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Study on the Influence of Physical Self-esteem on Physical Exercise Behavior—Exercise the Mediating Role of Self-efficacy

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Abstract: ***This study explored the relationship between physical self-esteem, exercise self-efficacy and physical exercise behavior among college students. Through a questionnaire survey of 314 college students from different majors, grade and gender, physical self-esteem was a significant positive predictor of physical exercise behavior, that is, college students tended to actively participate in physical exercise when they rated their physical appearance and exercise ability highly. Furthermore, exercise self-efficacy plays a partial mediator between physical self-esteem and physical exercise behavior. That is to say, when college students have confidence in their exercise ability, physical self-esteem is more likely to translate into actual exercise behavior. The study emphasized the importance of cultivating physical self-esteem and improving exercise self-efficacy to promoting physical exercise behaviors, which is important for enhancing their physical and mental health.***

Keywords: College students, Physical self-esteem, Exercise self-efficacy, Physical exercise behavior**.**

1. Research Necessity

In todays China, the number of college students has exceeded 50 million. As leaders in Chinas future social and economic development and construction, these young people play a vital role. In a 2020 survey on the current situation of college students participation in physical exercise in Jilin Province, Shan found that although sports are of great significance to the physical and mental health of college students, only 18.6 percent of boys and 5.6 percent of girls said they like sports very much. In addition, only 14 percent of the students reached the intensity of the national physical exercise standards. This data reflects that college students have low attention and low participation in physical exercise. In his 2022 study, Zhai Changqing further pointed out that college students participate in a single physical exercise program, and there are problems such as low exercise frequency, short duration and low exercise intensity. These problems are seriously inconsistent with the physical exercise standards proposed by the relevant national policies, showing that there are big problems in the physical exercise behavior of Chinese college students. These problems have seriously affected the physical health of Chinese college students.

The Young and middle-aged development plan of The State Council clearly points out that the physical health problems of Chinese college students need to attract the attention of all sectors of society, and it is urgent to improve the health level of college students. Research data show that the mental health problems of some college students are increasingly prominent, which also needs to attract attention from all walks of life. The declining level of college students physical health and the continuous reduction of their physical activity lead to the decline of the quality of various physical sports indicators, which seriously restricts the development of college students physical health. With the increasingly serious mental health problems of college students, the physical and mental health of college students has been seriously affected, which will seriously hinder the self-development of college students, which needs to cause the attention and attention of the society. Therefore, improving and improving the physical and psychological quality of college students, as well as promoting the improvement of physical exercise behavior, is one of the important problems to be solved urgently.

2. Research Design

2.1 Study Model

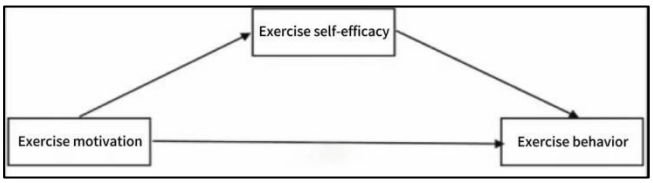

Figure 1: Study model

The model demonstrates the relationship between exercise motivation, exercise self-efficacy, and exercise behavior. The three main elements in the model and their relationships are as follows;

Motivation for exercise refers to the internal or external motivation of individuals to participate in exercise. Motivation is often the driving force for an individual to decide whether to exercise and may include maintaining health, improving physical fitness, and reducing stress.

Exercise self-efficacy. Self-efficacy refers to an individuals confidence in completing a task or activity. In this model, exercise self-efficacy reflects an individuals level of confidence in their successful participation in exercise and reaching their goals. The model suggests that exercise motivation indirectly influences exercise behavior by enhancing self-efficacy.

Exercise behavior refers to the actual participation in physical

exercise. Exercise behaviors may include aspects of exercise frequency, duration, intensity, etc. In the model, exercise behavior was not only directly influenced by motivation for exercise, but also indirectly by exercise self-efficacy.

In summary, the arrows in the figure indicate the causal relationship between the variables. Exercise motivation directly affects exercise behavior, while indirectly influencing exercise behavior through exercise self-efficacy. This means that if a person has a strong motivation to exercise and a higher sense of self-efficacy, they are more likely to practice and practice exercise behavior.

2.2 Study Hypothesis

This study suggests the following hypotheses. First, we hypothesized that individual physical self-esteem levels had a positive boost to their participation in physical exercise behavior. That is, when a person is more confident and satisfied to actively participate in physical exercise with his body image and abilities. Second, we also hypothesized that exercise self-efficacy, the individual belief in their confidence and ability to complete exercise tasks, would also have a positive impact on physical exercise behavior. In other words, those who believe they can stick to and complete the exercise program were more likely to participate in physical exercise. Finally, we hypothesized that exercise self-efficacy is a mediator between physical self-esteem and physical exercise behavior. This implies that body self-esteem may indirectly influence the individuals participation in physical exercise by influencing their sense of exercise self-efficacy. Specifically, higher physical self-esteem may enhance individuals exercise self-efficacy, which in turn prompts them to participate more actively in physical exercise.、

3. Study Subjects and Methods

3.1 Research Object

In this paper, 314 college students were selected to send questionnaires, and 298 questionnaires were collected, with a recovery rate of 94.90%. There were 293 valid questionnaires with an effective rate of 98.32%.

Table 1: Sample distribution (N=293)

	class	number of people	percentage
sex	man	114	38.9
	woman	179	61.1
grade	freshman	110	37.5
	sophomore	105	35.8
	junior	56	19.1
	senior	22	7.5
Subject category	liberal arts	185	63.1
	science	108	36.9
origin of student	city	151	51.5
	rural area	142	48.5

3.2 Research Methods

3.2.1 Physical activity grade scale

The revised physical exercise scale compiled by Liang Qingde et al. is an important tool to assess the degree of individual participation in physical exercise. It specifically measures the three core dimensions of intensity, duration and frequency of physical exercise. This scale provides reliable measures for research in the fields of kinematics, health science, and psychology, and helps to further understand the individuals performance and health status in physical activity. Using the scale allows for a better assessment of the depth and breadth of individual participation in physical exercise and the impact of physical exercise on individual physical and mental health.

The assessment dimensions of the scale include exercise intensity: the effort an individual makes during physical activity. The higher the intensity, the more energy that is needed, and the more effective the exercise is. The quantitative standard of intensity is reflected by physiological indicators such as heart rate and respiratory rate during exercise, and individuals can also perceive their exercise intensity according to their own physical consumption. Exercise duration: This is the duration of each individual exercise, usually measured in minutes or hours. The longer the exercise time, the more health benefits will come from exercise, so the exercise time is one of the important dimensions to assess the amount of exercise. Exercise frequency: the number of times an individual takes part in physical exercise during a certain period of time (usually each week). Frequency is a key measure of regular physical exercise behavior, and with more frequent exercise, individuals are able to maintain and improve their physical fitness.

The scale designed by Liang Qingde et al. calculates the amount of exercise through the formula, the formula is of, the exercise amount score = intensity (time 1) frequency. In this formula, intensity, time, and frequency represent three main dimensions of physical exercise. The score for each dimension range from 1 to 5 points, including intensity 1 to 5 points; the duration of each exercise is also 1 to 5 points (based on the actual length of exercise); the exercise frequency is divided by the number of exercise per week, also between 1 and 5 points. This formula can give a comprehensive score for the overall situation of individual participation in exercise according to the specific situation of exercise.

The revised scale of Liang Qingde et al. has a very high reliability, and its test-retest reliability has reached 0.954. This means that the scale maintains highly consistent results during repeated measurements, with good reliability. For studies or physical education programs that require multiple assessments of individual exercise, the high reliability of the scale ensures the stability and accuracy of the data. Moreover, the application scenarios of this scale are very extensive, which can be used not only to study the physical exercise behavior of individuals, but also as an assessment tool in physical education teaching and training. For example, PE teachers or coaches can use this scale to quantitatively assess students exercise, in order to develop a more personalized training plan for them.

In the actual study, Liang Qingde and other researchers made an in-depth analysis of the physical exercise behavior of college students through this scale. By measuring the intensity,

duration and frequency of exercise among different students, the researchers were able to understand the differences in physical exercise among students of different gender, grade and professional backgrounds. These data provide an important reference for the further analysis of the exercise behavior patterns of college students, and also help the school to develop more targeted sports activity promotion programs.

In general, the revised physical exercise scale developed by Liang Qingde et al. provides a scientific and reliable tool for assessing individual physical exercise behavior. Through their comprehensive assessment of exercise intensity, time and frequency, researchers and physical educators are able to better understand individual exercise habits and develop more effective interventions to promote individual physical and mental health. This scale is not only applicable to college student groups, but also can be extended to other groups of different ages, gender and occupation, providing theoretical support and practical tools for comprehensively improving the physical health level of the people.

3.2.2 Exercise the self-efficacy scale

In this study, we adopted the Exercise Self-efficacy Scale developed by the psychologist Marcus. To better suit our research needs, we revised and adapted the scale appropriately. Specifically, we modified the original 11-level scale to a more concise 5-level scale, so that subjects could understand and answer more easily. In addition, we further refined the dimensions of the scale and divided them into four main parts: body factors, activity factors, mental factors, and conflict factors. With this refinement, we were able to more comprehensively assess individual exercise self-efficacy in different aspects. In the revised scale, we designed a total of 18 measurement questions, each designed to capture the subjects self-efficacy in a specific context. To facilitate scoring and analysis, the Likert 5-point scoring method was used for all questions. This scoring method allowed subjects to choose one of the five options that most matched their feelings, from "completely impossible" to "definitely possible", according to their actual situation. In this way, we were able to obtain a more precise and meticulous exercise self-efficacy score.

To ensure the reliability and stability of the scale, we also tested the test-retest reliability. The results show that the test-retest reliability of this scale is very high, reaching 0.957. This result shows that the scale can obtain consistent and stable results when measured at different time points, thus ensuring its validity and credibility in practical application.

3.2.3 Physical Self-esteem Scale (PSPP)

The scale was compiled by the investigator Fox, which contains 30 different items and was scored using the Likert-5-point scoring method. In the process of conducting the localization research, Xu Xia revised the PSPP to make it more suitable for the actual situation of Chinese college students. The revised scale consists of a master scale and four subscales. The main scale is the sense of physical self-worth (PSW), while the four subscales are motor skills (SC), physical condition (PC), physical attractiveness (AB), and physical fitness (PF). Together, these subscales constitute a comprehensive tool for assessing physical self-esteem in college students. Moreover, the test-retest reliability of the scale was very high, reaching 0.959, indicating that it has not only excellent reliability but also extremely high validity as a measure of studying physical self-esteem in college students.

4. Data Analysis

Data descriptive statistics were performed using SPSS 21.0 to analyze the correlations between exercise motivation, exercise self-efficacy, and exercise behavior. The mediation effect test was performed by using the Process plug-in.

4.1 Correlation Analysis

Table 2: Result of correlation analysis

variable	*M±SD*	Body self-esteem	Exercise self-efficacy	Exercise behavior
Body self-esteem	2.28±0.79	1		
Exercise self-efficacy	2.18±0.70	0.822**	1	
Exercise behavior	2.19±0.76	0.773**	0.895**	1

pour: *P<. 05; ** P<. 01; *** P<. 001, the same as below.

First, a standardized treatment was performed for all variables except for gender. Then, under the premise of controlling the grade variables, the mediation effect analysis of the regulation was conducted. During the analysis, the Process plug-in of the SPSS software was used.5000 replicates to calculate 95% confidence intervals.

The main effect test in SPSS showed that physical self-esteem had a significant positive effect on exercise behavior after controlling for demographic variables (β=0.774, P<0.001). Subsequently, a mediation effect test using SPSS Process4.1, Model 4 was used to examine the mediation of exercise self-efficacy between body self-esteem and exercise behavior. Regression analysis revealed that after controlling for demographic variables had a significant positive predictor on exercise self-efficacy (β=0.834, P<0.001), and physical self-esteem also had a positive predictor on exercise behavior (β=0.105, P<0.05), while exercise self-efficacy also had a positive effect on exercise behavior (β=0.803, P<0.001). The analysis shows that the total effect Total=0.753,95% confidence interval is [0.68,0.826]; the indirect effect ab = 0.651, Boot SE=0.061, and 95% confidence interval is [0.532,0.769], accounting for 86.45% of the total effect. These findings confirm the hypothesis 1,2,3 that exercise self-efficacy plays a significant mediating role between physical self-esteem and physical exercise behavior.

4.2 The Relationship between Exercise Motivation, Exercise Self-efficacy and Exercise Behavior: The Analysis of the Intermediary Effect

Table 3: The Analysis of the Intermediary Effect

variable	Exercise self-efficacy			Exercise behavior		
	β	t	SE	β	t	SE
Body self-esteem	0.834	24.425***	0.03	0.105	2.249*	0.045
Exercise self-efficacy				0.803	17.486***	0.05
R2		0.68			0.807	
F		121.877			199.08	

5. Conclusion

Physical self-esteem has a significant positive effect on physical exercise behavior. In other words, people with higher levels of physical self-esteem are more likely to participate in physical exercise, and they tend to do exercise with longer frequency, intensity, and duration. Exercise self-efficacy plays a partially mediating role between physical self-esteem and physical exercise behavior. This suggests that body self-esteem not only directly drives physical exercise behavior, but also indirectly influences physical exercise behavior by enhancing exercise self-efficacy.

Further, the improvement of body self-esteem helps to enhance exercise self-efficacy, which then promotes physical exercise behavior. When individuals have higher physical self-esteem, they are more confident in their athletic skills, which encourages them to devote more committed to physical exercise. At the same time, physical exercise behavior itself can in turn enhance the bodys self-esteem. By participating in physical exercise, individuals can not only improve their body shape and appearance, but also improve their motor skills, thus enhancing their own recognition and further enhancing the bodys self-esteem.

6. Discussion

6.1 The Positive Impact of Body Self-Esteem on Exercise Behavior

Physical self-esteem has a positive effect on physical exercise behavior; in other words, the higher the level of physical self-esteem, the stronger the tendency to participate in physical exercise. This conclusion fits with previous research findings. Further research revealed a positive and tight positive correlation between body self-esteem and exercise behavior, implying that there may be mutually reinforcing dynamics between the two. Specifically, with continuous regular physical exercise, individuals cognition and motivation to participate in physical activity will gradually increase, which in turn will lead to more practical actions. This active participation not only changes the external image, but more importantly, deepens the cognition and emotional experience of oneself. With a more comprehensive understanding of themselves, individuals will have a deeper understanding of their own character and personality traits, thus improving their sense of self-identity and overall self-esteem.

Scientific and reasonable physical exercise can not only help to improve the emotional state, cultivate a strong will quality, relieve fatigue, but also can effectively prevent diseases, to provide a solid foundation for the healthy and comprehensive development of young people. By maintaining the correct values, physical exercise helps to promote the formation of a sound personality, make individuals better adapt to the development of the society, and become the qualified successors of the society.

The findings suggest a statistically significant correlation between physical self-esteem and exercise behavior. Participation and continuous physical exercise have a positive impact on the mental health of college students, and only through long-term physical exercise can individual physical self-esteem can be significantly improved.

6.2 Exercise the Intermediary Role of Self-efficacy

The mediation effect test revealed that the bodys self-esteem level can be indirectly enhanced by improving exercise self-efficacy. This finding is consistent with the research results of Dou Haoran and Pei Lingling (2014). Physical self-esteem can not only directly influence physical exercise behavior, but also can indirectly act on physical exercise behavior through the mediating variable of exercise self-efficacy, which further confirms the extended exercise and self-esteem model proposed by Sonstroem et al. The model points out that body self-esteem enhances peoples sense of exercise self-efficacy, and that increased exercise self-efficacy promotes the increase in physical exercise behavior.

Exercise self-efficacy plays a significant mediating role between body self-esteem and physical exercise behavior. In other words, physical self-esteem improves the level of physical exercise by enhancing exercise efficacy, which is consistent with Zhang Lianchengs research results. Individuals with higher physical self-esteem tend to have greater confidence in their ability to physically exercise and their ability to achieve results. Therefore, they are more likely to form a higher sense of exercise self-efficacy. Individuals with high exercise self-efficacy are more likely to experience a sense of achievement during physical exercise, which in turn strengthens their physical self-esteem and forms a positive cycle.

From the perspective of the mediation effect, the indirect effect of physical self-esteem in enhancing physical exercise behavior through exercise self-efficacy accounted for 34.3% of the total effect, which was higher than the effect of direct effects or other psychological variables. According to the study of Zhang Liancheng et al. (2015), the total mediation effect of the integration of the three intermediary variables of exercise self-efficacy, social physical anxiety, and ideal-real physical self-difference accounted for 39.32%, among which social physical anxiety accounted for 23.9%. The study by Zhang Furong (2019) showed that the mediation effect of physical health was 16.7%. These data suggest that exercise self-efficacy is a key variable to explain the mechanism of action of physical exercise behavior, thus revealing the psychological mechanisms by which physical self-esteem improves physical exercise. These studies not only clarify the psychological mechanisms of how physical self-esteem enhances physical exercise, but also provide a solid theoretical basis for the development of future targeted physical self-esteem interventions to improve peoples level of physical exercise.

In conclusion, exercise motivation and exercise self-efficacy are important bridges connecting physical self-esteem and physical exercise behavior. It is an effective way to improve students self-esteem and to stimulate their motivation and self-efficacy in physical exercise.

7. Suggestions

This study analyzed the effects of physical self-esteem, exercise motivation and exercise self-efficacy in Chinese college students. Based on this analysis, specific suggestions suitable for sports practice teaching are obtained.

First of all, pay attention to the cultivation of college students physical self-esteem. Schools and society should create a positive atmosphere of respecting individual differences and progress, avoid excessive evaluation and discrimination on the appearance and shape of college students, guide college students to establish correct views of body and health, and pay attention to the improvement of their own internal quality, so as to enhance physical self-esteem and promote the cultivation of physical exercise behavior.

Secondly, to improve the exercise sense of self-efficacy of college students. Schools should provide professional sports guidance and help to help students master sports skills, improve sports performance, enhance their confidence and ability in physical exercise, so as to enhance the sense of exercise self-efficacy, and then promote the persistence of physical exercise behavior.

Finally, the study results were applied to the PE teaching practice. For example, for the students with low physical self-esteem, group cooperative learning should be used, and timely feedback and encouragement should be improved.

8. Limitations

This study deeply explores the association between physical self-esteem and physical exercise behavior in Chinese college students, contributing valuable insights to related fields. However, limited to subjective and objective factors, studies have some limitations and these aspects need to be further refined in future studies.

First, the study was limited to students from Chinese provincial universities and failed to include students from different countries and cultural backgrounds. This limits the general applicability of the study conclusions. Future studies should consider the inclusion of international students to broaden the research horizons.

Secondly, the study mainly relies on the self-answering method of the questionnaire, which may lead to the high subjectivity of the data and may bring about the bias in self-report. To improve the objectivity of the research, future studies should consider using more diverse objective scales and methods to assess physical self-esteem and physical exercise behavior.

Finally, this study focused on the direct association between physical self-esteem and physical exercise behavior among college students, without considering mediating or moderating variables that may influence this relationship, such as social support and personal personality traits. Future studies should start from a more complex, multidimensional perspective to analyze how these variables affect physical self-esteem and physical exercise behavior in college students.

The time span of the study is limited, which should also be taken into account. Enhancing physical body self-esteem and enhancing physical exercise behavior may be a long-term process. Therefore, studies conducted in a short time period may be difficult to fully capture and understand the complexity of this process. The key is to design studies from a long-term view and consider how data are collected through long-term follow-up surveys.

This study focuses on exploring the quantitative relationship between physical self-esteem and physical exercise behavior among college students, but it does not involve the qualitative impact of physical self-esteem on physical exercise behavior. In future studies, it will be a more valuable research direction to explore how physical self-esteem, exercise motivation, and exercise self-efficacy may work together on physical exercise behavior.

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