

THE MANAGEMENT OF PHYSICAL EXERCISE BEHAVIOR FOR GUANGXI UNIVERSITY STUDENTS

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Abstract

In China, the physical health level of university students is still on the decline by year, regular physical exercise is helpful to improve the physical health level of university students. However, how to promote university students' physical exercise behavior is still a missing link. School is an important venue for adolescents to engage in physical exercise, a supportive school environment and high-quality physical education can provide students with exercise and health literacy for physical and mental health and an active lifestyle. The primary objective of this study is to explore the relationship between school sport environment, exercise motivation, exercise self-efficacy and physical exercise behavior for university students in Guangxi; and to develop model of promoting physical exercise behavior for university students in Guangxi. This study adopts quantitative and qualitative mixed research methods, the structural equation model is used to analyze the data collected by the questionnaires, the "Weiciyun" tool is used to analyze the results of focus group discussions. The results of the study indicate that school sports environment has a positive and significant influence on exercise motivation, exercise self-efficacy and physical exercise behavior for university students in Guangxi. Exercise motivation and exercise self-efficacy also has a positive and significant influence on physical exercise behavior for university students in Guangxi. Exercise motivation and exercise self-efficacy plays a mediating role between school sport environment and physical exercise behavior for university students in Guangxi. This study develops model of promoting physical exercise behavior for university students in Guangxi; enriches the theoretical literature and empirical about management of physical exercise behavior; can help universities to formulate targeted promote policies for physical exercise behavior.

Keywords: School Sport Environment, Exercise Motivation, Exercise Self-Efficacy, Physical Exercise Behavior, University Students.

1. INTRODUCTION

The World Health Organization (2018) states that currently 25% of adults and 75% of adolescents (ages 11-17) worldwide do not meet the weekly physical activity requirements set by WHO. In a global survey of physical activity among university students in 23 different income countries, 41.4% of university students did not meet the physical activity requirements recommended by the World Health Organization, ranging from a low of 21.9% in Kyrgyzstan to a high of 80.6% in Pakistan (Pengpid S, 2015). The US University Health assessment report that only 50% of male and 45% of female university students were able to achieve at least 150 minutes of moderate-intensity physical activity per week recommended by the World Health Organization (Helen M, 2018). Grasdalsmoen M (2019) found less than 25% of male students and less than 20% of female students in Norwegian universities meeting the minimum

recommended physical activity standards. As for China, Yue Hongyan (2017) invited 420 university students in Shanghai and found that only 31% of them formed the habit of physical exercise and 15.9% of them did not participate in physical exercise. Wu Yizhuo (2019) invited 1135 university students in Hangzhou and found that only 38% of them chose to take part in physical exercise in their spare time. Only 25 percent of female university students participate in physical education. Sun Lina (2022) found that more university students like to participate in low-intensity sports with low intensity and short exercise time.

Numerous studies have shown the health benefits of regular participation in planned, structured and repeated physical exercise and any physical activity that requires energy expenditure. Dolzhenko, L (2010) found that when senior students did not participate in physical education courses and did not participate in physical exercise voluntarily, their physical performance was significantly decreased, and their health condition was significantly deteriorated. Zhang Xiaonan (2022) pointed out that physical exercise behavior has a positive predictive effect on university students' physical health.

In order to promote students' physical exercise and improve their physical health, relevant government departments attach great importance to the role of school physical education. The Opinions on Comprehensively Strengthening and Improving School Physical Education in the New Era put forward specific requirements from the aspects of deepening teaching reform, improving school conditions, perfecting the evaluation system and strengthening organizational support (General Office of the State Council, 2020). However, the 8th National Survey report on the physical health status of university students shows that the decline trend of the physical health status of university students has not been effectively contained (Ministry of Education, 2021).

Therefore, it is very important to develop model of promoting physical exercise behavior for university students. The social ecological theory emphasizes the influence of ecological environment on human behavior (Fang Min, 2010). The social ecological model formed by this theory can effectively explain the role and internal relationship of influencing factors of physical exercise behavior and holds that multi-level environment will directly or indirectly affect physical exercise behavior (Chen Peiyou, 2014). A supportive school environment and high-quality physical education can provide students with physical and health literacy for physical and mental health and an active lifestyle.

Current research on school sport environment and university students' physical exercise behavior focuses on direct effects and ignores intermediary variables. It is well known that individual factors such as age, gender, self-efficacy, motivation and health status can affect people's physical exercise behavior (Bauman, 2012). In order to analyze the relationship between school sports environment and physical exercise behavior, this study concludes by introducing the mediating roles of exercise motivation and exercise self-efficacy. As a result, this study has two main research objectives. 1) To explore the relationship between school sport environment, exercise motivation, exercise self-efficacy and physical exercise behavior for university students in Guangxi. 2) To develop model of promoting physical exercise behavior for university students in Guangxi.

2. LITERATURE REVIEW

2.1 Social Ecology Theory

Social Ecology comes from the study of human and environment in system theory, and it is a discipline to study the relationship between human social organization and behavior and ecological environment (Bekoff, 1986).

According to the theory of social ecosystem, McLeroy et al. (1988) constructed a social ecological model based on individual, interpersonal, organization, community and policy levels. Bronfenbrenner (1994) thinks that the closer the environment is to the range of individual life, the greater the influence on individuals, and the subsystems interact and work together on individual behavior.

Social ecological model can effectively explain the functions and internal relations of the influencing factors of people's physical activities and behaviors. The far-end layer of social ecological model often plays its role through the near-end layer (behavior habits, psychological characteristics, etc (Dominick, 2015), which means that the external environment can determine the future behavior of the subject by acting on his psychological state.

As an important field for teenagers to engage in physical exercise, schools can provide an environment for students to participate in regular and organized physical activities, which has an important and even decisive influence on their physical exercise behavior. Therefore, this study mainly discusses the influence of school sports environment on the physical exercise behavior of university students in Guangxi.

2.2 School sport environment and Physical exercise behavior

School sports environment refers to the sports environment related to students' sports activities within the school, such as sports facilities, sports courses, teacher support, peer support, sports opportunities, etc (Guo Kelei, 2019; Lv Ruihua, 2021 and Sun Han, 2022).

School facilities are one of the material manifestations of school sports environment, the natural environment is the material or conditional support for individuals to engage in physical exercise activities, which can promote individuals' physical exercise behavior (Chen Shaping, 2006). Demetriou (2015) and others' research shows that the school sports venues, equipment and feasibility will directly affect students' physical exercise behavior.

Without the management of sports venues, equipment and venues, schools will be unable to meet the needs of students' physical exercise. Dong Baolin (2021) thinks strengthening the construction of school facilities and sports environment can effectively promote the physical exercise status of students. Peer support will provide continuous encouragement and important influence on the persistence of individual behavior.

Wang Fu Baihui (2018) pointed out that peer companionship and support behaviors have a positive and significant impact on adolescents' physical activities. Bao Ran (2020) put forward that peer support is an important part of reinforcement individual behavior factors; the closer the peer relationship, the higher the satisfaction of university students participating in physical

exercise. Teacher support can help students gain exercise recognition and can promote the autonomy and consciousness of young people's physical exercise participation (Dong Baolin, 2018). Yu Kehong (2021) points out that teachers' support for university students can improve their cognition of physical exercise, attach importance to physical exercise behavior, and eventually form reasonable physical exercise habits. Wang Yana (2022) found that students' perception of physical education teacher's support can gradually increase their interest in sports and enhance their enthusiasm to participate in physical exercise. Sport curriculum is the most important path for students to acquire exercise skills and knowledge,

Su Xiaohong et al. (2017) believed that the teaching concept and teaching method of physical education curriculum are important factors affecting teenagers' physical exercise. Exercise opportunity is an important environment for students to exercise, which directly affects their exercise experience and subsequent exercise behavior.

Han Hui (2016) found that organized extracurricular activities and other structured and unstructured leisure sports activities are important media to enhance the physical activities of teenagers. School is an important field for university students' engage in physical exercise activities, among them, sports facilities, peer support, teacher support, sport curriculum, exercise opportunities are closely related to students' physical exercise behavior.

2.3 School sport environment, Exercise motivation and Physical exercise behavior

Exercise motivation was the motive force of the individual's physical exercise activities, which was generated on the basis of the individual's certain demand for physical exercise (Bian Zenghui, 2012). Christina and others (2015) believe that intrinsic motivation plays a very important role in persisting in high-intensity exercise activities. Yang Yaqin (2016) concluded that sports motivation can affect students' physical exercise behavior, among which the influence of internal motivation on physical exercise behavior is greater than that of external motivation.

Yang Jiapeng (2017) found that physical exercise motivation has a significant impact on physical exercise behavior; Moreover, the dimensions of internal motivation of physical exercise are more predictive than those of external motivation and support the partial intermediary role of physical exercise behavior.

Hanna Kalajas-Tilga et al. (2020) shows that there is a positive correlation between intrinsic motivation and physical exercise activities. Special attention should be paid to the improvement of intrinsic motivation in physical exercise. Cheng Zhihao (2020) thinks that the four aspects of teaching atmosphere, classmates' relationship, venue equipment and performance evaluation have a positive predictive effect on students' sports motivation.

Bai Jinhao (2022) studied physical education class's learning satisfaction and the correlation between its dimensions and exercise motivation, and concluded that the higher the students' satisfaction with physical education class learning, the higher their motivation level in exercise motivation; Among them, the correlation coefficient of venue equipment to exercise motivation is the highest, followed by performance evaluation, and the correlation coefficient of classmate

relationship dimension is the smallest. Therefore, the variable of exercise motivation can not only affect students' physical exercise behavior as an independent variable, but also serve as an intermediary variable as a bridge to increase the explanatory power of school sports environment to students' physical exercise behavior.

2.4 School sport environment, Exercise self-efficacy and Physical exercise behavior

Self-efficacy is the most common important variable used to predict the occurrence of individual behavior. Lu Lin (2017) show that enhancing self-efficacy is an effective scheme to promote female university students to take leisure physical exercise.

Jin Ming et al. (2018) believe that exercise self-efficacy can promote individual sports participation behavior, and self-efficacy can realize cross-time mutual prediction of independent fitness behavior.

Garam J (2018) found that people with higher self-efficacy tend to hold a more positive attitude, perceive fewer obstacles and engage in more physical exercise. Chen Zewei (2022) believed that enhancing self-efficacy is an important prerequisite for participating in moderate and high-intensity physical exercise.

In addition, School sport environment can effectively predict students' sense of self-efficacy. Fan Huiying (2017) thought that most variables in school factors had an important influence on their willingness to exercise. Yu Kehong (2021) found that peer support at interpersonal level has a significant positive impact on self-efficacy.

Hu Meiling (2017) studies that physical education class, physical education teachers, peer support, physical exercise facilities and other external environments have a positive impact on adolescents' sense of self-efficacy.

Self-efficacy plays an intermediary role between external environment and physical exercise behavior, and external environment can indirectly promote teenagers' physical exercise behavior through its influence on self-efficacy.

Liu Chaohui (2020) pointed out that self-efficacy is an important intermediary variable between other variables and exercise persistence. Lv Ruihua (2021) found that there was a significant positive correlation between school sport environment and self-efficacy. Besides, self-efficacy has a significant impact on the physical exercise of students, and it can also play an intermediary role between the school sports environment and exercise behavior.

Therefore, the variable of self-efficacy can not only affect students' physical exercise behavior as an independent variable, but also serve as an intermediary variable as a bridge to increase the explanatory power of school sports environment to students' physical exercise behavior.

The following are the hypotheses:

Hypothesis 1: School sport environment has a significant positive impact on physical exercise behavior.

Hypothesis 2: School sport environment has a significant positive impact on exercise motivation

Hypothesis 3: School sport environment has a significant positive impact on exercise self-efficacy

Hypothesis 4: Exercise motivation has a significant positive impact on physical exercise behavior.

Hypothesis 5: Exercise self-efficacy has a significant positive impact on physical exercise behavior.

Hypothesis 6: Exercise motivation plays a mediating role between school sport environment and physical exercise behavior.

Hypothesis 7: Exercise self-efficacy plays a mediating role between school sport environment and physical exercise behavior.

3. METHODOLOGY

This study adopts quantitative and qualitative mixed research methods. The quantitative research part collected data through Chinese online questionnaire platform, then, AMOS were used to analyze the collected questionnaire data and construct a Structural Equation Model (SEM) to validate 7 hypotheses.

First, the researcher employs a method to determine the sample size using the Japanese Yamamoto Taro sample calculation formula, calculated a minimum sample size is 400, the study collected a total of 500 valid questionnaires, which met the theoretical requirements.

Second, this study obtained measurement scales for each research variable from existing literature. Measurement items for school sport environment were primarily derived from Dong Baolin (2021), Chen Shaping (2008), Zhang Jialin (2017), Guo Kelei (2019). Measurement items for exercise motivation were primarily derived from Wang Lei (2021), and measurement items for exercise self-efficacy were primarily derived from Wang Lei (2021).

Measurement items for physical exercise behavior were primarily derived from Liang Deqing (1994). For the qualitative research part, nine stakeholders were recruited to conduct a focus group, the "Weiciyun" tool is used to analyze the results of focus group discussions. The researcher designed the focus group discussion questions based on the literature reviews and the quantitative research findings in this study.

4. RESULTS

4.1 Quantitative Research

4.1.1 Descriptive Statistical Analysis

A total of 500 valid questionnaires were collected in this sampling survey and then performed a descriptive statistical analysis on the respondents' basic information. On the whole, the proportion of male and female university students is relatively balanced, including male university students account for 51.4% of the total sample, and female university students account for 48.6%. From the distribution of grades, most university students are freshman and sophomore, accounting for 47.8% and 20.8% of the total sample respectively. When it comes to students' majors, science and engineering majors are the most, accounting for 43.80% of the total sample; literature and history is the second major, accounting for 30.80% of the total sample.

4.1.2 Reliability and Validity Analysis

The main metrics used to measure reliability and validity in this study are Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). Cronbach's alpha coefficient with values that exceeded 0.70 as suggested by Hair et al. (2006). Composite reliability be larger than 0.7 and average variance extracted be greater than 0.5 as standards established by Black et al. (2010). As indicated in Table 1, Cronbach's alpha values for each construct are greater than 0.70, indicating strong reliability and statistical acceptance. The average variance extracted values for each construct are greater than 0.5 and composite reliability values for each construct are greater than 0.7, indicating ideal convergent validity. Thus, the structure passes the reliability and validity tests.

Table 1: Reliability and Convergence Validity test

	Cronbach's Alpha	AVE	CR
Physical exercise behavior	0.913	0.785	0.916
School sport environment	0.973	0.571	0.794
Sports facilities	0.911	0.774	0.911
Teacher support	0.912	0.781	0.914
Peer support	0.911	0.775	0.912
Sport curriculum	0.912	0.776	0.912
Exercise opportunities	0.910	0.776	0.912
Exercise motivation	0.963	0.730	0.964
efficacy-Exercise self	0.964	0.733	0.965

Measuring discriminant validity entails contrasting the correlation coefficients between the construct and other components with the square root of the AVE, it is thought to have excellent discriminant validity if the square root of AVE is greater than the correlation coefficient between the construct and other components (Fornell & Larcker, 1981). As table 2 shows, the square root of the average variance extracted by all variables is greater than the correlation coefficient between them and other factors.

4.1.3 Structural Equation Model

In this study, according to the conceptual model, AMOS is used to establish a structural equation model (See Figure 2). Then, structural equation modeling was employed to test the model fit, analyze the model paths, examine the mediating variables, and investigate the relationships between the constructs.

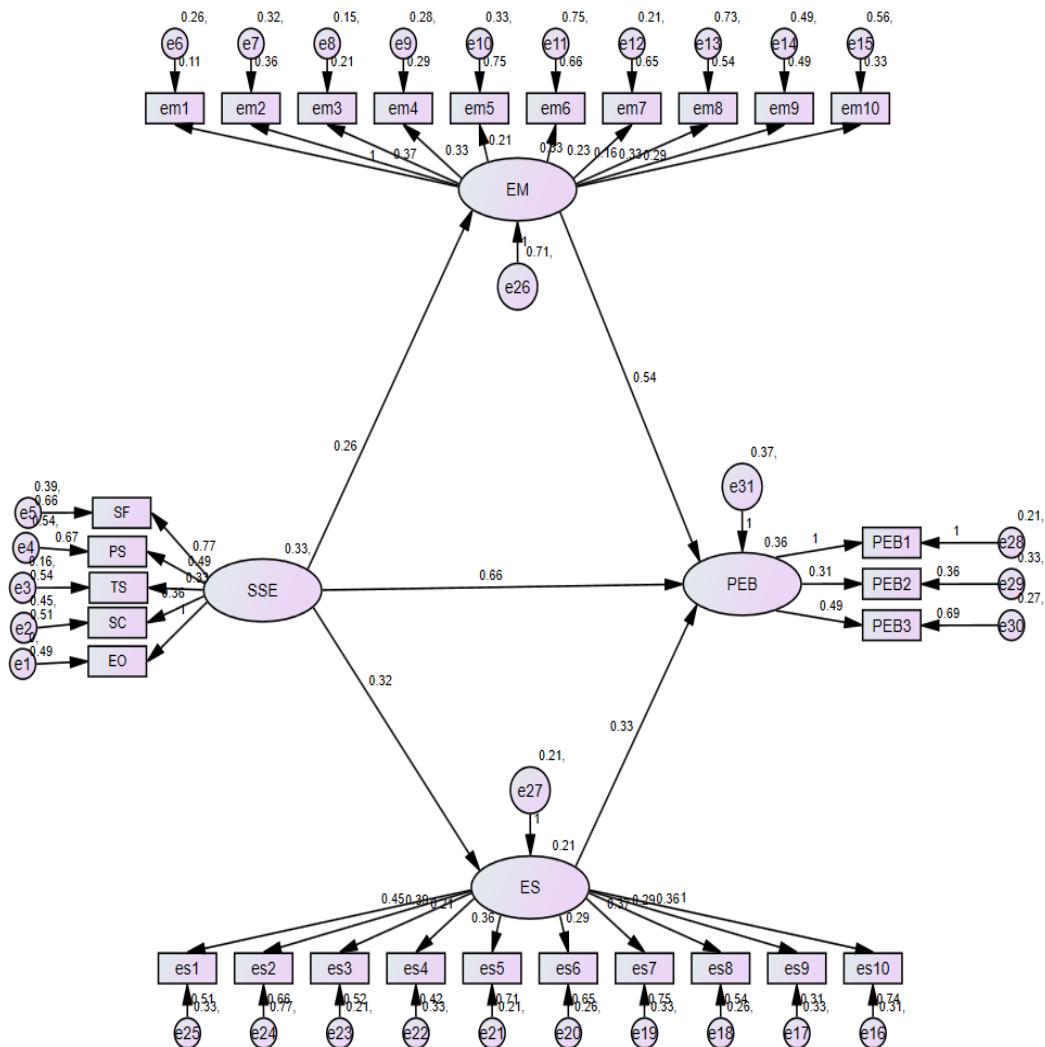


Figure 2: Structural equation model analysis results

This study mainly measures whether the structural equation model is established by measuring some fitting indexes. From the table 3, it can be observed that χ^2/df is 2.121 and less than 3, GFI is 0.946 and greater than 0.9, NFI is 0.911 and greater than 0.9, and TLI is 0.988 greater than 0.9. CFI is 0.930 is greater than 0.9, AGFI is 0.910 and greater than 0.9, indicating that the model has good adaptability. RMSEA is 0.08 and less than 0.10, SRMR is 0.045 and less

than 0.1, RMR is 0.04 and less than 0.05, indicating that the model has good fitting degree. In general, the fitting index of the model meets the requirements and the model is acceptable.

The evaluation of direct hypothesis correlations using T-statistics (C.R.) and P-values, a T-value more than 1.96 and a P-value less than 0.05 are the minimum requirements for statistically valid research hypothesis associations. As table 4 shows, H1:School sport environment has a significant positive impact on physical exercise behavior(T-value = 15.761,P-value = 0.000).H2:School sport environment has a significant positive impact on exercise motivation(T-value = 19.595,P-value = 0.000).H3:School sport environment has a significant positive impact on exercise self-efficacy(T-value = 13.806,P-value = 0.000).H4:Exercise motivation has a significant positive impact on physical exercise behavior(T-value = 9.149 ,P-value = 0.000).H5:Exercise self-efficacy has a significant positive impact on physical exercise behavior(T-value = 5.526 ,P-value = 0.000). In conclusion, all of the T-values for hypotheses H1 to H5 are higher than 1.96, and all of the p-values are lower than 0.05. As a result, statistical significance can be found for all five direct hypotheses.

Table 4: Hypothesis Testing Direct Effects

Hypothesis	Path	Estimate	S.E.	C.R.	P-value	Std path coefficient	Result
H1	SSE-->PEB	0.631	0.040	15.761	0.000	0.544	Support
H2	SSE-->EM	0.713	0.036	19.595	0.000	0.659	Support
H2	SSE-->ES	0.614	0.044	13.806	0.000	0.525	Support
H4	EM-->PEB	0.307	0.034	9.149	0.000	0.286	Support
H5	ES-->PEB	0.152	0.027	5.526	0.000	0.153	Support

Note: Physical exercise behavior(PEB), School sport environment(SSE), Exercisemotivation (EM), efficacy-Exercise self(ES)

In this study, bootstrap method is used to test the mediation effect, the samples are repeated 5000 times to calculate the 95% confidence interval. From the table 5, we can see that the confidence intervals for the SSE-->EM-->PEB path of [0.143, 0.237], which does not include 0, it can be concluded that H6 is supported at a 95% level of probability. The confidence intervals for the SSE-->ES-->PEB path of [0.035, 0.097], which does not include 0, it can be concluded that H7 is supported at a 95% level of probability. Therefore, H6 and H7 are established and the mediation effect is valid.

5. CONCLUSION AND DISCUSSION

This study constructs a theoretical model of promoting physical exercise behavior for university students in Guangxi through literature review, and the model is well validated by quantitative and qualitative mixed research methods. The overall research conclusions are as follows:

Firstly, school sports environment plays a significant role in promoting physical exercise behavior for university students in Guangxi, this results align with existing literature. School sports facilities is the material or conditional support for individuals to engage in physical exercise activities, which can promote students' physical exercise behavior; sport curriculum

is the most important path for students to acquire exercise skills and knowledge, the teaching concept and teaching method are important factors affecting teenagers' physical exercise (Su Xiaohong, 2017); organized extracurricular activities and other structured and unstructured leisure sports activities are important media to enhance the physical activities of teenagers (Han Hui, 2016); peer support is an important part of reinforcement individual behavior factors; the closer the peer relationship, the higher the satisfaction of university students participating in physical exercise (Bao Ran, 2020); teacher support can help students gain exercise recognition and can promote the autonomy and consciousness of young people's physical exercise participation (Dong Baolin, 2018).

In the promotion of physical exercise behavior for university students, should increase the construction of school sports facilities to create good conditions for students to participate in physical exercise; enrich the teaching contents and methods of sport curriculum, and arouse students' enthusiasm in participating in sports activities; actively organize extracurricular sports activities to create opportunities for students to exercise; try to create an environment and conditions for peer support and create a good exercise atmosphere for students; attach importance to physical education teachers' emotional support and ability support to students, and improve students' cognitive level of physical exercise.

Secondly, exercise motivation and exercise self-efficacy plays a mediating role between school sport environment and physical exercise behavior, these results align with existing literature. The persistence of individual physical exercise is largely influenced by internal motivation (Song mengke, 2022). Teaching atmosphere, venue equipment, classmates' relationship and performance evaluation can positively predict students' sports motivation (Cheng Zhihao, 2020; Bai Jinhao, 2022). The supportive environment provided can stimulate and cultivate teenagers' autonomous motivation; exercise motivation plays an intermediary role between sports environment and teenagers' physical activities (Yang Jiapeng, 2017).

Enhancing self-efficacy is an important prerequisite for participating in moderate and high-intensity physical exercise (Chen Zewei, 2022). Physical education class, physical education teachers, peer support, physical exercise facilities and other external environments have a positive impact on students' self-efficacy, and self-efficacy has a significant impact on the physical exercise of students. Self-efficacy plays an intermediary role between external environment and physical exercise behavior, and external environment can indirectly promote students' physical exercise behavior through its influence on self-efficacy (Hu Meiling, 2017; Liu Chaohui, 2020; Lv Ruihua, 2021). Therefore, at the same time of optimizing the school sports environment, also pay attention to stimulating and cultivating university students' exercise motivation and exercise self-efficacy, so as to better promote university students' physical exercise behavior.

To sum up, this study mainly verified the interrelations between school sports environment, exercise motivation, exercise self-efficacy and physical exercise behavior; and develops model of promoting physical exercise behavior for university students in Guangxi. This study enriches the theoretical literature and empirical about management of physical exercise behavior, provides a powerful reference for scholars when they carry out research related to the field of

physical exercise behavior in the future. This study can help universities to formulate targeted promote policies for physical exercise behavior, guide university students to actively carry out physical exercise and improve their health. While our study provides valuable insights, it is not without limitations. Firstly, the literature review were employed in this study to assist create the conceptual model. Future study should build on this study by doing more in-depth theoretical and empirical analyses to better understand how the variables interact. Secondly, although the sample size is sufficient for our analysis, it may limit the universality of the research results. Future study should consider a wider and more diverse sample to improve the external validity of the results.

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