

The Relationship between Adolescent Sports and Mental Resilience in Shanghai

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ABSTRACT. *The purpose of this study is to analyze the relationship between youth sports and mental resilience in Shanghai. Out of a total of 3,394 Adolescents from grade 7 to 12 in Shanghai city was selected by a general random sampling method, and a questionnaire survey was conducted using the document data technology, mathematical statistics, the Students' Personal Situation Questionnaire, the Resilience Scale for Chinese Adolescents (RSCA) and the Physical activity Rating Scale (ParS-3).The results showed that male students had better mental resilience than female students.As for the degree of physical activity, the group with high amount of physical activity had the highest score of mental resilience, and there were significant differences in the three dimensions of goal focus, positive cognition and emotional control (All $P < 0.01$), while the three groups with high amount of physical activity had significant differences in the dimensions of interpersonal assistance ($P < 0.05$).It is suggested that the amount of physical exercise should be increased appropriately, and schools should actively carry out network-fighting, team sports and leisure sports to improve the interest of young people in physical exercise, and then improve their mental resilience.*

KEYWORDS: *teenagers, Physical education, Psychological elastic*

1. Introduction

"When young people prosper, the country prospers; when young people are strong, the country becomes strong", General Secretary Xi Jinping further revealed the hope of contemporary youth on the road to national rejuvenation in his report to the 19th National Congress of the CPC [5]. However, adolescence is a critical period in the process of individual growth and development during which various psychological and behavioral problems are likely to occur, and it is also the developmental period during which most mental health disorders lasting into adulthood are first discovered [22]. Youth Health Risk Behavior (YHRB), also known as youth health risk behavior or adolescent health risk behavior, refers to the behavior that damages adolescent's health, integrity and adult health and quality of life [3]. Chinese scholars classify adolescent health risk behaviors into 7 categories:

(1) unintentional injury; (2) Intentional injury; (3) Substance abuse; (4) Psychotropic behavior; (5) sexual behaviour leading to sexually transmitted diseases and unwanted pregnancies; (6) Unhealthy eating behaviors; (7) Lack of physical activity [2]. In addition to depression, drug and alcohol abuse and victimization, mental health problems also include the following risk factors in many adolescents' lives: poverty, divorce, minority status and early sexual behavior [11].

According to the objectives and requirements of "Healthy China 2030" plan to strengthen the construction of mental health service system and standardized management, while attaching importance to the teaching level of teenagers, mental health education should be strengthened to cultivate students' positive, optimistic and healthy psychological quality [6]. In recent years, the incidence of adolescent risky behaviors in China has been increasing, which not only brings harm to individuals and families, but also brings negative effects to the society. Adolescent risky behaviors have become one of the public health problems to be solved urgently in the world. Resilience is a good fit, in the face of adversity is a kind of individual qualities and skills, also is a kind of widely has potential [10], resilience is also called the mental toughness and resilience, is mainly refers to people in the face of difficulties when the resistance and resilience after struggling [18], a view that resilience is a stable personality or ability, to protect the individual from the negative influence of danger and adversity, 17, 20 [16]. In the other view, mental resilience is a result of positive adaptation after encountering danger [14, 19]. This ability can change people's mental state after encountering difficulties or being in trouble, which is the findings of mental health research that directly affects people. In a word, mental resilience is a direct protective factor of mental health [7]. Good mental resilience can reduce the negative effects brought by adverse stress events and enable individuals to have a better quality of life [8]. It is well known that regular physical activity has a positive impact on the physical health of participants, helping to maintain optimal weight, healthy blood pressure and cardiovascular health. In addition, youth participation in physical activity has been found to be associated with mental health and prosocial behaviour. Adolescents who participate in physical activity report fewer mental health problems and fewer general health, diet and eating problems, and are more likely to attend college than those who do not participate in physical activity [21]. Although many articles are studied for sports and psychological benefits to the body, but relatively few articles studied the relationship between sports and mental flexibility, therefore, this article is mainly used to study the Shanghai sports activities influence on adolescent mental flexibility, so as to provide theoretical basis for related research.

2. Research objects and methods

2.1 Research Objects

This paper studies the relationship between physical exercises and mental resilience in obese children and adolescents. A questionnaire survey was conducted among 500 young obese children aged 7-15 at the peak.

2.2 Literature and data method

According to the research needs of this paper, a large number of books related to adolescent mental resilience are borrowed from the library of Shanghai Normal University. Out of Adolescents' Adolescents using the keywords of "obesity/FAT", "mental resilience /Adolescents", "physical activity /activities" and EBSCO foreign language database, the relevant literature was retrieved and read. By reading relevant literature, we can further understand the research status of the same thesis at home and abroad, and lay a solid theoretical foundation for the preparation of this thesis.

2.3 Questionnaire survey

2.3.1 Self-design questionnaire

Designed by the researchers themselves, including the investigator's age, gender and other personal information survey as well as the usual preferences for sports.

2.3.2 Adolescent Mental Resilience Scale (RSCA)

RSCA was compiled by Gan Yiqun et al., including 27 items, and assessed individual mental resilience from five dimensions: goal focus, emotional control, positive cognition, family support and interpersonal assistance. Likert 5-level scoring method is adopted in the scale :1= completely inconsistent; 5= completely consistent. There are 12 reverse scoring questions. After the reverse processing of the items, the higher the score of the item is, the higher the level of mental resilience of the item is. In this study, Cronbach's Salpha value of the scale was 0.847 [1].

2.3.3 Physical Activity Rating Scale (ParS-3)

It was compiled by Japanese psychologist Gongxiong Hashimoto and revised into Chinese version by Liang Deqing et al. Pars-3 investigates the degree of participation of individuals in physical exercise according to the intensity, time (monthly exercise) and frequency (monthly exercise), and makes statistical analysis of the physical exercise of the subjects in the previous month. Each indicator was scored on a scale of 5, with 5 being the highest score and 1 the lowest score, and the total score ranged from 0 to 100. According to the scores, the amount of physical exercise of the subjects could be divided into three levels: the amount of physical exercise was no more than 19, the amount of moderate physical exercise was 20-42, and the amount of large physical exercise was ≥ 43 . The reliability and validity of the scale in Chinese subjects is good, and the retest reliability is 0.82 [4].

2.4 Mathematical statistics

Sps25.0 statistical software was used for data analysis. Independent sample T-test was used to compare the differences in psychological resilience of teenagers with different levels of physical activity and different genders. Logist multi-factor method was used to analyze the relationship between physical exercise and psychological resilience of teenagers.

3. Results

Table 1 Demographic information distribution table

Demographic information		number	Percentage
grade	Seventh grade	545	17%
	Eighth grade	496	15.4%
	Ninth grade	496	16.8%
	Tenth grade	489	15.2%
	Eleventh grade	518	16.1%
	Twelfth twelfth	627	19.5%
gender	male	1684	52.4%
	Female	1531	48.6%
Marital Status of Parents	divorced	378	11.8%
	Not divorced	2837	88.2%
total		3215	100%

As shown in Table 1, among the 3215 samples, the sample Numbers from grade 7 to grade 12 were basically evenly distributed. There were 1,684 boys, accounting for 52.4% of the total number, and 1,531 girls, accounting for 24.2 percent. In the sample of all adolescents, there were 378 families with divorced parents, accounting for 11.8% of the total number, and 2837 families with unmarried parents, accounting for 88.2% of the total number.

Independent sample T-test and independent sample ANOVA were conducted between gender, grade, and parents' marital status and the five dimensions of students' physical activity and psychological resilience, respectively, to further analyze the relationship between gender, grade, parents' marital relationship and adolescents' mental resilience and physical activity.

Table 2 Demographics, exercise volume and mental flexibility characteristics

		Exercise amount (M±SD)	focused (M±SD)	emotional control (M±SD)	Positive cognitive (M±SD)	family support (M±SD)	Interpersonal assist (M±SD)
gender	male	25.58±18.89	28.18±5.42	23.34±3.01	23.28±3.89	24.15±3.21	24.31±5.82
	Female	17.82±16.31	25.34±6.28	22.89±4.12	24.14±2.85	25.85±4.10	24.64±4.91
	T	8.75**	2.38**	0.897	1.358	1.012	1.234

grade	Seventh grade	20.82±16.58	17.12±2.55	22.73±4.51	22.31±4.56	24.16±5.13	26.87±6.40
	Eighth grade	17.82±16.04	21.87±3.48	22.54±3.86	21.87±3.48	22.09±4.09	24.89±5.49
	Ninth grade	15.08±17.28	23.12±3.67	22.23±4.11	23.12±3.67	23.12±3.67	26.94±5.89
	Tenth grade	22.15±20.87	22.23±4.58	21.54±4.14	22.23±4.58	23.15±4.54	27.63±6.17
	Eleventh grade	21.62±22.33	21.15±3.56	22.19±4.03	21.15±3.56	24.15±2.52	26.66±6.45
	Twelfth twelfth	24.59±17.34	23.68±3.68	21.78±4.11	23.68±3.68	25.11±6.11	27.02±5.38
	F	4.453**	2.97**	1.408	1.889	1.321	1.156
Marital Status of Parents	Not divorced	20.76±19.88	24.19±4.58	22.19±4.01	23.05±3.94	24.81±4.32	26.80±5.47
	divorced	18.58±20.18	22.09±4.92	20.89±3.98	22.16±4.41	21.12±4.58	26.39±5.99
	F	1.894	1.783	2.27**	1.012	3.011**	0.487

P<0.01 **p<0.05*

3.1 Demographic analysis of adolescent mental resilience and the relationship between physical activity

The data collected from the questionnaire were used to conduct independent sample T-test with SPSS statistical software, and cross-validation analysis was carried out for adolescents from grade 7 to grade 12 in terms of grade, gender, parents' marital status, family income, amount of exercise, and psychological resilience. Data in Table 3 were obtained.

(1) The relationship between psychological resilience, physical activity and gender grade of adolescents.

According to the data analysis in Table 2, it is obvious that gender is one of the factors affecting adolescent mental resilience, and there is a significant difference between gender and the total score of mental resilience ($P < 0.05, X^2=8.872$). Reason to gender as the independent variable, youth physical activity and mental flexibility all dimensions as the dependent variable for further analysis, as shown in table 3, in the sports exercise extent, girls physical exercise less than boys sports exercise, and there was significant difference in physical activity and gender ($P < 0.01$), therefore, both school and family which actively encourage positive female teenagers take exercise, develop their interest in participating in physical exercise and hobbies, so as to improve the level of their mental flexibility. In addition, the boys are also significant differences between resilience score ($P = 0.025$), and further analysis shows that the positive cognitive, emotional control, between family support and interpersonal four dimensions, there is no significant difference between boys and girls, but boys and girls focus on the target dimension salience sex differences ($P < 0.01$). Thus explains the boy's earnest and exclusive ability is higher than the girl's. In adolescents of different grade as independent variables, exercise and psychological elasticity all dimensions as the dependent variable, find the seniors exercise was

significantly higher than the junior student physical activity level, which is in the highest grade 12 students exercise participation, grade 9 students exercise participation, shows the whole, the results of variance analysis and physiological load of exercise participation degree, grade between the significant difference ($P < 0.01$). There was no significant difference in the four dimensions other than goal focus among the teenagers of each grade, which indicated that the seriousness and focus of the younger students were lower than that of the older students.

(2) The relationship between the psychological resilience and amount of exercise of teenagers and their parents' marital status

Table 3 The relationship between the amount of adolescent physical exercise and the dimensions of psychological flexibility

amount of exercise	focused (M±SD)	emotional control (M±SD)	Positive cognitive (M±SD)	family support (M±SD)	Interpersonal assist (M±SD)
A small amount of exercise	23.41±3.64	21.87±3.87	21.83±8.33	18.81±5.01	25.48±6.27
The moderate exercise	25.89±3.71	23.56±3.79	24.62±2.87	18.49±4.03	26.46±4.98
The moderate exercise	26.03±4.48	24.32±4.10	22.82±4.56	21.31±3.56	26.81±5.74
F	8.679**	4.639*	3.378**	1.542	4.492*

$P < 0.01$ ** $p < 0.05$ *

Family is the main place to adolescent life, one of the most important source of pressure they face is parental marital conflict, empirical studies have also found that in marital conflict, both parents take the initiative to express negative emotions (such as criticism of spouse, blame, etc.), or another party in response to sexual expression of negative emotions (such as sadness, anger, etc.), can make the teenagers feel lonely and helpless, not safe, triggering adolescent mental health problems [13]. Table 2 can be found that parents are divorced and separated in two different families of elastic score in salience sex differences ($P = 0.01$), data and analysis found that the parents are divorced and separated two different families of adolescents in interpersonal relations, focused, positive cognitive there were very significant differences in three dimensions, but in emotional control and family support, especially family support salience sex differences in two dimensions ($P < 0.01$). In addition, in the five dimensions of mental resilience, the scores of adolescents from unmarried families in all dimensions were higher than those from divorced families, thus it can be seen that the stress and influence of parents' divorce on adolescents. Therefore, schools and society should give more care and love to teenagers whose parents are divorced, and take care of their emotions and life.

3.2 Multivariate analysis of variance on the relationship between adolescent mental resilience and amount of exercise

Scholars in Australia interviewed 14 male youth sports participants, ask them to share individual persons to participate in physical exercise motivation, said all participants take part in physical exercise in order to keep healthy and fit, said most people take part in physical exercise in order to enhance the social adaptation or enhance mental health, in 1030 to participate in sports activities among teenagers, all the students feel good, confidence [15].In addition, Cohu studied the influence of 155 American college students' participation in sports activities on their mental resilience, and found that there was a significant positive correlation between college students' participation in sports activities and their level of mental resilience [12].Table 2 shows that the greater the amount of exercise, the greater the significant difference between it and mental resilience.In Table 4, LSD method was used for multiple comparisons. In the dimension of goal focus, the greater the amount of exercise, the higher the score, and there was a high significant difference between small, medium and high amount of exercise ($P=0.000 < 0.01$).In the positive cognitive dimension, the group with the same large amount of physical activity scored the highest, followed by the moderate amount of physical activity, and finally the small amount of physical activity group, with a high significant difference among small, medium and high amount of physical activity ($P=0.000 < 0.01$).In the dimension of emotional control, the score of the group with high amount of physical activity was the highest, followed by the group with moderate amount of physical activity and the group with low amount of physical activity was the last, and there was a significant difference among small, medium and high amount of physical activity ($P < 0.05$).It is not that the greater the amount of exercise, the more significant the positive effect is. As shown in Table 3, students in the moderate exercise group had the best positive cognitive effect, followed by the large exercise group and the small exercise group. In the dimension of family support, the relationship between the small, medium and high amount of exercise could be ignored.It can be seen from this that increasing the amount of physical activity of adolescents can improve their emotional control, interpersonal assistance and ability to focus on goals, while appropriately increasing the amount of physical activity of adolescents can improve their positive cognitive ability.

Table 4 The relationship between youth sports items and various dimensions of mental flexibility

sporting events	focused (M±SD)	emotional control (M±SD)	Positive cognitive (M±SD)	family support (M±SD)	Interpersonal assist (M±SD)
Personal Events	18.15±3.25	19.22±3.67	17.18±4.46	23.56±4.61	22.78±4.88
Group events	24.17±4.65	23.89±3.83	21.76±3.98	23.44±3.67	23.69±4.01
Netted antagonist class	26.88±4.36	23.67±4.07	23.78±4.38	23.34±4.33	22.98±4.78
Leisure items	22.77±3.87	24.73±4.74	26.68±3.99	24.11±4.59	23.88±4.52
F	6.756**	2.233*	2.121	1.987	2.077*

$P < 0.01$ ** $p < 0.05$ *

3.3 Multivariate analysis of variance on the relationship between adolescent mental resilience and sports items

It can be seen from Table 5 that, through the analysis of variance, individual, collective, leisure and net-net-confrontation items have high significant differences in the dimensions of emotional control and goal focus. In the dimension of goal focus, the score of isolated confrontation items was better than that of individual, collective and leisure items. LSD method was used to conduct multiple comparisons, and it was found that there were highly significant differences between isolated confrontation and collective items, as well as individual items and leisure items in the dimension of goal focus. In terms of emotional control dimension, leisure items scored the highest, followed by group items and isolation confrontation, and it was found that there was a significant difference in emotional control dimension between individual items and isolation confrontation ($P = 0.000 < 0.01$). In the positive cognitive dimension, leisure items scored the highest, with a high significant difference between leisure items and individual and group items ($P = 0.001 < 0.01$). Leisure sports had the highest score in the dimension of family support, but the individual, group, leisure and net-fighting sports had no statistical significance in the dimension of family support. Leisure sports also had the highest score in interpersonal assistance, followed by team sports. There was only a significant difference in this dimension between leisure sports and individual sports ($P = 0.03 < 0.05$). Except for individual sports, there was no statistical difference in the other three sports. In the dimension of emotional control, leisure items scored the highest, followed by collective items. There was a significant difference between individual items and leisure items ($P = 0.03 < 0.05$), while there was no significant difference between leisure items, net-net-confrontation and collective items.

4. Conclusions and recommendations

4.1 The conclusion

In this paper, the relationship between the amounts of physical activity, total score of mental resilience and demographic characteristics of teenagers was integrated. The research results showed that male students' mental resilience was better than female students. Through further analysis, it could be known that male students' ability to focus on goals was higher than that of female students, with significant differences. In general, the psychological resilience score of senior students is higher than that of junior students. Through analysis, it can be seen that there is a big difference in the ability of target concentration between senior students and junior students. There was no significant difference between the three levels of poverty, average and good family income and the total score of mental resilience. The total score of mental resilience of adolescents whose parents are not divorced is higher than that of adolescents whose parents are divorced. The analysis

shows that there are significant differences in the dimensions of emotional control and family support. In terms of the degree of participation in sports, the psychological resilience score of the students in the high-exercise group was higher than that of the other two exercise groups, and there were significant differences between the high-exercise group and the three dimensions of target concentration, positive cognition and emotional control (All $P < 0.01$), and there were significant differences in the dimensions of interpersonal assistance. The total score of network-separated sports is the highest in each dimension of mental resilience, followed by team sports, leisure sports and individual sports.

4.2 Suggest

Adolescence is a critical period of development, and promote and strengthen resilience, their psychological unique happens in the adolescent stage of development, and the movement environment is an important environment of cultivating youth resilience, so teenagers should strengthen exercise, not only contribute to the construction of mental toughness, and can be converted to their motivation in study, work or personal life. In addition, it is necessary for schools to carry out sports such as net confrontation, team sports and leisure sports, so as to improve teenagers' interest in participating in sports, strengthen their understanding of sports, and make them widely participate in sports, so as to develop a good habit of physical exercise.

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