Research on the Physical Activity Level of University Students in College Sports Environment

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Abstract

This article explored the complex interplay among the university sports environment, willpower development, exercise intentions, and physical activity levels in college students. Drawing on Social Cognitive Theory, Self-Determination Theory, and Behavioral Decision Theory, it aimed to comprehensively understand the psychological processes influencing health-related behavior. The study primarily aimed to investigate the relationship between the university sports environment and willpower development, along with its impact on exercise intentions. Additionally, it seeks to examine the mediating role of exercise intentions in the link between the sports environment and physical activity levels in college students. This study was Employing a theoretical framework integrating social cognitive theory, self-determination theory, and behavioral decision theory, the research used various methods to assess these relationships. Researchers likely used statistical analyses to identify patterns within the data. The study revealed a significant positive association between the university sports environment and both willpower development and exercise intentions. College students identified exercise intentions as a mediating factor in the relationship between the sports environment and physical activity levels. The research contributed theoretically by integrating and validating multiple psychological theories and shedding light on mediating mechanisms. In practical terms, it offers guidance for educational institutions, informs policymaking, and suggests strategies for health promotion. The article underscores universities' pivotal role in fostering healthier lifestyles and holistic student development, emphasizing the

importance of creating supportive sports environments for enhanced physical activity, personal growth, and academic success.

Keywords: University Sports Environment; Developing Willpower; Physical Activity Level

Introduction

In recent years, numerous studies have confirmed the negative impact of insufficient physical activity on health, leading to higher mortality rates both globally and in China (Fang et al., 2020). Not only does it result in health issues like obesity and cardiovascular diseases, but also insufficient physical activity has become one of the leading causes of human mortality (Kraus et al., 2019). Although multiple studies indicate that increasing physical activity levels is beneficial for promoting physical health, the awareness of engaging in physical activities among university students remains inadequate. National fitness monitoring results show that as high as 84.16% of university students exercise less than 1 hour a day. In order to promote the improvement of the physical health of university students, it is essential to identify the factors influencing insufficient physical activity among them and implement targeted measures. Despite several nationwide student fitness monitoring efforts in China, the overall physical fitness level of university students has shown slight improvement, but there is a continuous decline in strength indicators such as grip strength, vertical jump, and back strength. Therefore, proactive and effective measures must be taken to reverse this trend and fundamentally improve the health of university students.

According to a study by Ruíz-Roso et al. (2020), approximately 80% of adolescents worldwide fail to meet the recommended daily standards for physical activity. The situation in China is also concerning, with only about one-third (29.9%) of children and adolescents meeting the recommended standard of at least 60 minutes of moderate-to-vigorous-intensity physical activity per day (Zenic et al., 2020), and this proportion decreases with age (Xiao et al., 2022).

In the late 20th century, researchers in developed countries such as the United States and Australia began to focus on the influence of the built environment on individual physical activity behavior (Sallis et al., 1993). The built environment, as an important carrier of people's daily lives, has significant value and potential in promoting individual development (Chen et al., 2021). Therefore, in the fields of health promotion, public health, prevention, and urban planning, the impact of the built environment on physical activity has become a hot research topic. Past research has primarily focused on analyzing the impact of the built environment on physical

activity, and it has been proven that a supportive built environment can promote individual physical activity (Tcymbal et al., 2020; Mitáš et al., 2019).

However, there is limited research exploring the internal mechanisms through which the built environment influences physical activity. Individual physical activity is influenced not only by the external factor of the built environment but also by psychological factors such as behavioral habits, emotional experiences, outcome evaluations, and social support (Laddu et al., 2021). Among these, exercise willpower significantly predicts individual physical activity (Hausenblas et al., 1997; Di Maio et al., 2020). Therefore, in the relationship between university sports environments and the physical activity of college students, exercise willpower plays a crucial role. The specific pathways and mechanisms of this role need to be further investigated.

In summary, insufficient physical activity is one of the main issues affecting human health globally and in China, with most college students and adolescents failing to meet recommended standards. This not only relates to health issues such as obesity and cardiovascular diseases but also involves psychological and environmental factors. The physical fitness environment has been proven to significantly influence individual physical activity. Therefore, improving the physical fitness environment and enhancing the exercise willpower of college students are essential for promoting their physical health and activity levels.

Hence, this study, grounded in sociology and focused on college students as subjects, delves into how the built environment affects the physical activity of university students. At the same time, the study applies the Reasoned Action Theory and the Theory of Planned Behavior to examine the mediating role of exercise willpower in the relationship between the built environment and physical activity among college students, thus laying a theoretical foundation for interventions and promotion of physical activity. In summary, this article poses the following research questions:

RQ 1: How does the university sports environment influence the physical activity levels of college students?

RQ 2: How does the university sports environment influence the exercise willingness of college students?

RQ 3: How does the exercise willingness of college students influence their physical activity levels?

RQ 4: How does the exercise willingness of college students mediate the relationship between the university sports environment and the physical activity levels of college students?

Literature Review

Relationship between University Sports Environment and Physical Activity Levels of College Students

This study, rooted in social cognitive theory, asserts that individuals form cognitive perceptions about situations through social learning, influencing behavior (Gruber et al., 2022). In the university sports context, positive perceptions can develop through coaches, peers, and knowledge transfer, motivating active engagement (Chen et al., 2020). van Sluijs et al. (2021) propose diversifying sports activities and competitions in the university sports environment to boost college students' interest and motivation for physical exercise. An et al. (2019) suggest that such an environment fosters sports awareness, health concepts, and healthy habits, facilitated by relevant courses and initiatives. The hypothesis (H1) posits a significantly positive impact of the university sports environment on college students' physical activity levels.

Relationship between University Sports Environment and Exercise Willpower of College Students

Human development, shaped by physiological factors, social environment, and education, involves physiological, psychological, and social dimensions (Chow et al., 2019; Emo et al., 2016). The environment, influencing development, demands acceptance for behavioral impact. Physical education aims to internalize motor skills and health knowledge, fostering proactive engagement for holistic health development (Fuentealba-Urra et al., 2023). The school sports environment, crucial for physical education, positively affects college students' exercise behavior (Eys et al., 2019). Enhancing the university sports environment offers diverse sports, promoting perseverance and patience (Guilmette et al., 2019). This training builds self-confidence, self-management skills, and strengthens willpower (Polet et al., 2021). Moreover, it supports students' physical and psychological health, aiding stress relief during exercise (Simons et al., 2023; Shapiro, 2020). The hypothesis (H2) The university sports environment has a significantly positive impact on the exercise willpower of college students.

Relationship between Exercise Willpower of College Students and their Physical Activity Levels

Drawing from Self-Determination Theory, the article posits that satisfying autonomous and intrinsic motivations in the university sports environment enhances exercise willpower (Deci & Ryan, 2013). Students, through chosen sports, achieve self-affirmation, fostering persistence and

value in exercise willpower (Brand & Ekkekakis, 2021). Exercise willpower, in turn, enhances the capacity to overcome inertia and negative emotions, facilitating initiation and maintenance of physical activity (Zafari et al., 2020). Rodrigues et al. (2020) support this, stating exercise willpower aids emotion and behavior management. Ramezanzade and Arabnarmi (2018) find that exercise willpower helps establish the habit of physical activity, integrating it into daily life (Fuentealba-Urra et al., 2023). Exercise willpower aligns with individuals' goals and values, motivating consistent physical activity (Brand, & Ekkekakis, 2021; Escobar et al., 2019). The hypothesis (H3) the exercise willpower of college students has a significantly positive impact on their physical activity levels.

Mediating Role of Exercise Willpower of College Students in the Relationship between University Sports Environment and Physical Activity Levels

Self-Determination Theory underscores exercise motivation's role in adolescents' physical activity, triggered by meeting psychological needs (Deci & Ryan, 2013). Families influence motivation; providing sports equipment fosters autonomy, benefiting exercise willpower, while exposure to electronic media weakens it. Decision-making theory states external and internal factors affect behavior (Hueston et al., 2017). In the university sports environment, diverse, challenging experiences positively impact college students' exercise willpower (Beets et al., 2009). Coach and peer support, through encouragement and recognition, enhance self-confidence, fostering active participation (Singh et al., 2019; Andersen et al., 2019). College students' physical activity levels are influenced by exercise willpower (González-Cutre et al., 2016). A supportive university sports environment, offering diverse experiences and support, enhances exercise willpower and physical activity levels (Tao et al., 2019). The hypothesis (H4) exercise willpower of college students mediates the relationship between the university sports environment and physical activity levels.

Research Framework

This article, drawing from Social Cognitive Theory and Self-Determination Theory (Bandura, 1977), posits that the university sports environment influences college students' cognition, emotions, and behavioral motivations. Exercise willpower, as a mediating variable, reflects autonomous engagement in exercise. The supportive university sports environment enhances autonomy needs, promoting exercise willpower and increasing physical activity levels. The research model is illustrated in Figure 1.

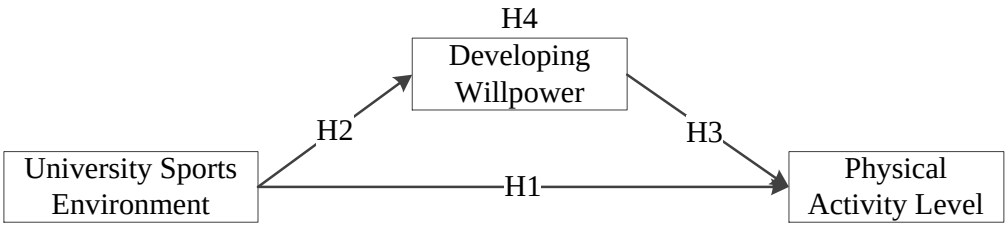

Figure 1 Research Framework

Materials and Methods

Research Methods

The specific research methods employed in this article primarily include literature analysis, questionnaire surveys, and statistical analysis, among others. Detailed descriptions and practical applications of these various methods can be found in the relevant chapters. Literature not only reflects societal realities and historical events but also constructs them, making it crucial for social research. Literature analysis encompasses literature reviews, historical studies, and the analysis of practical activities, among others. Survey research is more easily conducted, as questionnaires can be designed in advance, and data collected can be swiftly processed using relevant quantitative analysis software to present survey results. Key stages of conducting survey research include ensuring the validity of the posed questions, selecting the survey sample, questionnaire distribution and collection, the nature of data analysis, and consideration of different levels, among others.

Research Tools

University Sports Environment Scale. In this study, we utilized the College Environment Scale (CES) developed by Çingöz and Altug (2023) as a tool to assess the university sports environment. The scale consists of five dimensions: academic support (4 items), sports facilities (4 items), sports competitions (4 items), sports support (4 items), and sports events (4 items). The assessment is conducted using a 5-point Likert scale. The reliability of the scale, measured by Cronbach's α, was 0.884. The χ^2/df ratio was 2.499, CFI was 0.934, and GFI was 0.915, indicating good reliability and validity. Higher scores on the scale indicate a more supportive sports environment.

Exercise Willpower Scale. In this study, we employed the Exercise Behavioral Intention Scale (EBIS) developed by Herbert et al. (2020) to measure exercise willpower. EBIS is used to assess an individual's intention to engage in exercise and comprises 7 items. Ratings are given using a 5-point scale. The reliability of the scale, measured by Cronbach's α, was 0.911. The

χ^2/df ratio was 2.284, CFI was 0.979, and GFI was 0.943, indicating good reliability and validity. Higher scores on the scale indicate a stronger intention to engage in exercise.

Physical Activity Level Scale. In this study, we utilized the Physical Activity Level Scale designed by Baecke et al. (1982) to assess an individual's self-reported physical activity level. The questionnaire assesses physical activity across three dimensions: work-related activity (5 items), leisure-time activity (5 items), and sports/exercise activity (5 items). The assessment is conducted using a 5-point Likert scale. The reliability measured by Cronbach's α was 0.752. The χ^2/df ratio was 2.272, CFI was 0.932, and GFI was 0.901, indicating good reliability and validity. Higher scores on the scale indicate a higher level of physical activity.

Research Subjects and Sampling Methods

This study focuses on college students from a university in Chongqing Province, China. Data for this study were collected from May 8th to May 13th, 2023, resulting in a total of 405 completed questionnaires. After excluding 16 invalid questionnaires, a total of 389 valid questionnaires were obtained, yielding a valid response rate of 96.05%. Female students accounted for the majority (55.53%), and the first-year students were the largest group (31.88%) in terms of grade level. Most participants came from dual-parent families (89.97%), and there was no significant difference in the distribution of undergraduate majors, with the highest percentage being in the science field (24.94%). In summary, the sample structure of this survey closely matches the demographic structure of the target population, indicating that the 389 questionnaires collected in this study are representative and can effectively represent the research subjects of this survey.

Research Results

Common Method Variance

For surveys in social sciences, particularly those involving self-report measures, the issue of common method variance is likely to arise. To assess whether the questionnaire is significantly affected by common method variance, data analysis is required. In this study, the Harman's single-factor analysis was employed, involving an exploratory factor analysis without rotation. The sum of squared loadings extracted from the first factor is observed. If the sum does not exceed 40%, it suggests that common method variance is not a significant concern. In this case, the sum of squared loadings extracted from the first factor was 32.340%, which is less than 40%,

indicating that there is no substantial issue of common method variance affecting the questionnaire.

Correlation Analysis

Pearson correlation analysis was conducted to examine the relationship between two variables, as shown in Table 1. There is a significant positive correlation between university sports environment and developing willpower (r=0.439, p<0.01). There is also a significant positive correlation between university sports environment and physical activity level (r=0.350, p<0.01), as well as a significant positive correlation between developing willpower and physical activity level (r=0.482, p<0.01).

Table 1 Correlation analysis

Variable	M	SD	USE	DW	PAL
1. USE	3.850	0.888	1		
2. DW	3.676	0.753	0.439**	1	
3. PAL	4.077	0.576	0.350**	0.482**	1

Note: **p<0.01; USE=University Sports Environment; DW=Developing Willpower; PAL=Physical Activity Level

Hypothesis test

In the study, most domestic and international academic research has utilized the causal stepwise regression testing method proposed by Baron and Kenny (1986) to examine the mediating effects. This method provides a logical and intuitive analysis of the mediating effects, making it easier for researchers to explain and readers to understand.

As indicated in Table 2, in Model 1, where the university sports environment serves as the independent variable and the physical activity level as the dependent variable, the standard regression coefficient reveals a positive impact of the university sports environment on the physical activity level (β=0.460, p<0.001), thereby supporting H1: The university sports environment significantly and positively influences the physical activity level of college students. In Model 3, with university sports environment as the independent variable and developing willpower as the dependent variable, the standard regression coefficient shows that university sports environment has a positive impact on developing willpower (β=0.563, p<0.001), supporting H2: university sports environment has a significant positive influence on the willpower of college students to exercise.

Model 2, based on Model 1, introduces the mediating factor developing willpower. The standard regression coefficient indicates that developing willpower has a positive impact on physical activity level (β=0.462, p<0.001), supporting Hypothesis 3: College students' willpower to exercise has a significant positive influence on their physical activity level. By comparing the standard regression coefficients of university sports environment on physical activity level between Model 2 and Model 1, it can be observed that after adding the mediating variable, the coefficient decreases from 0.460 in Model 1 to 0.107 in Model 2. Based on the causal stepwise regression testing method proposed by Baron and Kenny (Baron & Kenny, 1986), this indicates that college students' willpower to exercise mediates the relationship between school sports environment and physical activity level. This finding is consistent with H4.

Table 2 Summary of Regression Analysis

	DV: PAL		**DV: DW**
	M1	M2	M3
USE	0.460***	0.107*	0.563***
DW		0.462***	
R^2	0.440	0.513	0.559
Adj R^2	0.413	0.486	0.514
F	57.500***	68.394***	81.049***
D-W	1.996	2.117	2.018

Note: ***p<0.001; USE=University Sports Environment; DW=Developing Willpower; PAL=Physical Activity Level

Visualization of the regression analysis results, as shown in Figure 2, solid lines represent direct effects, while dashed lines represent indirect effects. reveals that the university sports environment can directly and positively promote the physical activity levels of college students. Simultaneously, the university sports environment can also indirectly affect the physical activity levels of college students by enhancing their exercise willpower.

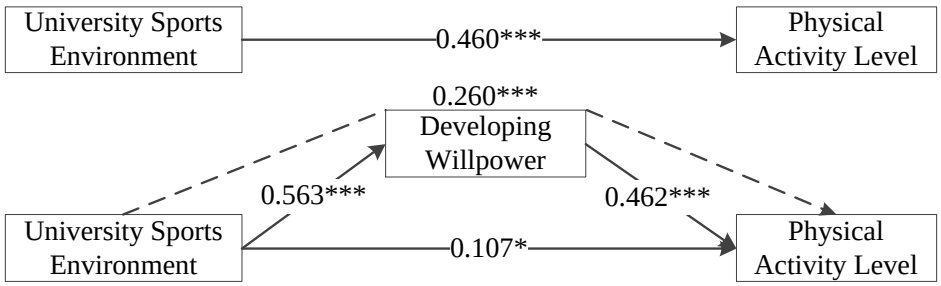

Figure 2 Research Model Results Diagram

Discussions

In conclusion, this study investigated the relationship between university sports environments, the development of willpower, exercise intentions, and physical activity levels among college students. The findings have provided valuable insights into the factors influencing students' engagement in physical activities.

The research supported the hypothesis that a positive university sports environment significantly impacts college students' physical activity levels. When universities provide supportive sports environments, including academic support, sports facilities, competitions, and social support, students are more likely to engage in physical activities (An et al., 2019). This highlights the importance of creating conducive sports environments within educational institutions (van Sluijs et al., 2021).

The study revealed that the university sports environment also has a positive influence on the development of students' willpower. A well-structured sports environment that offers diverse and challenging exercise experiences, along with support from coaches and peers, contributes to the strengthening of students' willpower (Polet et al., 2021). This underscores the role of universities in not only promoting physical activity but also fostering students' personal development (Eys et al., 2019).

Furthermore, the research demonstrated that exercise intentions play a mediating role in the relationship between the university sports environment and physical activity levels. College students with stronger exercise intentions are more likely to translate their willpower into increased physical activity (Hueston et al., 2017). This emphasizes the importance of targeting exercise intentions as part of intervention strategies to enhance students' physical activity levels (Tao et al., 2019).

In summary, this study underscores the significance of a supportive university sports environment in promoting physical activity and fostering the development of willpower among college students. The mediating role of exercise intentions highlights the need for comprehensive interventions that consider both the environment and individual factors. These findings can inform educational institutions and policymakers in creating healthier and more active campus environments.

Conclusion

The study strongly supports the hypothesis that a positive university sports environment significantly influences college students' physical activity. It highlights the crucial role of the sports environment in shaping students' willpower and underscores the multifaceted impact on personal growth. Exercise intentions serve as a key mediating factor, emphasizing the need for targeted interventions to promote physical activity. The conclusions stress the valuable implications for institutions and policymakers, encouraging the creation of a healthier educational environment. Policymakers can utilize these findings to develop comprehensive interventions for the overall health of college students.

Recommendation

Based on research findings, the following streamlined strategies can enhance college students' physical activity: First, universities should upgrade their sports facilities and organize diverse sports events to create a more engaging environment. Second, programs aimed at developing exercise willpower, including motivational workshops and goal-setting sessions, should be integrated. Additionally, physical activity components should be incorporated into curricula, offering credits for participation in sports. Universities should also provide a variety of physical activities to meet different interests and foster a supportive community through sports clubs and events. Leveraging technology and social media can further promote engagement. Continuous monitoring and evaluation will help assess and refine these strategies, creating an environment that boosts students' physical activity levels effectively.

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