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The Relationship between Familial Aspects and Physical Activities among Middle School Students in China

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Abstract: The purpose of this study is to explore the relationship between familial aspects and physical activities of middle school students, and to provide a theoretical basis for promoting physical exercise behavior of middle school students. By using the methods of literature, questionnaire and mathematical statistics, the author made a questionnaire survey on 481 middle school students. The results showed that gender and grade had significant effects on familial aspects and physical activity. The familial aspects have a significant effect on physical activity. Conclusion: parents play a key role in encouraging physical activity, underscoring the need for family-centred strategies in promoting physical activity; gender and grade levels play a crucial role, which points to the need for a tailored approach in promoting family-oriented sporting activities.

Keywords: Middle School Students; Physical Activity; Familial Aspects.

1. Introduction

Both the World Health Organization (2010) and the US Physical Activity Guidelines(2018) state that appropriate physical activity has a positive impact on the health of children and adolescents aged 5-17 years, increasing cardiorespiratory endurance and muscle strength, reducing obesity, lowering levels of cardiovascular and metabolic disease risk factors, promoting bone deposition, and decreasing depressive symptoms. It is also proposed that children and adolescents aged 6-17 years should accumulate at least 60 minutes of Moderate to Vigorous Physical Activity (MVPA) every day.

However, according to the World Health Organization, 6% of annual deaths globally are related to "physical inactivity", which has become one of the top four risk factors for human mortality (2018). Although the benefits of being physically active are well known, adolescents around the world suffer from health problems caused by physical inactivity to a greater or lesser extent. Regarding how to obtain, and maintain adolescent health status, several countries around the world, including China, recommend that adolescents engage in at least 60 minutes of moderate- to vigorous-intensity physical activity every day. Therefore, physical activity among adolescents is very important and effective measures need to be taken to improve their physical health.

Family is the core environment for the growth and life of children and adolescents, and family attributes, parental encouragement and guidance have a significant impact on students' physical activities (2007) . Experts and scholars at home and abroad have studied the family structure, family socioeconomic status and other factors in family factors, as well as students' physical activities, including family upbringing and other factors (2010); Family sports equipment, parents exercise, family support and role models, family sports atmosphere and other variables (2018) . Physical and psychological development during adolescence is uneven, in which psychological development is more susceptible to multiple influences, while physical development is dominated by the family, family upbringing, environment, and relationships among family members all have subtle effects on adolescents' mental health (2019) . To sum up, the family level has an important influence on students' sports activities. The family should set up a correct sports concept, provide a good sports environment, cultivate healthy sports habits and establish a harmonious sports relationship, to promote students' sports development and lay the foundation for lifelong sports.

From the above, it can be seen that the situation of physical activity behaviour of adolescents in China is not optimistic, and how to improve their physical activity is a key problem that needs to be solved urgently. Based on this, this study aims to investigate the relationship between family factors and physical activity among adolescents, to find out the factors that have a significant influence, and to propose corresponding promotion strategies. This study aims to provide a theoretical basis for research on the promotion of physical activity among adolescents, and to provide effective interventions and references for the improvement of adolescents' physical fitness and health and the promotion of adolescents' physical activity behaviours in China.

2. Object and Method of Study

2.1. Study Subjects

In this study, researcher used a random sampling method. The respondents were 481 middle school students in China. There were 164 students in 10th grade, 160 in 11th grade, 157 in 11th grade, 240 boys and 241 girls.

2.2. Research Instrument

The researcher used questionnaires to collect data to determine the relationship between familial aspects and physical activity among middle school students. The questionnaire is divided into three parts. The first questionnaire determines the demographic profile of middle

school students based on age, sex and grade. The second part of the questionnaire is about familial aspects, including middle school students' parental support, family role models, family routines and habits, family health awareness, and family restrictions & limitations. The third part of the questionnaire is the physical activity scale, which assesses the influence of peers on physical activity, physical activity environment, motivation and attitude, activity frequency and activity type, to help researchers understand middle school students at the level of physical activity and familial aspects.

2.3. Data Analysis

The researcher used t-tests, analysis of variance and Pearson's r-correlation analysis to determine significant relationships between variables. These data were counted with Excel, then coded, and finally processed with SPSS 26.0. Based on a significance level of 0.05, the calculated values would be compared. If the calculated significance value is less than the significance level of 0.05, the null hypothesis is rejected or otherwise accepted.

3. Results

3.1. Differences in the Familial Aspects based on Demographic Profile Analysis

Table 1. Level of Familial Aspects

Domains	Mean	SD	Rank	Interpretation
Parental Support	2.94	0.55	1	Agree/Evident
Family Role Models	2.78	0.63	3	Agree/Evident
Family Routines and Habits	2.65	0.67	4	Agree/Evident
Family Health Awareness	2.80	0.54	2	Agree/Evident
Family Restrictions and Limitations	2.30	0.59	5	Disagree/ Slightly Evident
Familial Aspects	2.69	0.45	-	Agree/Evident

Scale: 1-1.50: Strongly Disagree/Not Evident 1.51-2.50: Disagree/Slightly Evident; 2.51-3.50: Agree/Evident; 3.51-4.00: Strongly Agree/Very Evident

Table 1 synthesizes the level of familial aspects concerning the involvement in sports or physical activities, as reflected by the mean scores and standard deviations (SD) given by student respondents. The table also ranks these domains based on the mean scores and provides an interpretation of the level of agreement.

The overall domain of Familial Aspects has a mean of 2.69 and the smallest SD of 0.45, which indicates a more consistent agreement across respondents that familial aspects play a role in their engagement with physical activities. Despite some domains being agreed upon more strongly than others, the overall interpretation aligns with "Agree/Evident," showing that family influences are recognized as important in the context of sports and physical activities.

In terms of Parental Support, the research by Guo et al. (2023) is particularly relevant, highlighting the pivotal roles of both mothers and fathers in influencing their children's physical activities. Fathers, often the main income earners, play a crucial role in teaching social skills and encouraging physical exercise, while mothers contribute significantly within the family, especially in child-rearing and social capital development. This aligns with the data showing high parental support, indicating the importance of parental influence in promoting sports and physical activities.

With Family Health Awareness, the analysis by Chen et al. (2023) on national physical activity and sedentary behavior policies in China underlines the significance of health and fitness awareness in families. This mirrors the findings on family health awareness being a high-ranking domain, suggesting that students recognize their family's attention to health and fitness matters.

In terms of Family Role Models, Guo et al. (2023) also shed light on the role modeling effect of parents in physical activities, supporting the findings that family members often serve as role models, influencing the students' participation in sports.

Table 2. Differences in the Familial Aspects based on Demographic Profile

Demographic Profile	Category	Mean	SD	Stat. Value	P-Value	Interpretation/ Decision
Age	15 years old and below	2.69	0.50	F= -1.06	0.34	Not significant/ Accept H0
	16-17 years old	2.69	0.42			
	18 years old and above	2.84	0.45			
Sex	Male	2.79	0.46	t= 4.77	0.00	Significant/ Reject H0
	Female	2.60	0.41			
Grade	Tenth Grade	2.68	0.47	F= 3.14	0.04	Significant/ Reject H0
	Eleventh Grade	2.64	0.44			
	Twelfth Grade	2.76	0.41			

Table 2 presents the differences in familial aspects based on the demographic profiles of students, namely age, sex, and grade. The table includes mean scores, standard deviations (SD), statistical values, p-values, and interpretations or decisions based on hypothesis testing.

For the age category, the data for 15 years old and below, the mean score is 2.69 with an SD of 0.50. For 16-17 years old, the mean score is 2.69 with an SD of 0.42, and for those 18 years old and above, the mean is slightly higher at 2.84 with an SD of 0.45. The F-statistic value is 1.06 with a p-value of 0.34, leading to the interpretation that the age difference in familial aspects is not significant difference, and the null hypothesis (H0) is accepted, indicating no substantial difference due to age.

In terms of sex, there is a notable difference between males and females, with mean scores of 2.79 and 2.60, respectively. The SDs are fairly close, with 0.46 for males and 0.41 for females. The t-value is 4.77 with a p-value of 0.00, which is statistically significant. Therefore, the null hypothesis is rejected, indicating that there is a significant difference in the perception of familial aspects between male and female students.

The grade category shows variation across the three grades. Tenth graders have a mean of 2.68 with an SD of 0.47, eleventh graders have a mean of 2.64 with an SD of 0.44, and twelfth graders have a mean of 2.76 with an SD of 0.41. The

F-statistic value is 3.14 with a p-value of 0.04, which is significant at the 0.05 level. Thus, the null hypothesis is rejected, suggesting there are significant differences in the perception of familial aspects across different grade levels.

In summary, the table indicates that there are no significant differences in familial aspects based on age, but significant differences are observed with respect to sex and grade, suggesting these demographic factors influence students' perceptions of their family's involvement and support in sports and physical activities.

3.2. Sports Devaluation and Athletes Motivation correlation analysis

Table 3. Level of Physical Activity

Domains	Mean	SD	Rank	Interpretation
Type of Activities	2.93	0.52	1	Agree/Engaged
Frequency of Activities	2.77	0.55	5	Agree/Engaged
Motivation & Attitude	2.89	0.54	4	Agree/Engaged
Physical Activity Environment	2.91	0.50	3	Agree/Engaged
Peer Influence on Activities	2.92	0.57	2	Agree/Engaged
Physical Activities	2.88	0.48	-	Agree/Engaged

Scale: 1-1.50: Strongly Disagree/Not Engaged; 1.51-2.50: Disagree/Slightly Engaged; 2.51-3.50: Agree/Engaged; 3.51-4.00: Strongly Agree/Very Engaged

Table 3 provides a consolidated overview of the different aspects related to students' physical activity levels. It encompasses various domains, each rated based on the mean score, standard deviation (SD), and rank, with an overall interpretation provided for each.

The overall level of physical activity is calculated with a mean of 2.88 and a small SD of 0.48, which falls within the "Agree/Engaged" interpretation. This composite score signifies that the students generally agree that they are actively engaged in physical activities, considering the types of activities they do, the frequency with which they engage in them, their motivations and attitudes, the influence of their peers, and the environment in which they are active.

The study published in the journal Humanities and Social Sciences Communications by Guo, Z., et al (2023) explores the role of family structure in middle-school students' involvement in physical activities. It finds that both parents play critical roles in influencing their children's participation in physical activities. Fathers, often the primary breadwinners, impart social skills and responsibility, while mothers contribute significantly to child-rearing and educational decisions. This research underscores the importance of family dynamics in shaping students' involvement in physical activities, aligning with the high rankings in the study for the domains of 'Type of Activities' and 'Motivation & Attitude'.

Furthermore, another study Chen, S., et al (2022), Sedentary and Sleep Behaviors discusses the new Physical Activity and Sedentary Behaviour Guidelines (PASBG) in China. It emphasizes the need for effective communication, dissemination, and creation of supportive environments to promote active lifestyles. This aligns with the high ranking of 'Physical Activity Environment' in the study, highlighting the role of the surrounding environment in facilitating students' engagement in physical activities.

Lastly, a study from Scientific Reports by Guo, Y., et al (2021) focused on the impact of COVID-19 on physical activity, screen exposure, and sleep among students. It reported changes in physical activity levels and patterns due to the pandemic's restrictions. This study offers a contemporary context to the variations in physical activity frequencies among students, as observed in the study.

Table 4. Differences in the Physical Activity based on Demographic Profile

Demographic Profile	Category	Mean	SD	Stat. Value	P-Value	Interpretation/ Decision
Age	15 years old and below	2.86	0.52	F= 1.36	0.26	Not significant/ Accept H0
	16-17 years old	2.88	0.45			
	18 years old and above	3.06	0.58			
Sex	Male	3.02	0.42	t= 6.72	0.00	Significant/ Reject H0
	Female	2.74	0.49			
Grade	10th Grade	2.85	0.52	F= 3.84	0.02	Significant/ Reject H0
	11th Grade	2.83	0.48			
	12th Grade	2.97	0.43			

Table 4 examines the differences in physical activity levels based on the demographic profile of students, incorporating age, sex, and grade. The data is presented through mean scores and standard deviations (SD), along with statistical values (t-values and F-values) and p-values to assess the significance of the differences. The interpretations are based on hypothesis testing decisions.

For the age category, the data for 15 years old and below, the mean score is 2.86 with an SD of 0.52. The students aged 16-17 have a mean score of 2.88, and those 18 years and above have a mean of 2.88, with corresponding SDs of 0.45 and 0.58. The F-value of 1.36 with a p-value of 0.26 indicates no significant difference between these age groups, hence the null hypothesis (H0) that there is no difference is accepted.

Regarding sex, males have a higher mean score of 3.02 compared to females at 2.74, with SDs of 0.42 and 0.49, respectively. The t-value is 6.72 with a p-value of 0.00, which is statistically significant, leading to the rejection of the null hypothesis (H0) and the conclusion that there is a significant difference in physical activity levels between males and females.

Looking at grades, tenth graders have a mean of 2.85, eleventh graders 2.83, and twelfth graders 2.97, with SDs of 0.52, 0.48, and 0.43, respectively. The F-value is 3.84 with a p-value of 0.02, which is significant, indicating differences in physical activity levels across grades. Consequently, the null hypothesis (H0) is rejected, affirming that grade level significantly affects students' physical activity levels.

In summary, the table shows that while age does not significantly influence physical activity levels, there are significant differences based on sex and grade, suggesting these factors do play a role in how students engage in physical activities.

3.3. Relationship between Familial Aspects and Physical Activity

Table 5. Correlation analysis of Pirsson coefficient between family factors and physical activity

Pearson r Coefficient	P-Value	Decision/ Interpretation
0.74 (moderate, positive)	0.00	Significant/ Reject H0

Table 5 provides a statistical analysis of the relationship between familial aspects and physical activity among students, using the Pearson r correlation coefficient. The table includes the correlation coefficient value, the p-value for the test of significance, and the decision or interpretation based on these values.

The Pearson r coefficient is 0.74, which indicates a moderate to strong positive correlation between familial aspects and physical activity. This suggests that as familial aspects (like support, role modeling, routines, health awareness, and restrictions) are more positive or engaged, the level of physical activity among students also tends to be higher.

The p-value associated with this correlation is 0.00, which is less than the conventional threshold of 0.05 for statistical significance. Therefore, the result is statistically significant, and the null hypothesis (H0) that there is no relationship between the two variables is rejected.

The interpretation of these results is that there is a significant and positive relationship between familial aspects and physical activity. This implies that family dynamics, support, and the overall family environment play an important role in influencing how active students are. The moderate to strong correlation coefficient underscores the importance of the family in promoting an active lifestyle among students.

4. Discussion

4.1. Profile of Respondents

The survey data reveals a balanced representation of genders, with approximately 49.90% male and 50.10% female students. This gender equilibrium ensures a comprehensive perspective from both male and female viewpoints. Additionally, the respondents span various middle school grade levels, allowing insights from different educational stages. Notably, their diverse preferences for physical activities—ranging from badminton and running to table tennis—highlight a varied interest in sports among this group. Overall, this comprehensive profile provides a robust foundation for analyzing familial aspects related to physical activity in children and adolescents.

4.2. Assessment of Familial Aspects

Parental Support: Strong support is seen, especially in encouraging sports participation and providing the necessary equipment, suggesting a proactive role of parents in promoting sports.

Family Role Models: Having family members who are actively involved or successful in sports significantly influences the students, underlining the impact of role modeling.

Family Routines & Habits: Routine inclusion of physical activities in family life, such as shared exercises and outdoor trips, points to a lifestyle integrating health and fitness.

Family Health Awareness: The data shows a general consciousness about health and fitness in family discussions and practices.

Family Restrictions & Limitations: Some families face barriers to physical activities, though these are not widespread or severely limiting.

4.3. Demographic Influence on Familial Aspects

While the age group doesn't significantly alter the perception of familial aspects, the gender and grade of students lead to varying perspectives, highlighting the role of these factors in shaping perceptions about family support in physical activities.

4.4. Assessment of Physical Activities

Types of Activities: A mix of individual and team sports are popular, showing a versatile interest in physical activities.

Frequency of Activities: The regularity of physical activity participation suggests a habit of exercise among the students, increasing during school breaks.

Motivation & Attitude: Personal accomplishments and the joy derived from physical activities emerge as strong motivators, reflecting a positive mindset towards sports.

Physical Activity Environment: The supportive nature of the environment, yet underutilization of facilities like schools, highlights areas for improvement.

Peer Influence on Activities: Friends play a crucial role in influencing students' choice of activities, through encouragement and shared experiences.

4.5. Demographic Influence on Physical Activities Assessment

Notable differences are observed in the assessment of physical activities based on gender and grade, indicating these demographic factors crucially impact physical activity engagement among students.

4.6. Relationship between Familial Aspects and Physical Activities

The significant positive correlation found between familial aspects and physical activity levels underscores the importance of a supportive family environment in fostering active lifestyles among students.

5. Conclusion

Age differences do not significantly impact students' perceptions of familial aspects. However, gender and grade levels play a crucial role, suggesting the need for tailored approaches in family-oriented physical activity promotion.

Parents play a pivotal role in encouraging physical activities, highlighting the importance of parental support. Family members serve as significant role models, influencing students' attitudes towards sports. Family routines and habits incorporate physical activities, demonstrating the integration of fitness into daily life, while family health awareness is generally high. Some families face barriers, but these don't majorly impede physical activity participation.

Students show a preference for both individual and team sports, indicating diverse interests. Regular participation suggests a habit of physical activity, enhanced during school breaks. Motivation is strongly driven by personal achievement and enjoyment. The environment for physical activities is supportive but can be better utilized, particularly

school facilities. Peer influence is significant, affecting choices in physical activities.

The significant positive correlation between familial aspects and physical activities underlines the integral role of family dynamics in encouraging students' active lifestyles, emphasizing the need for family-focused strategies in promoting physical activity.

The theories Social Ecological Modeling Theory and Social Learning Theory which were integrated in this study emphasizes the complex interplay of individual, familial, and environmental factors, as proposed by Social Ecological Modeling Theory. This includes the significant role of family dynamics, peer interactions, and supportive physical environments in shaping students' behavior towards physical activity. Additionally, Social Learning Theory's concept of behavior being influenced by observing and imitating others is evident in the impact of family role models and peers. This integrative approach highlights the necessity of multifaceted strategies that address individual motivation, family engagement, and environmental facilitation to promote physical health and sports participation among students.

6. Recommendations

Enhance Family Engagement: Increase initiatives that encourage parental support and family involvement in physical activities. Programs could focus on educating families about the benefits of physical fitness and providing ideas for family-oriented activities.

Promote Role Models: Encourage the presence of positive role models within families and schools. Highlighting achievements of athletes and active family members can inspire students.

Diversify Physical Activity Options: Schools should offer a wider range of physical activities to cater to diverse interests. This could include both individual and team sports, as well as activities that are less traditional or require minimal equipment.

Strengthen Peer Influence Programs: Develop programs that leverage peer influence in a positive way, such as buddy systems or peer-led sports clubs, to increase participation in physical activities.

Customize Approaches Based on Demographics: Tailor physical activity programs to address specific needs and preferences based on gender and grade level, as these factors significantly impact students' engagement in physical activities.

Address Restrictions and Limitations: Identify and mitigate barriers to physical activity participation within families, such as scheduling conflicts or limited access to resources.

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