes.

These implications should be interpreted as context-specific suggestions rather than general prescriptions, given the single-university sample and cross-sectional design of the present study.

Several limitations of this study should be acknowledged. First, the cross-sectional design precludes causal inference regarding the relationships among FS, PFQ, and SPM. Additionally, the sample was drawn from a single university in Guangzhou, China, which limits generalizability of the findings. Multi-institutional and cross-regional studies are needed to examine whether the observed relationships are consistent across different educational and sociocultural contexts. Future research should test whether these associations vary across demographic and socioeconomic subgroups.

Second, the study relied on self-report measures collected at a single time point, which may be subject to recall bias, social desirability bias, and potential common method bias (CMB). This issue may be particularly relevant for FS and SPM, which involve subjective perceptions and self-evaluations. Although Harman's single-factor test and the one-factor CFA comparison indicated

that a single factor did not account for the majority of the variance, these approaches have known limitations and are not sufficient to definitively rule out CMB. To more rigorously address these shared method variances, future studies should incorporate objective measures of physical activity, mixed-method approaches, as well as robust statistical techniques such as a marker variable or a latent method factor.

Finally, the measurement instruments, particularly the Family Support scale, exhibited notable psychometric limitations in this sample. An unparceled item-level CFA as a sensitivity analysis demonstrated unsatisfactory global model fit ($\chi^2/df = 3.630$, RMSEA = 0.104, CFI = 0.641, TLI = 0.616), with low and non-significant factor loadings observed within the informational support and behavioral modeling dimensions. Although item parceling was adopted to stabilize the structural parameters given the sample size ($N = 300$), this approach may obscure item-level multidimensionality. The structural relationships involving family support should therefore be interpreted as exploratory and context-specific.

5. Conclusion

The present study found that family support shared a direct positive association with sports participation motivation, as well as a statistically significant indirect association through peer friendship quality among Chinese university students. Although the cross-sectional design precludes causal inference regarding the relationships among FS, PFQ, and SPM, and the findings derived from a single university represent statistical indirect associations rather than definitive causal mechanisms, the PROCESS framework effectively allowed for the examination of theoretically grounded associations among these constructs. Additionally, the modest convergent validity of the family support construct and the low factor loading of its informational support dimension may point to potential cultural variations in how family sports support is perceived in the Chinese context. While longitudinal and intervention-based studies are needed to clarify the temporal ordering and potential reciprocal relationships among these variables, the current findings suggest that coordinated family–peer support environments could be a relevant consideration for student health promotion initiatives in higher education settings.

Ethics Statement

The study was conducted in accordance with the guidelines of the Declaration of Helsinki and approved by the Ethics Committee of Jinan University (Approval No.: JNUECKY-20260325-059; March 2026). Informed consent was obtained from all subjects involved in the study.

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