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Predictive model of the relationship between social support, body image perception, and physical activity among university students

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This cross-sectional study explored the relationship between social support, body image perception, and physical activity among university students. A total of 400 students (mean age = 20.58, SD = 1.71) from six faculties and departments at Ludong University participated voluntarily, with convenience sampling employed for participant selection. The Multi-dimensional Social Support Scale, Physical Activity Rating Scale, and Body Image States Scale were administered to assess relevant variables. The results indicated that support from family, friends, and school support, as well as body image perception, were positively associated with university students' physical activity. Mediation analyses revealed that body image perception partially mediated the relationship between friend support and physical activity and fully mediated the relationship between school support and physical activity. No mediation effect was found between family support and physical activity. These findings suggest that friend and school support play a more prominent role in influencing university students' physical activity through body image perception. Programs aiming to promote physical activity among university students should prioritize enhancing friend and school support alongside strategies to improve body image perception, ultimately fostering healthier behaviors and overall well-being.

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Introduction

In modern society, insufficient physical activity among university students has become a significant public health concern (Bull et al. 2020). Despite the well-established benefits of physical activity, including enhanced cardiovascular function, increased muscle strength, and improved mental health (Bull et al. 2020), approximately 80% of adolescents worldwide do not meet the World Health Organization recommendations of at least 150 min of moderate-intensity or 75 min of vigorous-intensity aerobic activity per week (Hallal et al. 2012). According to 2022 Chinese health statistics, there are 42 million university students in China, and 55% of these students do not meet the recommended exercise guidelines of 30–60 min per day, 3–5 days per week (Daily, 2020). Although university students report favorable intentions to engage in physical activity, they encounter several barriers, including a lack of social support (Deliens et al. 2015; Kwan and Faulkner, 2011).

Physical activity is a complex behavior influenced by personal, social, and environmental factors (Spence and Lee, 2003). While many previous studies have explored the relationship between personal factors (e.g., self-efficacy and motivation) and physical activity, there has been relatively less focus on the relationship between social factors and physical activity (Craggs et al. 2011). According to social cognitive theory, social support is a crucial determinant of physical activity (Bandura, 2004), influencing the decisions individuals make about engaging in physical activity (Yang et al. 2014). For university students, social support primarily encompasses family, friends, and school support (Chen et al. 2016).

Family, friends, and school support play a crucial role in promoting physical activity among university students (Chen et al. 2016). Evidence suggests that parental support can encourage students to engage more in physical activity, helping them develop positive attitudes and values towards physical activity and motivating them to participate actively (Shen et al. 2018). For example, parents who are actively involved in physical activities themselves or provide necessary equipment and transportation can significantly enhance their children's levels of physical activity (Beets et al. 2010). This support helps establish a foundation for an active lifestyle that extends from adolescence into adulthood. As university students mature, friend support becomes more important than family support (Prochaska et al. 2002). Friends and peers can provide companionship, motivation, and positive reinforcement, which are essential for maintaining regular physical activity (Duncan et al. 2005). Participating in physical activities with friends can make exercise more enjoyable and socially rewarding, thereby increasing the likelihood of sustained participation (Maturo and Cunningham, 2013). School support is also a vital factor in promoting physical activity among university students (Babey et al. 2016). Educational institutions can facilitate physical activity by providing sports facilities, organizing sports activities, and offering encouragement from teachers and coaches (Durant et al. 2009). Universities that offer well-maintained sports facilities and a variety of physical activity programs can significantly enhance students' opportunities to engage in exercise (Durant et al. 2009). Additionally, positive reinforcement and support from teachers and coaches can motivate students to participate in and maintain regular physical activity routines (Pluta et al. 2020). In considering previous studies on social support and physical activity, it appears that family, friends, and school support can significantly increase physical activity levels among university students and promote the development of healthy lifestyle habits. However, studies that simultaneously examine the relationships and differences between these three types of support and physical activity remain relatively scarce. Therefore, this study is designed to comprehensively examine the relationships between family, friends, and school support and physical activity among university students.

University students, particularly those in adolescence, often place significant focus on their body image (Grossbard et al. 2009). Body image perception is defined as an individual's subjective perception and attitude toward their physical appearance (Cash et al. 2004). This perception plays a crucial role in influencing physical activity (Jensen and Steele, 2009). Evidence suggests that individuals with a positive body image perception are more likely to engage in physical activities because they feel confident and comfortable displaying their bodies in public (Olchowska-Kotala and Chromik, 2013). Conversely, those with a negative body image perception may feel dissatisfied with their body image, leading them to avoid social and physical activities (Añez et al. 2018). A positive body image not only enhances self-confidence but also increases interest and participation in physical activities, creating a positive feedback loop that promotes overall health (Cash et al. 2004). Therefore, improving body image is crucial for encouraging university students to participate in physical activities and enhancing their health.

Although many different factors influence university students' body image perception, social support is a critical factor as social relationships play a formative role in shaping attitudes and values toward the body (Cash and Smolak, 2011). Family and friend support are key in this regard. Parents' attitudes, dietary and weight control suggestions, and potential teasing can directly influence their children's body image perception (Dell'Osbel et al. 2021; Kluck, 2010; Schaefer and Salafia, 2014). Positive interactions and acceptance from friends can enhance self-esteem and body satisfaction, while negative feedback or comparisons may lead to body dissatisfaction (Gerner and Wilson, 2005; Hutchinson and Rapee, 2007). Additionally, school support influences students' body image perception through health education programs, the provision of sports facilities, and the promotion of body positivity and inclusivity (Fernandes and Sturm, 2010; Yager et al. 2013). However, current research exploring the relationship between social support and body image is limited. Therefore, further investigation into this relationship is crucial for understanding and improving university students' body image perception.

In view of the above, it is understood that social support and body image perception are significant predictors of physical activity among university students. Furthermore, body image perception is related to both social support and physical activity, indicating that body image may mediate the relationship between social support and physical activity. However, the interrelationships among social support, body image perception, and physical activity have not been thoroughly explored. This warrants further exploration to better understand how various forms of social support influence physical activity through body image perception.

Theoretical framework. This study adopts social cognitive theory (Bandura, 2004) and body image theory (Cash and Smolak, 2011) to explore the relationships between social support, body image perception, and physical activity among university students. Social cognitive theory emphasizes the reciprocal interaction between personal, behavioral, and environmental factors, where social support is a key environmental factor that influences physical activity. Social support, encompassing family, peer, and school support, directly affects physical activity by providing emotional, informational, and tangible resources (Chen et al. 2016). Beyond this direct effect, social support influences physical activity through outcome expectations, a core component of

social cognitive theory. Body image perception is conceptualized as an outcome expectation—individuals who perceive their body positively are more likely to engage in physical activity, as they feel more confident and comfortable with their appearance. According to body image theory, individuals with positive body image perceptions are more likely to engage in physical activity, as they anticipate improved appearance and self-esteem as outcomes (Cash and Smolak, 2011). Conversely, negative body image perceptions may act as a barrier, discouraging physical activity due to feelings of self-consciousness or dissatisfaction with one's body (Tylka & Subich, 2002). This study posits that body image perception mediates the relationship between social support and physical activity, with social support enhancing body image perception, which in turn increases the likelihood of engaging in physical activity. By combining social cognitive theory and body image theory, this framework illustrates how social support and body image perception work together to influence physical activity behavior among university students. However, the lack of research examining the role of different types of social support (family, friends, and school) in influencing physical activity through body image perception highlights the need for further investigation, which will be analyzed within this paper.

Literature review. In exploring the relationship between social support and physical activity, with the mediating role of body image perception, existing studies were reviewed to establish the theoretical foundation and understanding the interplay between these variables, also breaking down the hypotheses of the study.

Relations between social support and physical activity. A 2024 systematic review by Wang et al. encompassing 19 studies, investigated the association between social support and physical activity among university students, revealing a significant positive relationship. Among the types of support examined, peer support demonstrated a stronger correlation with physical activity levels than family support ($r = 0.27$ vs. $r = 0.14$), possibly reflecting the greater reliance of university students on peer engagement and companionship during their transition to independent living. Nevertheless, family support remains vital in providing emotional reinforcement and material resources, particularly in fostering long-term exercise habits. Although the review underscored the general importance of social support, it did not explore the role of school support in depth. For university students who predominantly reside on campus, school support may represent a critical and unique factor in promoting physical activity. Evidence suggests that school support fosters physical activity by enhancing students' sense of belonging and motivation. For instance, Babey et al. (2016) found that when students felt cared for and encouraged by teachers or school staff, physical activity levels significantly increased, particularly among low-income and minority groups, during recess and after-school periods. Similarly, Durant et al. (2009) highlighted the importance of adequate facilities (e.g., playgrounds, fitness equipment) and supportive policies (e.g., increased physical education hours and recess opportunities) in facilitating higher levels of physical activity. Pluta et al. (2020) further emphasized the role of physical education teachers in promoting moderate-to-vigorous physical activity, while parental emotional support and peer involvement also played critical roles in enhancing students' overall participation. Collectively, these findings demonstrate that family, peer, and school support each contribute significantly to the promotion of physical activity. This study hypothesizes that all three forms of social support positively influence university students' physical activity levels, with the relative strength of their impacts remaining a question for further investigation.

Social support, body image perception, and physical activity. While the relationship between social support and physical activity is well-documented, the mediating role of body image perception remains underexplored. Evidence suggests that social support positively influences body image perception, which in turn enhances physical activity, pointing to a potential mediating mechanism. For example, Dell'Osbel et al. (2021) showed that parental support significantly shapes adolescents' body image, with positive behaviors like emotional encouragement and the promotion of healthy lifestyles improving body satisfaction, while excessive focus on appearance exacerbates body dissatisfaction. Similarly, Kluck (2010) found that a supportive family environment—characterized by reduced appearance-based criticism and increased positive reinforcement—helps adolescents develop healthier body perceptions and self-esteem, reducing body image dissatisfaction. Furthermore, body image perception is strongly associated with physical activity. Two meta-analyses (Babic et al. 2014; Bassett-Gunter et al. 2017) reported a significant positive correlation between body image perception and physical activity, particularly in structured and high-intensity exercises, where individuals with more positive body perceptions were more likely to engage in physical activity. Given these findings, this study hypothesizes that body image perception mediates the relationship between social support and physical activity among university students.

The present study. This study aimed to investigate the relationships among different types of social support, body image perception, and physical activity. Specifically, it was hypothesized that (a) family, friends, and school support, along with body image perception, would prospectively predict physical activity; and (b) family, friends, and school support indirectly influence physical activity through the mediation of body image perception.

Methodology

Participants and procedures. This study used WJX, an online questionnaire collection system (https://www.wjx.cn/), for the presentation of the questionnaire and data collection. The online questionnaire was widely distributed by teachers to students at Ludong University in China through student exchange groups. Participants were drawn from six faculties and departments, including Foreign Languages, Journalism and Communication, Business, Arts, Food Engineering, and Humanities, all of which are part of the university. Convenience sampling was employed, a widely used method in university-based research due to its practicality and efficiency in recruiting a diverse student sample (Cohen et al. 2017). Participation was voluntary, and informed consent was obtained from all participants prior to completing the questionnaire. The informed consent procedure included an explanation of the study's purpose, procedures, and confidentiality measures, ensuring that participants understood their rights and that their responses would remain anonymous and used solely for research purposes. Finally, data were collected from 400 students aged between 18 and 26 years ($M = 20.58$; $SD = 1.71$), and 78% of them identified as female. Gender differences across key variables were also considered in the analysis to address potential gender bias. The sample size was sufficiently large to ensure statistically significant results (G*Power 3.1, $\alpha = 0.05$, effect size $= 0.15$, power $= 0.95$, $N > 138$). This study was granted approval by the Ludong University Ethics Committee (Ethics approval number: LDU-IRB202311001).

Instruments

Social Support for Exercise Behaviors Scale: This 16-item self-report instrument is designed to measure the level of social

support individuals receive for engaging in exercise activities (Sallis et al. 1987). It primarily includes two aspects: family support and friend support (e.g., "Gave me helpful reminders to exercise," "Exercised with me"). However, for students, school support is also crucial. Therefore, this study used the adapted Multidimensional Social Support Scale by Chen et al. (2016) to assess the social support for physical activity among university students, which includes an additional dimension of school support consisting of 5 items (e.g., "Your school often holds sports activities such as enjoyable games").

Physical Activity Rating Scale: Physical activity was measured with the Physical Activity Rating Scale, developed by Chinese scholar Liang (1994). It is widely utilized within the Chinese population and primarily assesses physical activity through three key dimensions: exercise intensity, duration, and frequency. Each dimension is rated using a 5-level scale, allowing participants to self-assess and provide a comprehensive evaluation of their physical activity levels.

Body Image States Scale: Body image perception was measured by the Body Image States Scale developed by Cash et al. (2002). This scale consists of 6 items, each rated on a 5-point Likert scale ranging from "not at all" to "extremely." For example, items include "Right now I feel satisfied with my appearance" and "At this moment, I am feeling confident about my body." These items help measure how individuals feel about their bodies, providing valuable insights into their current body image perceptions.

Data analyses. Data analyses were conducted using SPSS (IBM Corp, Armonk, NY) and AMOS 26.0 (IBM, Armonk, NY). The data were analyzed through three steps. First, descriptive statistics were used to summarize participants' demographic characteristics. The normality of the data was assessed to ensure the suitability of the measurement model. Skewness values ranged from −0.68 to 0.63, and kurtosis values ranged from −0.75 to 1.26, all within the acceptable range of ±2, confirming that the data conformed to a normal distribution (Kim, 2013). Second, Pearson correlations were calculated to examine the associations among social support, body image perception, and physical activity. Third, multiple regression analysis was employed to measure the relationship between social support and physical activity, including the mediating role of body image perception. The bootstrap method was employed for mediation effect analysis (Parameters: bootstrap samples, 2000; percentile confidence intervals, 95%; bias-corrected confidence intervals, 95%). A statistical significance threshold was set at $p < 0.05$.

Reliability and validity. Internal consistency and composite reliability (CR) were used to verify the reliability of the measurements. Table 1 shows that Cronbach's alpha, McDonald's omega, and CR for all variables were above 0.7, indicating good reliability (Hair, 2009). Additionally, the factor loadings and average variance extracted (AVE) were all above 0.5, indicating satisfactory convergent validity for all variables (Fornell and Larcker, 1981). Confirmatory factor analysis (CFA) was conducted to validate the measurement model. The results demonstrated a robust fit, as evidenced by the fit indices: $\chi^2/df = 2.493$ (≤5), CFI = 0.946 (>0.9), TLI = 0.939 (>0.9), IFI = 0.947 (>0.9), and RMSEA = 0.061 (<0.08).

Common method bias test. Harman's one-factor test was used to examine common method bias. The results showed that a single factor accounted for 34.344% of the covariance among the model indicators, which is below the 40% threshold. Therefore, this study did not have significant common method bias.

Results

Descriptive statistics and correlations matrix. Table 2 presents the descriptive statistics and the correlations among the studied variables. The scale midpoint of 2.5 on a 5-point Likert scale was defined as the average in this study. The mean scores for family support (2.97), friend support (2.98), school support (3.79), and body image perception (3.12) were above the average, while physical activity (2.48) was below it. No significant gender differences were observed across any of the variables.

As shown in Table 2, the results of correlation analysis showed there were significant correlations between social support (family, friends, and school support), body image perception, and physical activity. Among the three forms of social support, friend support showed significant correlations with body image perception ($r = 0.355$, $p < 0.01$) and physical activity ($r = 0.291$, $p < 0.01$). School support was also significantly correlated with body image perception ($r = 0.263$, $p < 0.01$) and physical activity ($r = 0.169$,

Table 1 The construct reliability and validity analysis.

Variables	Cronbach's α	Omega	CR	AVE	Factor loading
FaS (7 items)	0.91	0.93	0.91	0.59	0.62–0.88
FrS (6 items)	0.95	0.97	0.95	0.76	0.80–0.93
ScS (4 items)	0.89	0.90	0.89	0.67	0.72–0.93
BIP (4 items)	0.90	0.90	0.91	0.71	0.81–0.87
PA (3 items)	0.78	0.78	0.78	0.54	0.69–0.81

FaS family support, *FrS* friend support, *ScS* school support, *BIP* body image perception, *PA* physical activity.

Table 2 Mean, standard deviation, and Pearson correlations.

Variables	Mean (SD)	Male (M&SD)	Female (M&SD)	FaS	FrS	ScS	BIP	PA
FaS	2.97 (0.86)	2.93 (0.92)	2.98 (0.84)	1				
FrS	2.98 (0.92)	3.11 (0.97)	2.94 (0.90)	0.46**	1			
ScS	3.79 (0.75)	3.85 (0.81)	3.77 (0.73)	0.31**	0.32**	1		
BIP	3.12 (0.78)	3.10 (0.91)	3.13 (0.74)	0.23**	0.36**	0.26**	1	
PA	2.48 (0.98)	2.64 (1.06)	2.43 (0.95)	0.11*	0.29**	0.17**	0.28**	1

FaS family support, *FrS* friend support, *ScS* school support, *BIP* body image perception, *PA* physical activity. *$p < 0.05$, **$p < 0.01$.

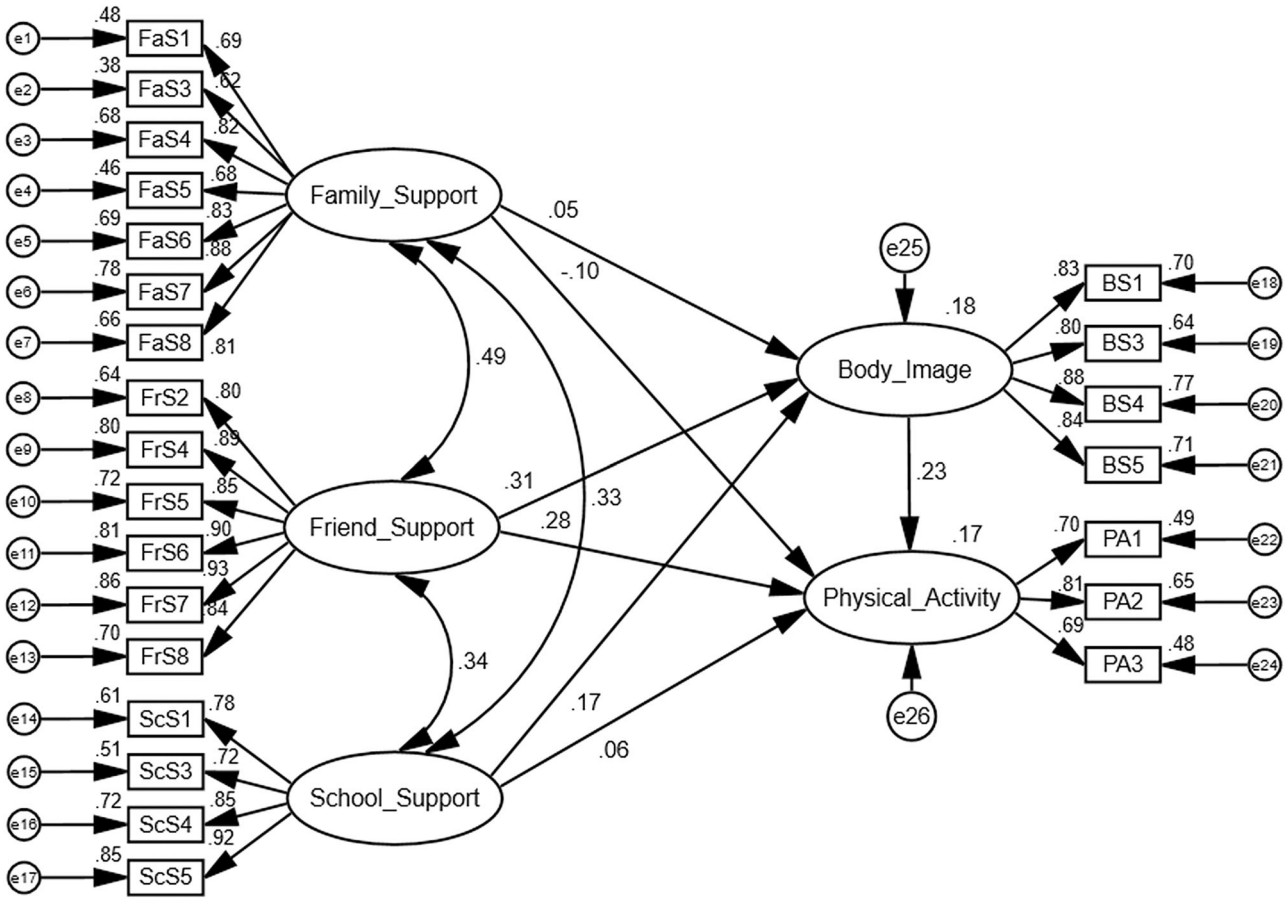

Fig. 1 Structural equation model with standardized coefficients.

Table 3 Path coefficients results.

Parameter path	Estimate	S.E.	C.R.	P
FaS → BIP	0.047	0.057	0.812	0.417
FrS → BIP	0.270	0.054	5.053	***
ScS → BIP	0.164	0.055	2.966	**
FaS → PA	−0.095	0.064	−1.482	0.138
FrS → PA	0.248	0.063	3.942	***
ScS → PA	0.060	0.062	0.968	0.333
BIP → PA	0.233	0.065	3.575	***

BIP body image perception, FaS family support, *FrS* friend support, *ScS* school support. $^{**}p < 0.01$; $^{***}p < 0.001$.

$p < 0.01$). In contrast, while family support showed a significant correlation with body image perception ($r = 0.229$, $p < 0.01$), its correlation with physical activity ($r = 0.108$, $p < 0.05$) was notably weaker compared to the other forms of social support. These differences may reflect cultural dynamics, which are explored further later in this paper. Additionally, body image perception was significantly correlated with physical activity ($r = 0.275$, $p < 0.01$).

The mediating role of body image perception in the relationship between social support and physical activity. The model was constructed with social support as the independent variable, physical activity as the dependent variable, and body image perception as the mediating variable. First, the predictive effect of university students' social support and body image perception on physical activity was examined. Figure 1 and Table 3 present the standardized direct path coefficients of variables and their significance levels. The results indicate that family support did not significantly predict body image perception or physical activity ($\beta = 0.047$, $p = 0.417$; $\beta = 0.064$, $p = 0.138$). However, friend support significantly predicted both body image perception and physical activity ($\beta = 0.270$, $p < 0.001$; $\beta = 0.248$, $p < 0.001$). School support significantly predicted body image perception ($\beta = 0.164$, $p < 0.01$), but did not significantly predict physical activity ($\beta = 0.060$, $p = 0.333$). Additionally, body image perception significantly predicted physical activity ($\beta = 0.233$, $p < 0.001$).

Table 4 shows the mediating effect of body image perception between social support and physical activity. The results indicated that body image perception did not significantly mediate the relationship between family support and physical activity ($\beta = 0.011$, $p = 0.369$). It partially mediated the relationship between friend support and physical activity ($\beta = 0.070$, $p < 0.001$), and fully mediated the relationship between school support and physical activity ($\beta = 0.038$, $p < 0.01$).

Discussion

This study explored the inner mechanisms underlying the association between different types of social support and physical activity, and also examined how body image perception mediates this relationship among university students. Correlational analyses revealed meaningful associations among social support, body image perception, and physical activity. Mediation analyses further revealed that body image perception partially mediated the relationships between both friend support and physical activity and fully mediated the relationship between school

Table 4 Bootstrap mediation effects of body image in the relationship between social support and physical activity.

Effect	Path	Beta	P	95% CI	
				Lower	Upper
Direct effect	FaS → PA	−0.098	0.210	−0.239	0.061
Indirect effect	FaS → BIP → PA	0.011	0.369	−0.015	0.044
Total effect	FaS → PA	−0.087	0.259	−0.237	0.064
Direct effect	FrS → PA	0.275	***	0.139	0.419
Indirect effect	FrS → BIP → PA	0.070	***	0.025	0.122
Total effect	FrS → PA	0.345	***	0.224	0.479
Direct effect	ScS → PA	0.060	0.406	−0.086	0.195
Indirect effect	ScS → BIP → PA	0.038	**	0.008	0.088
Total effect	ScS → PA	0.098	0.198	−0.048	0.231

BIP body image perception, *FaS* family support, *FrS* friend support, *ScS* school support. $^{**}p < 0.01$; $^{***}p < 0.001$.

support and physical activity. In contrast, no significant mediation effect was found in the relationship between family support and physical activity.

Relationship between social support and physical activity. Correlation analysis revealed a significant positive relationship between three types of social support and physical activity, aligning with prior studies demonstrating the beneficial impact of social support on physical activity levels (Durant et al. 2009; Maturo and Cunningham, 2013; Pluta et al. 2020; Shen et al. 2018). These findings underscore the pivotal role of social support in shaping physical activity behaviors, particularly in university students. The practical importance of this relationship has also been observed in intervention studies. For example, Quaresma et al. (2014) found that a year-long intervention incorporating parental and peer support significantly enhanced adolescents' physical activity levels and quality of life. Similarly, Rackow et al. (2015) showed that an 8-week emotional support intervention, such as exercising with a new partner, effectively improved participants' self-efficacy and physical activity behaviors.

Although social support generally has a positive impact on physical activity, this study found that family support was less strongly associated with physical activity among university students compared to peer and school support. This difference likely reflects behavioral changes driven by the cultural and developmental transitions during university life. As students transition into this stage, their decision-making increasingly relies on peer support and school resources, while interactions with family decrease due to physical distance and lifestyle changes (Wang et al. 2024). Such transitions also involve a shift in social identity, where students seek independence and form new social groups, leading to greater reliance on peers for support rather than family (Tajfel and Turner, 1979). Research further indicates that during childhood and adolescence, peer and family support both play significant roles in promoting physical activity (Lisboa et al. 2021; Morrissey et al. 2015). However, as students enter university, the influence of peer support becomes more pronounced. Belanger and Patrick (2018) found that peers, by providing companionship and opportunities for shared activities, exert a stronger motivational effect on physical activity among university students, while the direct role of family support diminishes.

This shift in reliance on peer support also explains why family support did not directly predict physical activity in this study's SEM model, while peer support demonstrated a significant direct effect. However, it is noteworthy that school support did not show a significant direct predictive effect on physical activity. This suggests that school support may primarily influence physical activity through indirect pathways. For example, it could enhance psychological factors such as self-efficacy, motivation, and perceived competence, which support sustained engagement in physical activity (Lin et al. 2024; Zhang et al. 2012). School support often operates by creating an enabling environment through structural resources, such as facilities and programs, which provide the foundation for long-term behavioral change (Chen et al. 2016). Although its effects may not be as immediate as those of peer support, school support likely contributes to shaping conditions that facilitate physical activity over time.

Relationship between body image perception and physical activity. This study found a significant positive correlation between body image perception and physical activity among university students, with body image perception having a significant predictive effect on physical activity. This suggests that students who feel positively about their bodies are more likely to engage in physical activities. Existing literature supports this, showing that a positive body image is closely associated with higher levels of physical activity (Añez et al. 2018; Kołoło et al. 2012). Specifically, a positive body image can enhance students' confidence and self-efficacy, making them more willing to try new exercise activities and maintain long-term exercise habits (Kołoło et al. 2012). Conversely, students with a negative body image may avoid physical activity due to dissatisfaction with their appearance, leading to a lack of motivation to engage in exercise and concerns about being judged by others, further reducing opportunities for physical activity (Añez et al. 2018). Therefore, body image perception plays a crucial role in physical activity among university students.

Mediating role of body image in the relationship between social support and physical activity. The results of this study indicated that body image perception mediated the relationship between friend support and physical activity, as well as the relationship between school support and physical activity. However, body image perception did not mediate the relationship between family support and physical activity. These findings provide new insights into how social support influences physical activity through body image perception.

Firstly, the finding that friend support influenced physical activity through body image perception indicates that friends played a significant role in shaping an individual's body image perception. Students with strong friend support may develop a positive body image due to the positive feedback they receive in social interactions (Kenny et al. 2017). This positive body image perception can enhance their confidence and self-efficacy, thereby increasing their willingness and frequency to engage in physical activity (Cash et al. 2004). Existing research highlights the importance of friend support in promoting physical activity among adolescents and young adults (Duncan et al. 2005; Maturo and Cunningham, 2013). This support not only provides emotional encouragement but may also include practical

opportunities and resources for participating in physical activities, such as exercising together or joining sports clubs.

Secondly, the finding that school support influenced physical activity through body image perception highlights the significant impact of the educational environment on students' body image perception. Schools provide physical education, health promotion activities, and positive feedback from teachers, which help students develop a more positive body image perception (Fernandes and Sturm, 2010; Yager et al. 2013). A positive body image perception can enhance students' confidence and self-efficacy, thereby increasing their willingness and frequency to engage in physical activity (Cash et al. 2004). Although research specifically addressing the interconnected relationships between school support, body image perception, and physical activity is currently limited, our study offers new insights by emphasizing the critical role of body image perception in how school support influences physical activity.

In contrast, family support did not influence physical activity through body image perception, which may be related to the nature of family support. Family support primarily involves emotional and material aspects, which may not directly impact students' body image perception. While family feedback is crucial during early development, such as dietary habits, exercise routines, and parental attitudes towards body image, its influence diminishes as students enter university (Kirsch et al. 2016). At this stage, the influence of friends and school becomes more significant (Wang et al. 2024). Emotional encouragement and social interactions from friends, along with activities, health courses, and positive feedback from teachers, have a greater impact on students' body image perception and physical activity (Kirsch et al. 2016; Wang et al. 2024; Yager et al. 2013). Therefore, the influence of family support on body image perception and physical activity weakens. This finding suggests that health promotion programs for university students should focus more on support from friends and school to more effectively enhance physical activity levels and body image perception.

To translate these findings into practical strategies, health promotion programs might consider incorporating peer- and school-based interventions that encourage physical activity and foster positive body image perception. For example, schools could explore the potential of peer-led initiatives, such as buddy systems or group fitness challenges, which may create opportunities for shared physical activity and mutual support. Similarly, integrating body-positive themes into school programs, such as workshops combining discussions on self-esteem and body image with engaging physical activities, could be a promising approach. Additionally, digital platforms might offer a scalable means to facilitate peer interaction, track fitness goals, and organize group activities. These strategies could offer valuable insights for developing initiatives aimed at fostering healthier lifestyles and more positive body image perceptions among university students.

Conclusion

This study identified social support and body image perception are important factors associated with university students' physical activity behaviors. While family support and school support do not directly predict physical activity behaviors in university students; their influence may be mediated by other psychological factors, or their effects might be diluted or overshadowed by friend support. Furthermore, body image perception partially mediates the relationship between friend support and physical activity and fully mediates the relationship between school support and physical activity. No mediation effect was observed in the relationship between family support and physical activity. These findings underscore the importance of prioritizing friend and school support in interventions aimed at promoting physical activity, alongside strategies to enhance body image perception. Such efforts may help universities foster healthy physical activity behaviors and improve overall well-being.

Strengths and limitations. This study has several strengths, including identifying significant factors influencing university students' physical activity behaviors and elucidating the mediating role of body image perception. However, this study also has some limitations. Firstly, the participants were drawn from a single university, limiting the generalizability of the findings. Future research should include samples from multiple universities, different geographical regions, and a broader age range to enhance the external validity of the results. Secondly, this study employed a cross-sectional design, which precludes the determination of causal relationships between variables. Future research should adopt longitudinal designs to better understand the causal pathways and temporal dynamics between social support, body image perception, and physical activity behaviors. Thirdly, the data collection relied on self-reported measures, which may introduce biases and lack objectivity. Future research should incorporate more objective measurement tools, such as wearable activity trackers and observational methods, to obtain more accurate and reliable data.

Data availability

All data analyzed during this study are included in this published article and its supplementary information files.

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Author contributions

Conceptualization: XG, XW, and CSC; methodology: XG, XW, SS, and MZF; data collection: XG, XW, LM, PL, and YZ; formal analysis: XG, XW, SS, and MZF; writing—original draft preparation: XG and XW; writing—review and editing: XW and CSC; supervision: CSC.

Competing interests

The authors declare no competing interests.

Ethical approval

This study received approval from the Research Ethics Committee of Ludong University on December 15, 2023 (Approval No. LDU-IRB202311001). All surveys were conducted in accordance with the relevant laws and regulations of the People's Republic of China.

Informed consent

Participants were given written informed consent forms that explained the aim of the study and its significance. Informed consent was obtained from March 1 to March 15, 2024.

Additional information

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