

# *Research on Sports Morality of Young School Children Based on Social Network Analysis*

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**Abstract:** In order to thoroughly implement the “double reduction” policy, achieve moral education, and promote the overall development of teenagers, based on social network analysis and questionnaire method, this study profoundly understands that the situation of young school children's sports morality is not ideal in general; young school children's social preference network structure is more concentrated, and the centralization is higher, and it shows that middle school students in the network center have stronger ability to control and influence the whole network. At the same time, using the Moran's I, we find a positive, moderate and significant correlation between the students with similar influence and the students with similar sports morality scores in the social preference network of primary and middle school students. The research perspective of the social network provides a new field of vision for the study of primary and middle school students' behavior attributes. It provides a scientific basis for the intervention of physical education.

## 1. Introduction

The General Office of the Chinese State Council issued the “Opinions on Further Reducing the Homework Burden and Off-campus Training Burden of Students in Compulsory Education” (after this, referred to as “double reduction”). The “double reduction” policy has a far-reaching impact, strict implementation, and rapid effect, which is surprising. When many fields are flag-wagging for the “double reduction” policy, sports bearing its extraordinary mission of The Times, become the primary position to reduce the academic burden, achieve moral education, and thoroughly implement the “double reduction” policy. Physical education classroom is not only the response to “double reduction” but also the embodiment of the concept of carrying out new development on the educational front in the new era.

Rousseau, an enlightenment thinker in the 18th century, believed that “physical education is a part of the whole development process from children to adults” and put forward the idea of “cultivating people through physical education” for the first time. Physical education is not only the teaching of sports skills; in the process of skills teaching, fully excavating the attribute of sports education, we can dig deeply into the essence of “cultivating people through physical education.” However, the “sports person” research cannot be separated from the social relationship environment background. The research on “sports person” based on the social relationship

background will be better than the traditional research perspective. Emirbayer and Goodwin (1994) believe that sociological interpretation from the perspective of social relations is superior to interpretation from the perspective of individual attributes and that “network theory builds interpretation on the relationship model.”<sup>[1]</sup> Liu (2018) also found that all social phenomena can be best studied through basic social network structure, an essential new idea in social research<sup>[2]</sup>. As early as the 1950s, in the field of geography, Moran began to link spatial dimension, and unit attributes together to study the relationship between two places with similar geographical features and their spatial distance and proposed the Moran index. Later, scholars began to apply this research on spatial and unit attributes to the research on social relations and individual attributes (eg. the similarity of mutual relations and voting behaviors of different parties in American political behavior). The effect of social networks on mental health is also significant in China. Relationships not only affect our mood in the short term but also have long-term, lasting effects on our mental health and attitudes (e.g., the study of friendship networks and bullying). Significant to the country, small to the individual, micro to the neural network, all involved in the social network relationship, so what kind of relationship in young school students between the physical education classroom network structure and sports morality?

## 2. Method

In order to deeply understand the structural characteristics of young school children's relationship networks, the current characteristics of sports morality, and whether there is a relationship between them, this paper uses social network analysis to conduct research. Social network analysis is a comprehensive set of techniques that use graph theory and matrix algebra to analyze relationships. This study, UCINET6.5 was used to transform the collected “relationship data” into two modes. The network structure characteristics were analyzed, and then Netdraw was used to draw the network relationship map. Finally, Moran's I was used to analyze the correlation between relationship data and sports character characteristics.

The network of relationship data survey in the study is the Social preference network of primary and secondary school students. The survey is conducted by the Name Generator Questionnaire (which three students do you like to practice within PE class? Then the students will give their names in turn). Based on this data, the relational data matrix is established. The index of relational data research is “Betweenness Centrality.” In a sense, “Betweenness Centrality” measures the influence of nodes on information spread through the network. Compared with Degree centrality, which is an effective measure of local network features, mediation centrality can provide better results for measuring global network features<sup>[3]</sup>. In this study, mediating centrality represents a measure of the influence of members in the peer preference network in the physical education classroom. This measure of peer favorability, which has been linked to various developmental outcomes for children and adolescents, was assessed by asking participants to nominate the peers they most and least liked or least wanted and wanted to be with. The social preference index can better capture the trait of peer ecology and organizational belonging in the classroom and is closely related to organizational behavior<sup>[4]</sup>.

This study investigated the status quo of sports morality based on Tang's (2019) evaluation index system of youth sports morality<sup>[5]</sup>. Sports character includes sportsmanship, character, and sportsmanship behavior of 3 and 14 secondary indicators. The secondary indicators include patriotism, collectivism, pioneering competitive spirit, striving and enterprising spirit, teamwork spirit, innovation spirit, legal spirit, love, ambition, faith, justice, sportsmanship, meaning ability, sportsmanship creation ability, and sportsmanship self-education ability. The researchers designed the sports morality evaluation questionnaire according to the above dimensions. The physical

education teachers and head teachers scored each item with the 5-scale Likert (the total score is 100 points). Finally, the total score was calculated according to the weight of the youth sports morality evaluation index system.

### 3. Definition of Terms

**Social network:** Social network is a collection of social agents and their relationships as nodes<sup>[2]</sup>. Social network analysis uses graph theory and matrix algebra to analyze relationships based on quantized data. In this study, nodes represent students in a physical education class, and relationships represent the title directions of different questions among students.

**Social preference:** Peer nominations based on “most liked” and “least liked” indicate the degree to which a teenager is liked or disliked by peers. In this study, social preference represents the mutual relationship between the peers of middle and primary school students who like or dislike taking PE classes together.

**Betweenness Centrality:** In a sense, mediation is a measure of the impact of nodes on disseminating information through the network<sup>[2]</sup>. In this study, it represents the measure of students' influence on the structure of social preference networks in physical education class.

**Network Centralization:** Network Centralization refers to the degree to which a graph shows the tendency to centralize to a certain point<sup>[6]</sup>. This study indicates that in the social preference network of physical education classrooms, the preference relationship points to the central tendency of a particular student. The strength of this central tendency determines the influence of a particular student in the physical education classroom in the network structure.

### 4. Participants

The purpose of this study is to understand the relationship between the structure of social preference network and sports morality in primary and secondary school students. In order to achieve this purpose, we adopted the following sampling process and methods. China has a total of 663 cities, which are divided into five categories according to their comprehensive development level: first-tier cities, second-tier cities, third-tier cities, fourth-tier cities and fifth-tier cities. In order to improve the efficiency of the study, the typical case sampling of the purposive sampling methods was used in this study<sup>[7]</sup>. According to the ranking of Urban charm in China, Yueyang City of Hunan Province, a third-tier city, was selected as the research city. The reason is that Yueyang lies in the middle of China, neither on the developed eastern coast nor in the economically backward west. The economic, educational and cultural level of the city can represent the characteristics of most ordinary cities in China. A total of 202 students, including 102 boys and 100 girls, were investigated in two classes of the fourth grade in a primary school and two classes of the second grade in a middle school in Yueyang City. At the same time, the status quo of sports morality and social preference in sports classrooms were investigated. A total of 202 primary and middle school students in Yueyang city were surveyed by name generation questionnaire on their social preferences in P.E. class. A total of 202 valid questionnaires were collected, with an effective recovery rate of 100%. There were 576 valid candidates, with a rate of 95%. Four social preference networks with precise edges were constructed respectively.

### 5. Results

#### 5.1 The Characteristics of the Present Situation of Sports Morality in Young School Students

As shown in Table 1, the distribution of physical morality scores of primary and secondary

school students mainly concentrated in the 70-90 division, among which 43.6% of primary and secondary school students scored 70-79, accounting for the most significant proportion. Second, the proportion between 80 and 90 districts was 32.7%; Students with scores above 90 accounted for 11.9%; The proportion of 60-69 zoning was even less, only 5.4%; Only two students, 1%, received a failing grade. We can also find that all classes' average score is between 72 and 78, and the overall average score is 74.7. At the same time, we found that the proportion of primary and secondary school students with less than 80 points is more prominent, indicating that the overall performance of physical morality in primary and secondary schools has not reached a reasonable level. The current situation needs to be improved.

Table 1: Distribution Table of Sports Morality Score

Score	90-100	80-90	70-79	60-69	0-50	Mean
P1	4	26	18	3	1	77.4
P2	6	10	31	3	0	73.4
M1	9	19	19	2	1	75.2
M2	5	11	21	3	0	72.5
%	11.9%	32.7%	43.6%	5.4%	1%	74.7

## 5.2 Social Preference Network Characteristics of Primary and Middle School Students

Table 2: Characteristics of Class Social Preference Network Mediation Centrality

Class	Betweenness				
	Mean	Std Dev	Sum	Min	Max
P1	121.73	146.16	6330	0	583.1
P2	147.32	174.76	7366	0	737.17
M1	195.04	221.92	9752	0	763.05
M2	201.42	211.30	10071	0	955.86

Table 3: Characteristics of Standardized Mediation Centrality in Class Social Preference Network

Class	nBetweenness					
	Mean	Std Dev	Sum	Min	Max	Centralization
P1	4.77	5.73	248.24	0	22.87	18.45%
P2	6.26	7.43	313.18	0	31.34	25.59%
M1	8.29	9.44	414.62	0	32.4	24.64%
M2	8.56	8.98	428.19	0	40.64	32.73%

Tables 2 and table 3 show the Node Betweenness of the social preference network of each class P.E. class analyzed by UCINET software (from which we can quantify how the relationship between two students controls and affects the whole network). According to Table 2, the average intermediary centrality of primary school students is lower than that of middle school students, and the standard deviation is also more minor. The total value of intermediary centrality of the whole network is also lower than that of the middle school network. The maximum intermediary centrality of primary schools (583.1 and 737.17) was lower than that of secondary schools (763.05 and 955.86). At the same time, we can find that the standardized betweenness of each class is consistent with the size of the unstandardized betweenness. It shows that the difference in influence distribution of each student in a primary school class is slight; Middle school students are more differentiated than primary school, and there will be individual students who have a significant influence, at the same time, marginalized in the classless influence of middle school students will be more; The specific students who are in the center of the network in middle school can control and influence the whole network more. According to Table 3, network Centralization also shows that middle school students' preference for network Centralization is more concentrated than in primary school networks, which further indicates that particular actors in middle schools have more

prominent control over the entire network.

### 5.3 The Test of the Relationship between Sports Moral Character and Social Preference

Moran's I was proposed by Moran in 1984. It reflects the similar degree of attribute values of adjacent units in space. It is generally used to test whether there is clustering in space. Its calculation formula is as follows:

$$I = (n \sum_{i=1}^n \sum_{j=1}^n C_{ij} (x_i - \bar{x})(x_j - \bar{x}) / \sum_{i=1}^n \sum_{j=1}^n C_{ij} \sum_{i=1}^n (x_i - \bar{x})^2)$$

Based on the similarity degree of spatial units, this study studies the similarity degree of node position of preference network between primary and secondary school students. The researcher uses the Moran index to study whether the influence of the social preference network of primary and secondary school students in each class (measured by betweenness centrality) is correlated with students' sports morality scores. The study used the betweenness centrality of the network as a relationship variable to measure the autocorrelation of students' sports morality scores in each class. As shown in Table 4, the correlation between middle school students' intermediary centrality and the characteristics of sports morality scores is more vital than that of primary school students. The correlation between the influence of students in each class and students' sports morality scores was positive, medium intensity, and statistically significant. ( $r > .3$ ,  $P < .001$ ). It shows that students with similar influence in the social preference network of primary and secondary school students are correlated with students with similar sports morality scores.

Table 4: Moran Autocorrelation Analysis of Student Intermediary Centrality and Sports Morality Score

<i>Class</i>	<i>Autocorrelation</i>	<i>Significance</i>
<i>P1</i>	.367	.000
<i>P2</i>	.404	.000
<i>M1</i>	.528	.000
<i>M2</i>	.478	.000

## 6. Discussion and Suggestions

As an essential carrier to carry out the policy of “double reduction,” the physical education classroom takes “sports people” as the goal to promote the strategy of building moral education and realizing sports power. In this process, the research provides scientific, quantified, and operable data for the “Cultivate people with sports.”

First, in the study of sports morality, it is found that the current development of sports morality in the middle developed areas is not ideal. The overall sports morality of primary and middle school students is not good. It proves that Chinese education has been in the unbalanced situation of “longer than wisdom, less than morality, weaker than physical beauty, and less than labor” for a long time<sup>[8]</sup>; At the same time, we also found that the overall situation of middle school students' physical morality score is slightly better than the primary school stage, which shows that the students with age, mental, physical education, environment, and other effects of the current situation of physical morality can be gradually improved and improved; On the other hand, it cannot be denied that before implementing the “double reduction” policy, primary school students in ordinary third-tier and fourth-tier cities were more deficient in physical education than middle school students. The main reason is that middle schools must face the physical education examination. Primary school students often have physical education classes taught by teachers other than language and number, or the physical education class is indirectly occupied. According to the

eighth National Survey on Students' physical fitness and health released by the Ministry of Education in September 2021, compared with the previous seven surveys, “the decline of college students' physical fitness has not been effectively curated.”The essential attribute goal of physical fitness enhancement has not been achieved, and the road of “Cultivate people with sports.” has a long way to go.

Secondly, regarding the social preference network of physical education classrooms, the research also found that compared with primary school students, middle school students have more online phenomena than individual students have great influence. The reasons for this phenomenon are complex and dynamic. With the growth of age, middle school students are more capable than primary school students in maintaining the relationship of social preference, such as their mind, appearance, athletic ability, and social ability. These increasing abilities and characteristics have a direct positive impact on social preference. Therefore, the influence of middle school social preference networks is more concentrated than that of primary school students.

Finally, the study found that students with similar mediating centrality of social preference networks in physical education classrooms had similar scores on physical morality. Such a similar relationship is consistent with research on adolescent mental and physical health. Previous surveys of happiness, for example, have generally shown that friends and good family life are the primary sources of increased happiness. When people around you are happy and optimistic, you are more likely to feel happy. Individuals tend to flock together in other problematic behaviors, such as obesity and smoking. The perspective of this study is inspired by the characteristics of the geographical location units of the Moran index, which can be explained by the Group socialization Theory proposed by Harris (1995). He believes peer groups are the most critical environment and the primary motivation for children's socialization outside the family environment<sup>[9]</sup>. People always tend to belong to a particular group. Primary and secondary school students are no exception. The rules, culture, and ideas within the school group are transmitted among the students, making the peers have similar behaviors and attitudes related to sports morality.

To sum up, this study provides the following humble opinions: First, the “double reduction” policy issued for our compulsory education stage physical education strengthened and the promotion injected a strong heart. Physical education classroom is an important carrier to implement “Cultivate people with sports” to realize the overall development of moral education. Primary and secondary schools should actively compensate for the lack of after-school physical education to ensure regular physical education in class. From the allocation of physical education teachers to the guarantee of per capita sports facilities; From the teaching of sports skills to the shaping of good sports character; From the selection of the weight of each subject in the entrance examination to the perfection of the talent evaluation mechanism, in-depth reform is needed. Secondly, “Cultivate people with sports”, can not leave the social attributes of people, from the perspective of social relations, to study education. Education work is more in line with the social reality of youth growth. A thorough understanding of the development and change of adolescent peer relationships is helpful for a deeper understanding of the mechanism of adolescent consciousness and behavior change. Finally, the intervention of sports morality of teenagers in the compulsory education stage can be carried out based on the theories of “social dynamics,” “behavioral dynamics,” and “group socialization.” In China, there is still a lack of research in the field of physical education based on social network analysis, so it is imperative to carry out relevant empirical research further.

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