

# Physical Activity Involvement and Mental Health of Middle School Students

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**Abstract:** To promote the mental health of middle school students through physical activity involvement and to provide scientific physical activity recommendations for middle school students with different states of emotional well-being, interpersonal relationships, coping skills, self-esteem, and body image. Using literature review, questionnaire surveys, and statistical analysis, the study analyzed the types, duration, and intensity of physical activities participated in by middle school students, as well as their mental health status across five psychological factors. Middle school students' involvement in physical activities is moderate but slightly below average. Students mainly engaged in school-organized physical activities; higher grade level, older age, and being male are risk factors for physical activity involvement among middle school students. Overall, middle school students had a high level of mental health, with interpersonal relationships reaching a high level of health and even the lowest-scored body image reaching a healthy level. There were a highly correlation between the types, duration and involvement of physical activities with their mental health among middle school students. The physical and mental health of middle school students should be promoted by increasing their types, duration, and participation in physical activities.

**Keywords:** Physical Activity, Mental Health, Middle School Students.

## 1. Introduction

With the rapid economic and social development of China, the incidence of psychological and behavioral problems and the prevalence of mental disorders among children and adolescents have gradually increased, which has become an important public health issue related to the future of the country and the nation (National Health Commission of the People's Republic of China,2019). In order to improve the physical activity and mental health of children and adolescents, the Chinese government has successively issued relevant policies, documents or regulations by the Ministry of Education and the Health Commission of the People's Republic of China(National Health Commission of the People's Republic of China,2019 ; Ministry of Education of the People's Republic of China ,2023), It aims to comprehensively improve the physical and mental health of Chinese children and adolescents. Therefore, the physical activity and mental health problems of middle school students are one of the important research hotspots in the Chinese academic circle.

According to the definition of health by the World Health Organization, health is a unity that includes many elements such as physical, psychological, moral and social adaptation. In theory, the components of health - physical activity and mental health could be looked as a whole in health promotion. Physical activity is a protective factor for mental health) (White, R. L., et al, 2017). Physical activity is associated with mental health (Salman, A., et al,2019; Gireesh, A., et al,2018; Tanaka, H., & Tamura, N. ,2016; Murawski, B., 2018). Therefore, it should be possible to take physical activity and mental health promotion of middle school students as a whole, and using physical activity promotion to promote mental health.

In order to persuade schools and parents from a health perspective to encourage and support middle school students to participate in various physical activities, and provide them

with various support, this study is conducted.

## 2. Research Objects and Methods

### 2.1. Object of Study

The relationship between middle school students' physical activity involvement and their mental health status.

### 2.2. Research Instrument

Two questionnaires will be used in this study. One of is researcher-made questionnaire based on the Physical Activity Rating Scale (PAR-3) revised by Liang Deqing (1994). The other is a self-made questionnaire for middle school students' mental health. Which includes 5 sub-scales, that is emotional well-being, self-esteem, coping skills, body image and interpersonal relationships etc. The two questionnaires were tested by experts from Adamson University and considered to be useful for this study.

### 2.3. Research Participants and Sampling Method

**Table 1.** Distribution of respondents (N=480)

profile	frequency	percentage
sex		
man	264	55.0
Female	216	45.0
total	480	100.0
Age		
12	14	2.9
13	146	30.4
14	210	43.8
15	110	22.9
total	480	100.0
Grade level		
7	160	33.3
8	160	33.3
9	160	33.3
total	480	100

The study was reviewed and approved by the Academic Ethics Committee of the School of Physical Education of Guizhou Normal University. This study was conducted in four junior high schools in Guiyang, namely, High School Affiliated to Guizhou Normal University, Guiyang No. 2 Experimental Middle School, Guiyang Zhongtian Middle School and Guiyang No. 18 Middle School. Stratified sampling method was adopted, 160 samples were randomly selected from each grade according to grade, and 40 students were randomly selected from each grade in each school. A total of 480 students were selected for the survey (see table 1).

### 3. Results & Analysis

#### 3.1. Differences in Physical Activity among the Respondents

##### 3.1.1. Gender Differences in Physical Activity Involvement

**Table 2.** T test of gender differences in physical activity

Variable	Gender	Overall mean	P
Type	man	2.75	0.270
	female	2.81	
Intensity	man	2.61	0.875
	female	2.55	
Duration	man	2.51	0.345
	female	2.52	
Overall	man	2.62	0.940
	female	2.63	

Table 2 reveals the degree of participation in physical activities among respondents, particularly the gender differences in three dimensions: type of physical activity, intensity, and duration. According to the research results, the average scores for the degree of participation in the type of physical activity differ between respondents; females (2.81) scored higher than males (2.75). The p-value from the significance difference test is 0.27, indicating that there is no significant difference in the degree of participation in the type of physical activity. In terms of exercise intensity, the average score for male physical activity intensity (2.61) is higher than that of females (2.55), and the result of the significance difference test has a p-value of 0.875. This suggests that although there are some differences in the degree of participation in physical activity intensity between genders, there is no statistically significant difference. Similarly, for the duration of physical activity, although the average scores for males (2.51) and females (2.52) differ, the difference test has a p-value of 0.345, indicating no significant gender difference. There is also no significant gender difference in the total physical activity' involvement degree.

Male adolescents are active and energetic, tend to be extroverted, and are more willing to participate in group and competitive exercise activities with their peers, while female adolescents tend to be gentle and implicit. In their spare time, they tend to choose recreational physical activities based on leisure and easy to do. In this study, the average score of girls' participation types is higher than that of boys, which can be understood as that boys mainly participate in group activities at school and have fewer opportunities to participate in group competitive projects in their spare time, while girls prefer to participate in non-group activities in their spare time in addition to participating in fixed types of activities at school, so they have higher participation in sports types. Due to sample size limitations, the difference was not statistically

significant. It is necessary to show that the type of exercise takes gender into account so that students have more options.

Sun Jiancui, et al. (2018) pointed out in his research that middle school students' sports activities are mainly medium and low-intensity, with gender differences in participation intensity, and boys' participation in medium and high-intensity sports is higher than that of girls, indicating that boys are more willing to participate in highly competitive sports, such as running, basketball, football and other medium and high-intensity sports. This study was limited by the sample size and the background of the study samples, and there was no significant difference in exercise intensity between genders.

Sun Jiancui, et al. (2018) pointed out that within 1 hour of physical activity of middle school students, the average scores of both boys and girls were not too high, indicating that the duration of physical activity of middle school students did not reach the "1 hour of physical activity a day" stipulated by the Ministry of Education of China. The study pointed out that there was a gender difference in the time of high-intensity physical activity among adolescents (Wu Huifang, Zhang Ming, et al. 2022). Perhaps due to the influence of sample size, behavioral habits and personality traits of respondents, the results of this study did not show a significant gender difference in the duration of exercise. However, the score of exercise duration is generally low, which should be paid enough attention to effectively reduce the learning burden of students and allow students to have more time to participate in sports.

In short, this study results suggests that, especially for middle school students and their parents, considering the health and learning efficiency of the students, they should also be encouraged and helped to participate in physical activities, rather than solely relying on those organized by the schools. The results of this study also indicate from another perspective that gender itself is not a decisive factor in middle school students' participation in physical activities. Therefore, schools, physical activity planners, and guidance office staff should consider the gender characteristics and differences in middle school students' participation in physical activities to create a diverse environment for physical activities, attracting and facilitating the involvement of students in various kinds of physical activities.

##### 3.1.2. Differences in Physical Activity among Different Grades

**Table 3.** Physical activity involvement difference test of middle school students in different grades

Variable	Grade level	Overall mean	P
Type	7	2.93	0.001
	8	2.73	
	9	2.67	
Intensity	7	2.53	0.071
	8	2.69	
	9	2.53	
Duration	7	2.63	0.004
	8	2.54	
	9	2.39	
Total PA	7	2.70	0.007
	8	2.65	
	9	2.53	

Table 3 reveals the grade-level differences in three dimensions of physical activity among respondents: type, intensity, and duration. According to the research results, the average scores for the degree of participation in the type of

physical activity differ among the grades, with the 7th grade scoring the highest at 2.93, followed by the 8th grade at 2.73, and the 9th grade scoring the lowest at 2.67. The degree of participation in the type of physical activity among middle school students shows a gradual decline as the grade level increases, with a significant difference ( $p < 0.01$ ). This indicates that there is a statistically significant difference in the degree of participation in the type of physical activity across grade levels.

In terms of the degree of participation in the intensity of physical activity, the average scores also vary across the three grades, with the 7th grade at 2.53, the 8th grade at 2.69, and the 9th grade back at 2.53. The significant difference test has a p-value of 0.071, which is greater than 0.05, indicating that there is no statistically significant difference in the degree of participation in the intensity of physical activity across grade levels.

For the duration of physical activity participation, the average scores for the three grades are 2.63, 2.54, and 2.39, respectively. Middle school students' participation time in physical activities shows a trend of gradual reduction with increasing grade level, with a p-value of 0.004, which is less than 0.01. This demonstrates that there is a statistically significant difference in the duration of physical activity across grade levels.

The overall degree of middle school students' Total PA participation follows the same trend as the type and duration of physical activity participation, with no significant differences between grades, and a p-value of 0.007, which is less than 0.01.

The results of physical activity type and duration of middle school students in this study are the same as those of Yang Xiangdong et al. (2021) found that the participation rate, activity time and participation frequency of adolescents showed the same downward trend from grade 7 to grade 9. Because 7th grade students have just entered the middle school stage of learning, learning pressure is relatively small, have more time to participate in physical activities; They are excited about new learning environments and are willing to try or participate in various types of physical activities.

Overall, there are significant grade-level differences in middle school students' participation in physical activities, and the trend shows a gradual decline with increasing grade levels. This indicates that as middle school students advance in grade, their academic pressure increases, severely squeezing and occupying the time available for physical activities. The results of this study are also supported by the findings of Wang Kai (2020), who suggests that the reduction in exercise time among junior high school students is partly due to the pressure of coursework and homework burdens, with a sharp decrease in exercise time after the physical education entrance examination.

The above results suggest that to improve the level and degree of participation in physical activities among middle school students, schools and teachers should reduce the academic burden on higher-grade students. Also, if the physical education entrance examination is to be used as a lever to encourage middle school students to engage in physical activities, it would be advisable to assess and evaluate students' participation in physical activities every semester, preferably postponing the timing of the physical education exam until after the academic subject exams. As for middle school students and their parents, they should not sacrifice time for physical activities due to increased learning

tasks. On the contrary, to maintain health under the pressure of heavy academic workloads, it is even more important to participate in physical activities. Doing so can lead to better health and higher learning efficiency.

## 3.2. Differences in Mental Health among Survey Respondents

### 3.2.1. Gender Differences in Mental Health

As can be seen from Table, there are no significant differences between male and female students in mental health, and the scores of female students are higher than that of male students.

**Table 4.** T test of gender differences in mental health of middle school students

Variable	Gender	Overall mean	p
emotional well-being	man	3.06	0.173
	female	3.15	
interpersonal relationship	man	3.23	0.101
	female	3.33	
coping skills	man	3.03	0.017
	female	3.18	
self-esteem	man	3.16	0.089
	female	3.27	
body image	man	2.74	0.780
	female	2.73	
Mental health	man	3.04	0.099
	female	3.13	

From Table 4, we can see that among the five dimensions of psychological health, females scored higher than males in four dimensions: emotional well-being, interpersonal relationships, coping skills, and self-esteem. However, for the dimension of body image, males scored slightly higher than females. Yet, for all five dimensions, the P-values from the difference tests are greater than 0.05, indicating no statistically significant gender differences at a conventional level.

The findings of this study align with those of Yin Ruimin et al. (2023), who surveyed middle school students in another region of Guizhou Province and found that the overall psychological condition of middle school students is generally good, with no significant overall differences between male and female students. Wang Ziyao et al. (2023) concluded that there are no significant gender differences in psychological health emotional symptoms such as anxiety and depression among middle school students in Taizhou City, Zhejiang Province. Zhang Zhenfeng (2023) also found that females scored slightly higher than males in interpersonal relationships on average, but without significant gender differences. Qin Guoyang et al. (2023) reported data showing no significant gender differences in the social coping abilities of adolescents ( $P=0.43$ ). Zhang Yalun (2023) indicated that the self-esteem level of junior high school students is at a moderate level, with no significant gender differences. Gong Jie et al. (2020) concluded that "the satisfaction level of junior high school students with their body image is not very high" and that "males are slightly more satisfied with their body image than females." All these related studies support the result of no significant gender differences between male and female middle school students in our study. The possible reason for this could be that the subjects of these studies all

basically come from the same region, where the socio-economic, cultural, and educational environments are essentially the same, thus exerting a similar psychological impact on the middle school students.

Regarding the subjects of our study, Guizhou Province is an economically and educationally less developed province in China. Moreover, as Guizhou is a multi-ethnic province, there are many ethnic minority preferential policies in China, such as additional points in the college entrance examination. At the same time, due to underdevelopment, many adults go to more economically developed areas to work, leaving many rural children to be monitored by their grandparents, which results in relatively less pressure felt by middle school students. These factors may be the main reasons for the relatively lower academic pressure and possibly higher levels of psychological health among middle school students in Guizhou Province. As Wang Ziyao et al. (2023) also pointed out, adolescents under greater academic pressure are more likely to screen for depressive and anxiety symptoms. Excessive academic burden can have a significant negative impact on students' psychological health.

In this study, female middle school students had a higher level of psychological health than males, especially in coping skills which were significantly higher than those of males. For teachers and parents, this suggests providing more attention to the psychological health of male students and consciously cultivating their social life and coping skills. There are no significant gender differences in psychological health between male and female middle school student.

### 3.2.2. Differences of Different Grades and Mental Health and Various Factors

As can be seen from Table 15, junior high school students of different grades have significant differences in interpersonal relationship and emotion well-being. The scores of these two factors among middle school students in different grades showed a gradual decline with the increase of grades, and their health level also declined gradually.

**Table 5.** Inter-grade difference test of middle school students' mental health

Factors	Grade	Mean	95% CI for Mean		p
			LB	UB	
Emotion well-being	7	3.21	3.10	3.31	0.020
	8	3.11	3.01	3.21	
	9	2.99	2.88	3.11	
Interpersonal Relationships	7	3.35	3.25	3.45	0.033
	8	3.31	3.22	3.41	
	9	3.17	3.06	3.28	
Coping skills	7	3.19	3.08	3.30	0.093
	8	3.05	2.94	3.16	
	9	3.04	2.94	3.15	
Self-esteem	7	3.28	3.17	3.39	0.334
	8	3.17	3.05	3.28	
	9	3.18	3.06	3.29	
Body Image	7	2.72	2.61	2.83	0.194
	8	2.81	2.71	2.92	
	9	2.68	2.58	2.78	
Mental health	7	3.15	3.06	3.24	0.100
	8	3.09	3.00	3.18	
	9	3.01	2.93	3.10	

The coping skills scores among middle school students of different grades also showed a gradual decline with the increase of grade level, with the significance of the score difference between grades being  $p=0.093>0.05$ ; the self-

esteem scores were highest among first-year students and lowest among second-year students, with the difference test showing  $p=0.334>0.05$ , indicating no significant difference; body image scores were highest among second-year students and lowest among third-year students, with the difference test showing  $p=0.194>0.05$ , indicating no significant difference. The overall psychological health scores decreased gradually with the increase of grade level, with  $p=0.100>0.05$ , indicating no significant difference.

Fu Xiaolan et al. (2019), in their editorship of "China National Mental Health Development Report (2017-2018)", pointed out that the mental health level of Chinese middle school students tends to decline with advancing grade levels, with first-year students having the highest level of mental health. Li Jiahui (2019) found significant differences in emotional regulation among middle school students of different grades; Ni Caiyong (2020) and Chang Shuaishuai (2022) indicated significant differences in interpersonal relationships among middle school students of different grades; Zhang Yalun (2023) noted that the self-esteem level of second-year students is lower than that of first-year students; Wang Xiangning (2021) stated that middle school students' overall body image scores are above average, with no significant differences in total body image scores across grades; Ma Hongxia et al. (2021) surveyed that among the three grades of junior high, ninth-grade students have the lowest level of mental health; Xu Yanfeng & Huang Heying (2014) concluded that first-year students have better social coping abilities than second and third-year students; while Liang Yanfang (2023) suggested that there are no differences in anxiety and depression among junior high students based on gender, grade, and other factors ( $p>0.05$ ). "The current status of academic pressure on junior high school students under the 'double reduction' policy and educational countermeasures". All these related study results support the findings of this study.

However, some scholars have reported results different from those of this study, such as Ma Hongxia et al. (2021), who found significant differences in mental health levels among the three grades of junior high; Zhou Pengsheng & Fu Jianqiang (2023), who noted that third-year students have significantly higher levels of coping skills than first and second-year students; Gong Jie et al. (2020), who found that second-year students had the lowest body image scores. Overall, current research findings on grade-level differences in mental health levels among junior high students are inconsistent and vary greatly. The main reason for these different results may be the use of different measurement tools.

As middle school students advance in grade, the time left before the middle school entrance examination shortens, and their academic pressure and workload increase, making them more prone to psychological issues. It is recommended that schools and parents, where possible, avoid increasing the academic burden on middle school students, regularly arrange activities beneficial to mental health such as physical activities, lectures, and exchanges, and closely monitor changes in behavior and psychology among middle school students.

### 3.3. Correlation between Respondents' Participation in Physical Activities and Their Mental Health Status

**Table 6.** Correlation between physical activity and mental health among secondary School Students

	Emotional Well-being	Interpersonal Relationships	Coping Skills	Self-esteem	Body Image	Mental Health
TYPE	.347**	.275**	.375**	.288**	.272**	.377**
DURATION	.333**	.230**	.364**	.248**	.310**	.360**
INTENSITY	.059	.043	.068	.047	.123**	.083
Involvement of PA	.327**	.242**	.357**	.258**	.316**	.363**

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

The study reveals that among middle school students, The study reveals that among middle school students, there the type and duration of physical there is a significant correlation between the type and duration of physical activity participation, as well as the overall level of physical activity, with mental health and its five factors: emotional well-being, interpersonal relationships, coping skills, self-esteem, and body image. However, the intensity of physical activity participation is only significantly correlated with the body image factor of mental health and not with overall mental health or the other four factors. This could be related to the inherently uncertain relationship between physical activity intensity and mental health (see table 6). For instance, research by Mireia Felez-Nobrega et al. (2021) suggests that light-intensity physical activity has no significant association with mental ill health. Paolucci, E. M. et al. (2018) argue that only moderate-intensity physical activity effectively promotes mental health; Dong Rubo et al. (2023) suggest that high-intensity physical activity may not be beneficial for mental health.

The results of this study show that the higher the type and duration of physical activity participation of middle school students, the higher their mental health level .For students, parents, teachers, schools, and all relevant personnel, in order to strengthen the physical health and improve the mental health of middle school students, it is advisable to increase the level of physical activity participation by considering the types of activities and/or duration, either individually or comprehensively. Based on existing research, it is best to maintain physical activity intensity at a moderate to high level.

#### 4. Research Deficiencies and Limitations

The data used in this study came from cross-sectional surveys, and the accuracy of self-reported retrospective questionnaire surveys may be affected by the memory bias of survey respondents. The survey respondents were limited to Guiyang City, and the representativeness of the sample may be affected by factors such as geographical environment and social culture, and so on.

#### 5. Conclusion

The study focuses on middle school students from four junior high schools in Guiyang city, aiming to assess the relationship between the participation in physical activities and mental health among these students. The conclusions are as follows:

Relied solely on school-organized physical activity had led to the moderate to low levels of physical activity involvement among middle school students in China.

The mental health of middle school students in China was relatively high; however, the academic pressure, older age,

higher grades, and male gender were risk factors for the mental health of Chinese middle school students.

The type, duration, and total involvement of physical activity were protective factors for the mental health of middle school students in China, The contribution of physical activity intensity to mental health was relatively limited.

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