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

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**Abstract:** This article explores the intricate relationship between the university sports environment, willpower development, exercise intentions, and physical activity levels among college students. Drawing on Social Cognitive Theory, Self-Determination Theory, and Behavioral Decision Theory, the study offers a comprehensive understanding of the psychological processes underlying health-related behavior. Findings reveal a significant positive association between the university sports environment and both willpower development and exercise intentions. Furthermore, exercise intentions were found to mediate the relationship between the sports environment and physical activity levels. The study's theoretical contributions lie in the integration and validation of multiple psychological theories and the identification of mediating mechanisms. Practically, it provides guidance for educational institutions, informs policymaking, and offers strategies for health promotion. This article highlights the pivotal role universities play in promoting healthier lifestyles and holistic student development. By creating supportive sports environments, institutions can contribute to enhanced physical activity, personal growth, and academic success among their students.

**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 [1]. 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 [2]. 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. [3], 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 [4], and this proportion decreases with age [5].

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 [6]. The built environment, as an important carrier of people's daily lives, has significant value and potential in promoting individual development [7]. 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 [8, 9].

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 [10]. Among these, exercise willpower significantly predicts individual physical activity [11, 12]. 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.

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?

## **Research Hypotheses**

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

This study, based on social cognitive theory, posits that individuals gradually form cognitive perceptions, beliefs, and expectations about specific situations through social learning and interaction, which in turn influence their behavior [13]. In the context of the university sports environment, students can develop positive perceptions and beliefs about physical activity and expect themselves to engage more actively in physical activities through the influence of coaches and peers, as well as the transmission of knowledge and skills. This social cognitive process can encourage students to participate more actively in physical activities and subsequently elevate their physical activity levels [14].

van Sluijs et al. [15] suggest that the development of the university sports environment can also offer a variety of sports activities and competitions, increasing the interest and motivation of college students to engage in physical exercise. For instance, universities can organize various competitions and sports events to stimulate student participation enthusiasm. Additionally, universities can arrange sports culture activities such as sports lectures and fitness training to enhance students' understanding and knowledge of sports [16]. Research has shown that participation in sports competitions and activities significantly promotes the physical activity levels of college students [17].

An et al. [18] argue that the development of the university sports environment can also cultivate students' sports awareness and health concepts, promoting the adoption of healthy lifestyles and habits. For example, universities can offer relevant courses such as health education and sports physiology to help students understand the benefits and necessity of physical exercise. Furthermore, universities can encourage healthy eating habits by providing nutritious dining options, among other means, thus motivating students to adopt healthier dietary practices [19].

H1: The university sports environment has a significantly positive impact on the physical activity levels of college students.

### ***Relationship between University Sports Environment and Exercise Willpower of College Students***

Human development is a complex process, influenced by the interaction of physiological factors, the social environment, and education. Physiological factors provide the material basis, while development is determined by education and the environment [20]. Human development encompasses physiological, psychological, and social aspects [21]. The environment serves as external conditions that affect human development. Objective environmental factors continually present new demands to individuals, and these demands only influence behavior when they are accepted and internalized as inner needs. The ultimate goal of physical education is to enable learners to acquire motor skills, understand basic knowledge about a healthy lifestyle, and transform these into internal needs that drive proactive engagement in physical exercise, promoting physical and mental health development [22]. The school sports environment is the setting and space for physical education, a critical factor in ensuring students' engagement in physical education. The university sports environment positively impacts college students' physical exercise behavior [23].

The development and improvement of the university sports environment can provide a diverse range of sports activities, allowing students to choose sports they are interested in and excel at [22]. During this process, students need to invest a significant amount of time and effort in learning and practicing, requiring them to possess a certain level of perseverance and patience to achieve success in sports [24]. This kind of training can help students build self-confidence and self-management skills, positively influencing their willpower [25]. The construction of a university sports environment can also provide physical and psychological health support, helping students better cope with the stresses of learning

and life [26]. While exercising, students can release pent-up emotions, reduce stress, and alleviate fatigue [27].

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***

This article, based on Self-Determination Theory, asserts that individuals have autonomous and intrinsic motivations, and only when they experience satisfaction of these autonomous and intrinsic motivations can they generate enduring and valuable behavioral changes [28]. In the university sports environment, students have the opportunity to choose sports activities that interest them and align with their strengths. Through achievement and self-affirmation obtained in competitions and training, they can satisfy their autonomous and intrinsic motivations, thereby promoting the persistence and value of their exercise willpower and subsequently enhancing their exercise willpower levels [29].

Exercise willpower itself can enhance the capacity for willpower, enabling individuals to overcome inertia and negative emotions more effectively [30]. This makes it easier for individuals to initiate and maintain physical activity. Similar conclusions have been drawn by Rodrigues et al. [31], who state that exercise willpower helps individuals better manage their emotions and behaviors to achieve their goals. Researchers Ramezanzade and Arabnarmi [32] found that through exercise willpower, people can gradually establish the habit of physical activity. Developing such a habit takes time and repetition, but if maintained, individuals can integrate physical activity into their daily lives, making it easier to sustain a higher level of physical activity [22].

Exercise willpower can help individuals better understand their goals and values, and enhance their motivation to pursue these goals [29]. If physical activity is seen as one of these important goals, exercise willpower can assist individuals in finding the time and motivation to engage in physical activity more easily [33]. This suggests that exercise willpower can help individuals maintain long-term positive drive and motivation for physical activity.

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***

Exercise motivation is a critical factor in adolescents' participation in physical activity, and Self-Determination Theory suggests that when individuals' basic psychological needs are met, it can trigger intrinsic motivation and internalize external motivation [28]. Families can either provide facilities that promote physical activity for adolescents or facilities that inhibit it, such as electronic media. When families offer ample sports equipment to children, allowing them opportunities for choice, it can potentially satisfy their need for autonomy, facilitating autonomous motivation, and benefiting exercise willpower. Conversely, when families expose children to more electronic media, it may weaken autonomous motivation for exercise.

Decision-making theory posits that individuals' behavioral choices are influenced by both external environmental factors and internal cognitive factors [34]. Within the university sports environment, numerous factors may either facilitate or hinder exercise, encompassing course schedules, support from coaches and peers, and the availability of facilities [35]. These factors influence the exercise willpower and physical activity levels of college students. Specifically, within the university sports environment, if college students can gain diverse, challenging, and enjoyable exercise experiences, their exercise willpower is likely to strengthen [36]. These exercise experiences can stem from physical education classes, sports events, extracurricular activities, and more [37]. Furthermore, the support of coaches and peers can have a positive influence on college students' exercise willpower [38]. For example, coach encouragement and recognition, as well as cooperation and competition among peers, can enhance students' self-confidence and sense of belonging, promoting active participation in exercise [39].

Building upon exercise willpower, college students' physical activity levels are also influenced [40]. They may choose to engage in more sports activities or increase their daily physical activity, thereby improving their overall physical health. However, if the university sports environment lacks support and encouragement, or if factors such as unreasonable class schedules and inadequate facilities exist, it may lead to a decrease in college students' physical activity levels [41]. The university sports environment plays a crucial role in promoting physical activity levels among college students [42]. By providing diverse, challenging, and enjoyable exercise experiences and obtaining support from coaches and peers, college students' exercise willpower and physical activity levels can be enhanced. This process aligns with the idea of external environmental factors and internal cognitive factors jointly influencing behavior in decision-making theory [43].

H4: Exercise willpower of college students mediates the relationship between the university sports environment and physical activity levels.

**Research Framework**

Based on Social Cognitive Theory, this article posits that individuals form their behavioral intentions through the observation, assessment, and interpretation of the social environment. Self-Determination Theory suggests that individuals autonomously select and execute behaviors based on their own needs, values, and motivations [44]. Exercise willpower, as the mediating variable, reflects the extent to which college students autonomously choose to engage in exercise. The university sports environment, by supporting and stimulating college students' autonomy needs, can promote the formation and maintenance of exercise willpower, thereby increasing their levels of physical activity.

In summary, this article model involves concepts and relationships from multiple psychological theories. The university sports environment, as an independent variable, influences college students' cognition, emotions, and behavioral motivations, which, in turn, affect their exercise willpower and behavior. Exercise willpower, as a mediating variable, reflects the degree to which college students autonomously choose to engage in exercise. Therefore, this article proposes the research model illustrated in Figure 1.

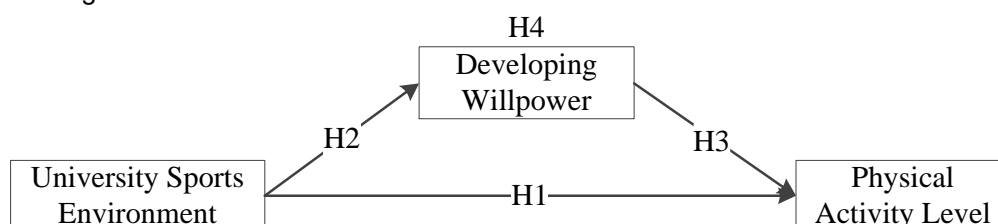


Figure 1. Research Framework

**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 [45] 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  $\alpha$ , was 0.884. The  $\chi^2/df$  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. [46] 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  $\alpha$ , was 0.911. The  $\chi^2/df$  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. [47] 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  $\alpha$  was 0.752. The  $\chi^2/df$  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.

**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 Testing**

In the study, most domestic and international academic research has utilized the causal stepwise regression testing method proposed by Baron and Kenny [48] 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 II, 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 ( $\beta=0.460, p<0.001$ ), 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 ( $\beta=0.563, p<0.001$ ), 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 ( $\beta=0.462, p<0.001$ ), 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 [48], 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 <sup>2</sup>	0.440	0.513	0.559
Adj R <sup>2</sup>	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

### Conclusions

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.

Firstly, 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. This highlights the importance of creating conducive sports environments within educational institutions.

Secondly, 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. This underscores the role of universities in not only promoting physical activity but also fostering students' personal development.

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. This emphasizes the importance of targeting exercise intentions as part of intervention strategies to enhance students' physical activity levels.

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.

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