



OPEN Physical self-perception as mediator between physical activity and quality of life among Chinese university students

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This study examined the mediating role of physical self-perception profile (PSPP) in the relationship between physical activity (PA) and quality of life (QoL) among China university students. A total of 420 students from five public universities in China participated in this quantitative study. Data were collected using the International Physical Activity Questionnaire-Short Form, the PSPP, and the World Health Organization Quality of Life-BREF. Correlation and mediation analyses were conducted using SPSS 27 and SmartPLS 4.0. The results indicated moderate positive correlations among PA, PSPP, and QoL. Mediation analysis showed that PSPP partially mediated the relationship between PA and QoL, with a Variance Accounted For of 28.8%. PA significantly predicted PSPP ($\beta = 0.54$, $p < 0.001$) and QoL ($\beta = 0.42$, $p < 0.001$), while PSPP also significantly predicted QoL ($\beta = 0.31$, $p < 0.001$). The findings of this study underscore the importance of PSPP in promoting health and QoL among university students. Integrating strategies to enhance PSPP may strengthen wellness promotion initiatives within higher education settings. The model involving PA, PSPP, and QoL variables will allow university administrators, healthcare professionals, researchers, and the general public to better estimate the expected physical activity involvement.

Keywords Physical activity, Quality of life, Physical self-perception, Mental health, Physical self-worth

Improving and maintaining good QoL and well-being are universal goals across all life stages. Achieving those goals are particularly important for those starting college, as habits formed in college life will affect the second half of life or even the whole life^{1–5}. PA is one of the main factors influencing QoL^{2,6–8}. However, in 2019, about 75% of Chinese college students did not meet the World Health Organization's (WHO) recommended guidelines on PA⁹. WHO identifies physical inactivity as the fourth leading cause of death globally, with an estimate of about 3.2 million deaths annually^{10,11}.

The transition to college life introduces numerous challenges that can impact students' mental and physical health, leading to issues such as alcohol abuse, fear of failure, depression, anxiety, and negative self-perception profiles^{12–15}. These psychological and social stressors—which are compounded by new social environments, heavier academic demands, and irregular schedules—can substantially reduce students' QoL. Since mental health is closely intertwined with physical health, it can deteriorate significantly due to physical inactivity and lifestyle changes experienced in university^{16,17}. Given its influence on academic success and future well-being, the mental health of college students is a pressing concern^{18–21}.

Previous research findings support the positive impact of physical activity on mental health outcomes^{22–26}. PA has been shown to alleviate symptoms of depression and anxiety, enhance mood, and improve cognitive performance^{27–30}. Despite these well-documented benefits, physical inactivity remains a concern among university students. A recent cross-sectional study revealed a low and declining trend in PA participation among China university students³¹. In particular, international students from countries such as South Korea, India, and China were found to exhibit the lowest levels of physical activity³².

In understanding how PA influences QoL, it is useful to consider individuals' perceptions of their physical selves. According to the Exercise and Self-Esteem Model (EXSEM) proposed by Sonstroem and Morgan, improvements in physical competence through PA can lead to enhanced physical self-perception and, ultimately, increased global self-esteem^{33,34}. This model provides a theoretical basis for exploring the mediating role of physical self-perception in the PA–QoL relationship.

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PSPP refers to how individuals subjectively evaluate their physical abilities, body image, and overall physical self-worth. It is a multidimensional construct that includes perceived strength, sport competence, physical attractiveness, and fitness level. These perceptions play a critical role in shaping one's self-esteem and mental well-being. Research has shown that individuals with more positive physical self-perceptions are more likely to engage in physical activity, maintain healthier lifestyles, and report higher levels of life satisfaction and psychological resilience. As such, PSPP is not only an important outcome of physical activity but also a key psychological mechanism that explains how physical activity contributes to improved QoL.

The PSPP is a well-established concept in the realm of health and wellness. It reflects individuals' perceptions of their physical attributes across five key domains: sports competence, physical strength, physical conditioning, body attractiveness, and physical self-worth³⁵. Some studies assert that PA improves QoL and PSPP by improving one's brain health, helping in weight management, reducing the risk of diseases, strengthening muscles and bones, enhancing positive effects, promoting sport competence (SC), developing physical self-worth (PSW), improving body image, and improving one's ability to conduct daily activities^{36–39}.

Several studies have validated the PSPP in various cultural contexts, underscoring its cross-cultural applicability. For example, Lindwall et al.⁴⁰ tested the factorial validity of the Revised PSPP (PSPP-R) across three countries — (Sweden, Turkey, and the UK) — and reported measurement invariance across those national samples. Similarly, Page et al.⁴¹ evaluated the cross-cultural validity of PSPP using British college students and found strong psychometric support for the original factor structure and internal reliability of the PSPP, replicating the psychometric integrity initially established with American samples. Those studies suggest that the PSPP is a reliable instrument for evaluating perceived physical competencies and body-related self-evaluations, showing strong cross-cultural applicability with minimal cultural bias^{40,41}. In the context of China, Yang and Wu⁴² conducted a large-scale validation study using the Rasch model with 1651 university students to evaluate the psychometric properties of the Chinese version of the PSPP. Their results showed that the scale met the requirements of one-dimensionality, demonstrated high reliability (Cronbach's $\alpha > 0.90$). The four-point rating scale was confirmed to function well.

This study is grounded in a conceptual framework that posits physical self-perception, as measured by the PSPP, as a mediating variable between PA and QoL. Prior studies have consistently emphasized the critical role of PSPP in influencing both PA and QoL among university students^{43,44}. As illustrated in Fig. 1, the model explores how PSPP mediates the relationship between PA engagement and perceived quality of life.

PSPP is employed as a mediator due to its well-documented associations with both physical activity and psychosocial outcomes across various contexts. For example, Ruiz-Montero et al.³⁶ found positive correlations between physical fitness, Body Mass Index (BMI), and PSPP subdomains such as physical condition, sport competence, and body attractiveness. Similarly, Chalabaev and Sarrazin⁶⁵ reported that students with higher physical activity developed more positive perceptions of their physical abilities, which in turn enhanced their physical self-worth. In the Chinese context, Yang and Wu⁴² observed higher physical self-esteem among male university students, contributing to stronger overall self-worth. Given that self-worth is often considered a psychological indicator of QoL^{45,46}. The theoretical justification for the proposed mediation model is robust.

Furthermore, previous research has confirmed the beneficial effects of PA on both physical and mental health, which are key contributors to QoL^{47,48}. University students engaging in more PA report higher QoL levels, while those with low PA are more likely to experience health-related declines in life satisfaction⁴⁸. In addition to demographic factors such as gender and age, PA level has been shown to exert a strong influence on students' QoL^{49,50}.

In this study, we considered PSPP as a mediating variable to investigate the relationship between PA and QoL in Chinese university students. By doing so, we aim to contribute to the existing body of knowledge on the cross-cultural application of PSPP and understand the unique influences of physical activity and self-perception in enhancing QoL within a Chinese cultural context.

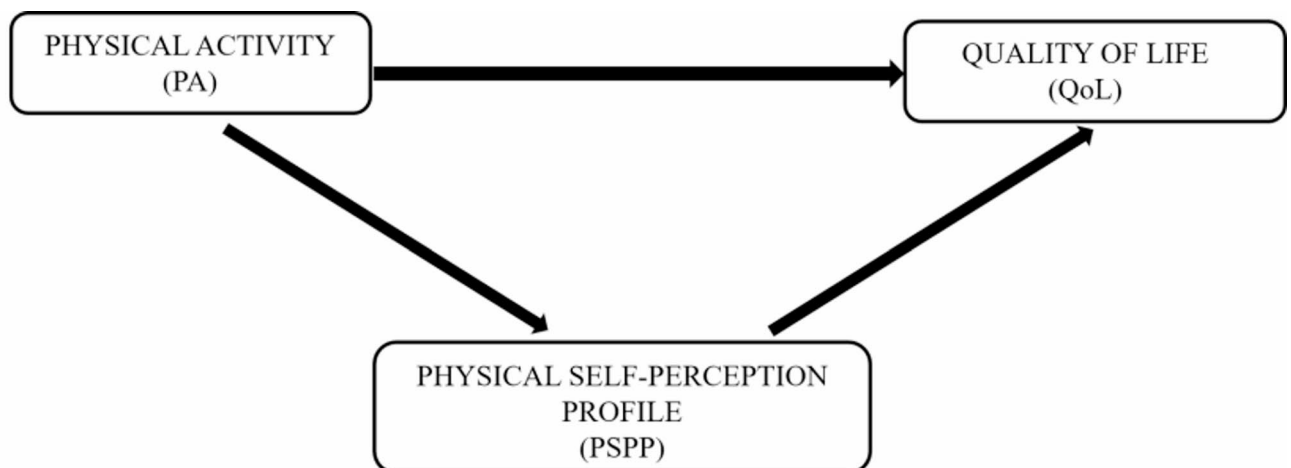


Fig. 1. Conceptual Framework (Mediating role of PSPP on the relationship between PA and QoL).

Materials and methods

Participants

Participants of the study were undergraduates from five public universities in Deyang City which is located in Sichuan Province in China. A total of 420 participants were surveyed using the stratified sampling method according to gender (Age: 20.12 ± 1.26 years; males: $n = 261$, 62.1%; females: $n = 159$, 37.9%). The participants were from freshman year (23.1%), sophomore year (22.1%), junior year (25.5%), and senior year (29.3%).

Procedure

The primary objective of this study was to investigate the mediating role of physical self-perception in the relationship between physical activity and quality of life among Chinese university students. To ensure the accurate measurement of key constructs within the Chinese context, this study also involved the adaptation and preliminary validation of the Chinese versions of several standardized self-report instruments, including the PSPP and QoL.

A rigorous translation and back-translation process was employed to translate the instruments used in this study to ensure cultural and linguistic appropriateness of the research instruments. The questionnaires were first translated from English into Mandarin by a bilingual language expert. It was then back-translated into English by another qualified translator. A third language teacher compared the back-translated version with the original to check for discrepancies. Finally, both versions were reviewed and validated by a panel of two experts fluent in both English and Mandarin.

After receiving ethical approval, formal communications were established with the heads of departments at each university. Meetings were conducted by the researcher to present the research objectives, procedures, and potential benefits. Subsequently, on-campus briefing sessions were organized to explain the study to potential participants. Written informed consents were obtained from all participants prior to their participation in this study. All methods were performed in accordance with the relevant guidelines and regulations.

Statistical analysis

Missing data handling

Prior to conducting the main analyses, the dataset was screened for missing values and outliers. Among the initial 450 participants, 30 cases with more than four missing responses were removed using listwise deletion, resulting in a final valid sample of 420 participants for further analysis.

Normality assumption check

The normality of the main variables—PA, PSPP, and QoL—was evaluated using multiple methods to ensure robustness of results.

Descriptive statistics including skewness and kurtosis values are summarized in Table 1. Most variables demonstrated skewness and kurtosis outside the ± 1.0 threshold, suggesting deviations from normality.

Further normality tests, Kolmogorov–Smirnov (KS) and Shapiro–Wilk (SW), are presented in Table 2. Both tests returned statistically significant results ($p < 0.001$), confirming the non-normal distribution of the data.

Given the evidence of non-normality in the distribution of key variables, subsequent analyses such as correlation and group comparisons were conducted using non-parametric tests (e.g., Spearman’s rho, Mann–Whitney U test). This decision aligns with the guidelines by Meyers et al.⁵¹, allowing for more robust inferences under non-normal conditions.

Instrumentation

The International Physical Activity Questionnaire–(IPAQ-SF), The PSPP⁴⁰, The World Health Organization Quality of Life—BREF (WHOQOL-BREF)⁵² were used in this study.

	N	Minimum	Maximum	Mean	Std. deviation	Skewness	Kurtosis
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
QoL	420	1.13	4.92	3.6651	0.71447	– 2.093	4.305
Social	420	1.00	5.00	3.7023	0.94612	– 1.404	1.408
Environment	420	1.00	4.88	3.6825	0.89446	– 1.900	2.580
Psychological	420	1.00	5.00	3.6590	0.93577	– 1.690	1.913
Physical	420	1.00	4.86	3.6374	0.92903	– 1.723	1.941
PSPP	420	1.37	3.80	3.0823	0.66709	– 1.476	0.778
Sports Competence	420	1.00	4.00	3.0528	0.84854	– 1.221	– 0.148
Physical Conditioning	420	1.17	4.00	3.0272	0.83880	– 1.136	– 0.352
Body Attractiveness	420	1.00	4.00	3.2069	0.72594	– 1.760	1.790
Physical Strength	420	1.17	4.00	3.0728	0.80427	– 1.265	0.015
Physical Self-Worth	420	1.17	4.00	3.0523	0.82445	– 1.220	– 0.125
PA	420	320	5271	1810.88	939.725	1.217	0.457

Table 1. Skewness and Kurtosis values for PA, PSPP, and QoL variables (n = 420).

	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
PA	0.075	420	0.001
QoL	0.217	420	0.001
Social	0.222	420	0.001
Environment	0.275	420	0.001
Psychological	0.264	420	0.001
Physical	0.259	420	0.001
PSPP	0.237	420	0.001
SC	0.307	420	0.001
PC	0.303	420	0.001
BA	0.310	420	0.001
PS	0.310	420	0.001
PSW	0.304	420	0.001

Table 2. Kolmogorov–Smirnov Normality tests for PA, PSPP, and QoL (n = 420). PS = Physical Strength; PC = Physical Conditioning; PSW = Physical Self-Worth; SC = Sport Competence; BA = Body Attractiveness; PSPP = Physical Self-Perception Profile; QoL = Quality of Life.

Measure for physical activity

Participants’ physical activity was measured using the IPAQ-SF. It consists of 7 items measuring average daily time spent sitting, walking, and engaging in mediate and vigorous PA over the last seven days. IPAQ-SF has been extensively studied within Chinese university student populations, with its reliability well-established (Intraclass Correlation Coefficient (ICC)=0.79)⁵³. This questionnaire assesses three levels of physical activity intensity: low-intensity activities (3.3 metabolic equivalents, METs), moderate-intensity activities (4.0 METs), and vigorous-intensity activities (8.0 METs). Participants were asked to indicate how often and for how long they engaged in each level of physical activity, with each activity session lasting at least 10 min. Total physical activity per week for each participant was calculated using the formula: Total MET-minutes/week = (Low-intensity PA: METs × minutes × days) + (Moderate-intensity PA: METs × minutes × days) + (Vigorous-intensity PA: METs × minutes × days).

In this study, a professionally translated Chinese version of the IPAQ-SF was used, ensuring linguistic accuracy and conceptual equivalence.

Measure for physical self-perception profile

The PSPP⁴⁰ consists of 30 items with 5 subdomains, each subdomain containing 6 items. The subdomains included sports competence (SC), physical strength (PA), physical condition (PC), bodily attractiveness (BA), and physical self-worth (PSW)^{35,41}. The PSPP utilizes a 4-point Likert scale for responses to items.

The total score ranges from 30 to 120, with higher scores indicating stronger physical self-perception. Subdomain scores range from 6 to 24, with 15 considered the midpoint. Scores below 15 reflect lower perceived competence, while scores above 15 suggest higher perceived competence.

Before the main data collection, a pilot study was conducted with 150 Chinese university students to test the reliability of the PSPP. The results showed strong internal consistency, with Cronbach’s alpha values exceeding 0.80 across the total scale and all subdomains, supporting its psychometric soundness in the Chinese context.

Measure for quality of life

The World Health Organization Quality of Life – BREF (WHOQOL-BREF) [WHO, 1995] is a 26-item instrument using a 5-point Likert scale. It includes four domains: Physical (7 items, 7–35 points), Psychological (6 items, 6–30 points), Environmental (8 items, 8–40 points), and Social (3 items, 3–15 points).

The theoretical midpoint of the total score is 78, which is calculated by summing the midpoints of all subdomains and represents an average level of perceived quality of life. Scores below 78 suggest lower-than-average QoL, and scores above 78 suggest higher QoL.

In practice, however, to differentiate between high and low QoL levels more clearly within our sample, a pragmatic cutoff score of 78 was adopted. Scores below 84 were interpreted as indicating lower QoL, while scores above 78 indicated higher QoL.

Results

Additional analyses were conducted to explore whether participants’ demographic factors (gender, age, and year of study) were associated with significant differences in PA, PSPP, and QoL. The results are summarized in Table 3.

No significant differences were observed across year of study and age for any measured variable. However, significant gender differences emerged in several key dimensions. Specifically, males reported significantly higher scores than females in physical activity, physical self-worth, physical self-perception profile, and body attractiveness. In contrast, females scored significantly higher than males in the psychological and total quality

Dimension	Year of study	Age	Gender
Physical activity	NS	NS	Sig. M > F
Sports competence	NS	NS	NS
Physical strength	NS	NS	NS
Physical conditioning	NS	NS	NS
Physical self-worth	NS	NS	Sig. M > F
Body attractiveness	NS	NS	NS
Physical self-perception profile	NS	NS	Sig. M > F
Social	NS	NS	NS
Environment	NS	NS	NS
Psychological	NS	NS	Sig. F > M
Physical	NS	NS	NS
Quality of Life	NS	NS	Sig. F > M

Table 3. Summary of research results. NS = Not Significant, M = Male, F = Female.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Total MET-min/week												
2. QoL	0.390**	–										
3. Social	0.213**	0.693**										
4. Environmental	0.272**	0.810**	0.456**									
5. Psychological	0.254**	0.765**	0.470**	0.466**								
6. Physical	0.418**	0.783**	0.485**	0.434**	0.434**							
7. PSPP	0.457**	0.487**	0.311**	0.287**	0.238**	0.627**						
8. Sport Conditioning	0.431**	0.397**	0.249**	0.223**	0.176**	0.541**	0.848**					
9. Physical Conditioning	0.374**	0.379**	0.231**	0.216**	0.176**	0.508**	0.841**	0.628**				
10. Body Attractiveness	0.267**	0.435**	0.338**	0.321**	0.276**	0.407**	0.710**	0.487**	0.493**			
11. Physical Strength	0.424**	0.409**	0.240**	0.221**	0.191**	0.565**	0.854**	0.677**	0.651**	0.504**	–	
12. Physical Self-Worth	0.375**	0.394**	0.236**	0.212**	0.173**	0.554**	0.860**	0.676**	0.671**	0.500**	0.677**	–

Table 4. Correlations among total volume of PA, Quality of Life, and PSPP Factors and their sub-domains.

**Correlation is significant at the 0.01 level (2-tailed).

	Original sample	Sample mean	Standard deviation	T statistics (O/STDEV)	P values	VAF
PA → PSPP	0.54	0.54	0.03	17.83	0.001	–
PA → QoL	0.42	0.42	0.05	9.18	0.001	–
PSPP → QoL	0.31	0.31	0.07	4.41	0.001	–
PA → PSPP → QoL	0.17	0.17	0.04	4.39	0.001	28.8%

Table 5. Mediation result.

of life domains. These findings suggest that gender plays a notable role in influencing students' physical self-perception and perceived well-being, whereas academic year and age did not yield significant effects.

Table 4 shows the results of the correlation among QoL and PSPP factors and the total volume of PA. Significant moderate correlations were found between the QoL subscales and total volume of PA, specifically physical ($r = 0.418$, $p < 0.01$) while significant low correlations were found between other sub-scales of QoL (social, environmental, psychological: correlations ranged from 0.213 to 0.272) and total QoL ($r = 0.390$, $p < 0.01$) and total volume of PA. Further, significant moderate correlation was found between total PSPP and subscales and total volume of PA, specifically sport conditioning ($r = 0.431$, $p < 0.01$), and physical strength ($r = 0.424$, $p < 0.01$). However, there was a significant low correlation between other subscales of PSPP (physical conditioning, body attractiveness, physical self-worth: correlations ranged from 0.267 to 0.375). According to Cohen's (2013) guidelines, correlations of $r < 0.30$ are considered low, $0.30 \leq r < 0.50$ are considered moderate, and $r \geq 0.50$ are considered strong⁵⁴.

The mediation results in Table 5 revealed that PSPP partially mediates the relationship between PA and QoL among Chinese university students, contributed a total of 28.8% Variance Accounted For (VAF).

The study found significant positive effects of PA on PSPP ($\beta = 0.54$, $p < 0.001$) and QoL ($\beta = 0.42$, $p < 0.001$), and of PSPP on QoL ($\beta = 0.31$, $p < 0.001$). The decision on partial mediation is based on the suggestion of Sobaih

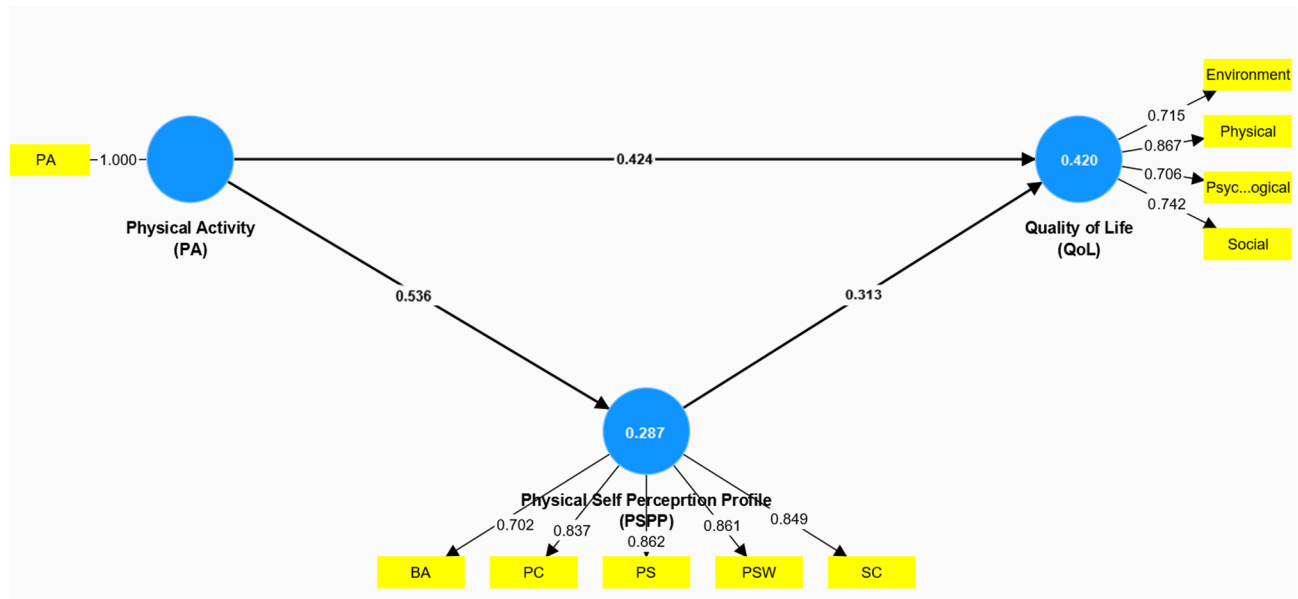


Fig. 2. Structural equation model showing the mediating role of PSPP in the relationship between PA and QoL.

and Elshaer (2022) that VAF value between 20 and 80%, is considered partial mediation. Figure 2 further visualized the mediation of PSPP on the relationship between PA and QoL⁵⁵.

Figure 2 shows the mediation model results. Physical Activity had a significant direct effect on QoL ($\beta = 0.424$) and an indirect effect mediated by PSPP, with Physical Activity positively influencing PSPP ($\beta = 0.536$), which in turn enhanced QoL ($\beta = 0.313$).

QoL subscales showed strong loadings, including Environmental (0.715), Physical (0.867), Psychological (0.706), and Social (0.742). Similarly, PSPP subscales such as Body Attractiveness (0.702), Physical Conditioning (0.837), Physical Strength (0.862), Sports Competence (0.849) and Physical Self-Worth (0.861) demonstrated robust contributions. All variables demonstrated factor loadings above 0.7.

Discussion

The present study aimed to investigate the mediating role of PSPP in the relationship between PA and QoL among Chinese university students.

The moderate positive correlation ($r = 0.390$) between PA and QoL highlights the significant impact that regular engagement in physical activities has on the overall well-being of university students. This relationship suggests that physical activities, which include exercise routines, sports participation, and recreational activities, contribute positively to various dimensions of students' lives, such as mental health, physical health, social interactions, and emotional stability. Previous studies support these findings, showing that physical activity can reduce symptoms of depression and anxiety, improve mood, and enhance cognitive functions^{56–60}. The finding of this study was supported by Marquez et al.² who reviewed 87 articles and reported strong evidence that PA improves Health Related QoL and well-being for adults aged 18–65 years.

This study also found significant moderate positive correlation ($r = 0.457$) between physical activity and the PSPP. This relationship could be attributed to the improvements in physical fitness, muscle strength, endurance, and overall body image that come with regular physical activity. This finding is supported by Antony and Azeem⁶¹ found that physical activity had a strong positive correlation with various aspects of physical self-concept among undergraduate students^{61–64}. Similarly, this relationship could be explained using self-efficacy theory which proposes that individuals' confidence in their physical capabilities is enhanced through repeated successful experiences in physical activities⁶⁵.

The moderate positive correlation ($r = 0.487$) between QoL and PSPP indicated that students with a higher QoL might have a more positive perception of their physical selves^{66,67}. This finding was supported by numerous researchers. Vaquero-Solis et al.⁶⁸ conducted a study on university students reported that self-perception, particularly related to physical health, had a modest positive correlation with QoL. While Sarlab et al.⁶⁹ divulged positive correlation between self-esteem and quality of life among sports students.

The significant indirect mediation effect of PSPP on the relationship between PA and QoL, with VAF of 28.8%, highlights the importance of PSPP in understanding how physical activity contributes to QoL. Students with higher of PA reported better PSPP, which subsequently correlated with higher QoL scores. This underscores the role of self-perception in enhancing the positive effects of physical activity, consistent with the principles of Social Cognitive Theory⁷⁰ and Self-Determination Theory⁷¹. According to these theories, individuals' perceptions of their abilities and intrinsic motivations are crucial in fostering sustained engagement in physical activity, ultimately improving both physical and mental health. Similarly, Zayed and Elshaer¹⁰ highlighted the

mediating role of physical self-esteem in the relationship between physical activity and quality of life, suggesting that improving self-perception through physical activity can lead to better quality of life outcomes. Research by Vaquero-Solis et al.⁶⁸ and Sarlab et al.⁶⁹ supports this perspective, showing that modest improvements in self-perception related to physical health can contribute to better quality of life outcomes. These findings underscore the importance of not only promoting physical activity but also enhancing students' self-perception to achieve a more comprehensive improvement in their overall well-being.

Limitations and future directions

Despite these significant findings, several limitations must be acknowledged. First, the study relied on self-reported data, which may be subject to social desirability bias or recall bias. Second, the cross-sectional design precludes conclusions about causality between the variables. Third, the generalizability of findings is limited, as the sample was restricted to five universities in one city in China. Fourth, due to the sample size, subgroup analyses by gender or year of study were limited in scope. Future research should consider longitudinal designs and broader sampling to enhance external validity.

Conclusion

Based This study provides empirical evidence that PSPP partially mediates the relationship between PA and QoL among Chinese university students. The findings highlight significant and moderate correlations between these variables, emphasizing that physical activity promotion alone is not sufficient—and enhancing students' self-perceptions plays an equally critical role in improving their overall well-being.

From a practical standpoint, the results suggest that health promotion programs in universities should not only encourage physical activity but also foster positive physical self-concepts such as self-worth, strength, and body confidence. Given the partial mediation effect of PSPP (VAF = 28.8%), interventions aimed at improving PSPP could significantly enhance the overall effectiveness of PA-based wellness programs.

Moreover, subgroup analysis revealed significant gender differences. Male students reported significantly higher of physical activity, physical self-worth, and overall PSPP than females, while females scored higher on psychological QoL. These gender-based disparities indicate a need for tailored interventions. For instance, programs for female students may benefit from focusing more on improving body image and self-worth to increase physical activity engagement and perceived QoL. Conversely, male students may benefit from stress management and psychological well-being support to balance their higher physical activity with mental health promotion.

Future directions should focus on conducting longitudinal studies to establish causal relationships and evaluating how specific subdimensions of PSPP (e.g., body attractiveness, physical strength) contribute to QoL over time. In addition, exploring the role of cultural and environmental factors in shaping self-perception and physical activity behaviour will provide a more comprehensive understanding of relationship among those variables which consequently could guide the formulation of sound institutional policies.

Data availability

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

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Author contributions

Contributions: Conceptualization, H.C. and E.H.W.; methodology, H.C. and Z.W.; software, Z.W. and E.H.W.; validation, H.C. and W.Q.; formal analysis, H.C. and Z.W.; data curation, W.Q. and E.H.W.; writing—original draft preparation, E.H.W.; writing—review and editing, H.C. and E.H.W.; supervision, H.C. and Z.W. All authors (H.C., E.H.W., Z.W., W.Q.) have contributed significantly to the work and have read and agreed to the published version of the manuscript.

Declarations

Competing interests

The authors declare no competing interests.

Ethical approval

Prior to data collection, ethical clearance was obtained from SEGi University (Approval No.: SEGiEC/SR/FOELPM/91/2024–2025).

Additional information

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