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The relationship between socioeconomic status and organized sports participation among Chinese children and adolescents: the chain-mediated role of parental physical exercise and parental support

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Abstract

Objective To examine the relationship between socioeconomic status and organized sports participation among children and adolescents, and to reveal the mediating role of parental physical exercise and parental support between socioeconomic status and participation in organized sports.

Methods A cross-sectional survey of 1512 parents of children and adolescents in Shanghai was conducted via the socioeconomic status scale, physical activity rating scale, and parental support for children's sports training scale. Structural equation modeling was used to test the direct and mediating effects.

Results (1) The direct effect of socioeconomic status on organized sports participation was significant ($\beta=0.184$, $P<0.001$) (2). The simple mediating effect of parental support was significant ($\beta=0.051$; 95% CI [0.030, 0.079]), accounting for 16.56% of the total effect. The chained mediating effect of parental physical exercise and parental support was significant ($\beta=0.056$, 95% CI [0.034, 0.084]), accounting for 18.18% of the total effect (3). The hypothesized paths did not differ significantly in multigroup structural equation modeling of different genders among children and adolescents.

Conclusion Socioeconomic status not only directly influences organized sports participation among children and adolescents but also indirectly influences organized sports participation through parental physical exercise and parental support. This study posits that reducing socioeconomic status disparities in organized sports participation among children and adolescents requires not only a focus on children and adolescents of lower socioeconomic status but also increased parental physical exercise and parental support.

Significance

What is already known.

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Before this study, socioeconomic status was a known determinant of organized sports participation among children and adolescents. However, the mechanisms by which socioeconomic status influences the participation of organized sports among children and adolescents still need to be further explored.

What this study adds.

This study validated the relationship between socioeconomic status and organized sport participation among children and adolescents in the Chinese context, and further found that socioeconomic status can influence organized sport participation among children and adolescents through the mediation of parental support as well as the chain mediation of parental physical exercise and parental support.

How this study might affect research, practice or policy.

The findings highlight the need for policymakers not only to focus on children and adolescents of low socioeconomic status but also to consider that improving parental physical exercise and parental support may be more effective in reducing socioeconomic status disparities in organized sports participation.

Keywords Socioeconomic status, Parental physical exercise, Parental support, Organized sports, Children and adolescents

Introduction

Organized sports (OS) is defined as physical activity (PA) under professional guidance, including formal practice and competition under the rules. Children and adolescents usually participate in OS after school or in sports clubs (typically excludes physical education classes) [1]. Several studies have indicated that OS has more health benefits than unorganized PA (e.g., cardiorespiratory fitness, executive function and mental health) [2–4]. However, the global matrix 4.0 PA report card study of 57 countries revealed that only 40–46% of children and adolescents participate in OS [5]. In China, the PA report card noted that fewer than 20% of children and adolescents participate in OS (2022), which is even lower than the 20.5% reported in 2018 [6, 7]. Therefore, it is important and necessary to study the factors of OS participation, especially in countries with low participation rates.

In recent years, some studies have identified parent-related factors (e.g., educational level and income) as determinants of participation in OS among children and adolescents [8–11]. These indicators are typically used to measure socioeconomic status (SES). Owen et al. systematically reviewed 104 studies on the relationship between SES and participation in OS and reported that children and adolescents from high-SES families were more likely to participate in OS and keep participating over the long term [12]. However, most of the current evidence is from Western developed countries, and the relationship between SES and OS has not been examined among Chinese children and adolescents. Furthermore, most of these studies of parent-related factors have chosen macro-level demographic indicators, but few studies have further explored how these indicators influence OS participation among children and adolescents—what are the mechanisms? To improve the participation of children and adolescents in OS, it may not be sufficient to focus on parent-related demographic factors only, and further research is needed in combination with parent-related

behavioral and psychological factors. Only by combining these factors and exploring the mechanisms can we know how SES influences OS participation among children and adolescents and how to reduce the negative impact of SES on OS.

To our knowledge, only one relevant study has explored the mechanism by which social class (measured by parental occupation) influences participation in OS among 16–19 years old youth, with mediating variables including economic resources, cultural resources, immigrant status, neighborhood and school affiliation [13]. It is necessary to continue exploring the mechanisms by which SES influences the OS participation of children and adolescents, and to combine parental behavioral and psychological factors.

Therefore, the purpose of this study was to explore the influence of SES on OS participation among children and adolescents in the Chinese context, and to examine the mediating effects of parental exercise behavior and parental support. Providing a theoretical basis for public health policy development to promote OS participation among children and adolescents.

Socioeconomic status and organized sports participation

SES is defined as the relative position of a family or individual within the hierarchical structure of society on the basis of their access to or control over wealth, prestige and power [14]. Previous studies have confirmed that SES is an important factor influencing the PA among children and adolescents in China [15–17]. Recent research findings have shown that SES disparities may be greater in OS than in overall PA [12]. This discrepancy is likely to be associated with the economic resources available to families [18]. Participation in OS usually requires a series of fees, such as registration (membership) fees and equipment fees [19]. Families with high SES have objectively better educational and economic resources to support

the long-term participation in OS of children and adolescents [20]. Although a recent large-scale review revealed that children and adolescents with higher SES were more likely to participate in OS, there is no research evidence from China [12]. Therefore, it is necessary to examine the relationship between SES status and the organized sports among children and adolescents in the Chinese context.

Based on the aforementioned research evidence, we propose Hypothesis 1: SES is a positive predictor of OS participation among children and adolescents in China.

The mediating effect of parental physical exercise

Physical exercise is a category of PA that is planned, structured, repetitive and purposeful and is aimed at improving or maintaining one or more components of physical fitness [21]. In the relationship between SES and OS participation among children and adolescents, parental physical exercise may play an important role. Previous research has found that physical exercise as a health behavior is influenced by SES, with adults of high SES having more adequate leisure time, stronger intentions to exercise, and more exercise behaviors than those of low SES [22–24]. Additionally, the family is commonly considered the “first classroom” for children and adolescents to grow up in, and parents will teach healthy behaviors to their child, thus forming an intergenerational transmission of healthy behaviors. Some studies have identified a positive correlation between parental PA and OS participation in children and adolescents. Erkelenz et al. examined the association between parental PA and child’s OS participation in 1615 German children (7.1 ± 0.6 years, 50.3% male) and found that the more active the parental PA, the higher the child’s participation in OS [25]. Rodrigues et al. examined the association between parental PA and sport participation in 834 Portuguese children and came to similar conclusions, and further noted that while there may be gender differences in this effect, i.e., fathers were more strongly associated with boys and mothers with girls, the form of PA performed by the parents (organized/unorganized) had no significant effect on the participation in OS among children and adolescents [26].

Based on the aforementioned research evidence, we propose Hypothesis 2: Parental physical exercise is a positive predictor of OS participation among children and adolescents. Hypothesis 3: Parental physical exercise has a mediating role between SES and OS participation among children and adolescents.

The mediating effect of parental support

The World Health Organization defines social support as emotional and practical support characterized by good social relations, which are social determinants of health [27]. Parental support is an important part of the social

support system in children and adolescence, and is usually expressed in the form of parental concern and assistance with child’s behavior [28]. Previous research has confirmed the positive association between parental support and PA in school-aged children and adolescents, which indicates the importance of parental support in preventing the decline of PA among children and adolescents [29–31]. Similarly, in the context of OS, parental support can be specified as a series of behaviors, such as watching sporting events with the child, purchasing sports equipment for the child, and encouraging the child to stay engaged in OS [32]. Two studies have indicated that parental support is a determinant for participation in sports among children and adolescents, and that a variety of support (e.g., allowing participation in sports, encouraging participation, accompanying behaviors, and buying equipment) provided by parents is a significant predictor of long-term participation in sports among children and adolescents [33, 34]. Additionally, SES is an important predictor of parental support in OS, and there may be a direct association between consumption related to OS and economic resources in the SES, and an indirect effect may be that community environments in which families of high SES tend to have more opportunities to participate in OS [18, 35]. The type of parental support also varies by SES, with parents of high SES tending to provide instrumental support while parents of low SES are more likely to provide emotional support, compared to the probability that children and adolescents from families of high SES will participate in OS [12, 18]. It can be inferred that SES is an important factor influencing parental support, which is an important factor influencing OS participation among children and adolescents, and that parental support may serve as a mediating variable explaining the relationship between family SES and OS participation among children and adolescents.

Based on the aforementioned research evidence, we propose Hypothesis 4: Parental support is a positive predictor of OS participation among children and adolescents. Hypothesis 5: Parental support has a mediating role between SES and OS participation among children and adolescents.

The chain-mediated effect of parental physical exercise and parental support

Chain mediation refers to the existence of a sequential relationship between two and more mediating variables through which the independent variable can influence the dependent variable. Compared to simple mediators, chained mediators can reveal the complex mechanism of the relationship between the independent and dependent variables, providing a deeper understanding of that relationship [36]. In this study, two potential mediating variables (i.e., parental physical exercise and parental

support) were proposed between SES and OS participation among children and adolescents. According to several studies, parents with positive physical exercise habits and higher levels of PA tend to provide higher levels of support for PA in their child, and the participation in PA with their children is also considered a form of parental support [37, 38].

Therefore, based on the aforementioned understanding, we propose Hypothesis 6: Parental physical exercise and parental support have a chain-mediated effect in the relationship between SES and OS participation among children and adolescents. Based on all the hypotheses, we propose a conceptual model for this study.

Gender differences in groups of children and adolescents

In studies of parent-related factors and OS participation among children and adolescents, conclusions about the existence of gender differences have been inconsistent. For example, Cairney et al. found no significant gender differences in the relationship of household income on OS participation among children and adolescents [39]; Garcia et al. found that gender was the best predictor of whether children and adolescents were involved in OS [40]; and Appelhans et al. found that family support had a significant effect on girls' participation in OS, but not on boys' [41]. Inconsistencies in the conclusions of existing studies may be attributed to cultural differences in different countries. It is not known whether gender differences among children and adolescents in Chinese context affect all the hypotheses of this study. Multigroup tests are needed to analyze the results of the research hypotheses among children and adolescents of different genders.

Methods

Participants and procedures

We used online questionnaires and stratified sampling to investigate parents of children and adolescents in 16 schools (12 elementary school and 4 secondary schools) in 16 districts of Shanghai, China from October to December 2021. The questionnaire was designed through the "Questionnaire Star" online platform. One or two teachers from each school as linkers randomly selected 3–5 classes and sent the link to the online questionnaire and QR code to students' parents via WeChat. Before the survey, in order to ensure the validity of the questionnaire items, we reviewed the relevant literature, chose a measurement instruments appropriate to the Chinese context, and finally invited 6 professors in related fields to review the questionnaire content to ensure that the questionnaire accurately reflected the research objectives and variable measurement needs. The survey procedure was in accordance with the Declaration of Helsinki. The informed consent form was on the first page of the online questionnaire and provided a detailed description of the purpose of the study. Participants were informed of the principles of anonymity, confidentiality, and voluntary participation in the study, and that they could withdraw directly or at any time during the response process without any adverse effect on the participant, and that the questionnaire response page would be accessed by selecting "I agree to participate in this study" at the bottom of the informed consent page. All procedures of this study were approved by the ethics committee of Shanghai University of Sport. During the data collection process, we used a number of features of the "Questionnaire Star" platform to ensure the quality of the data,

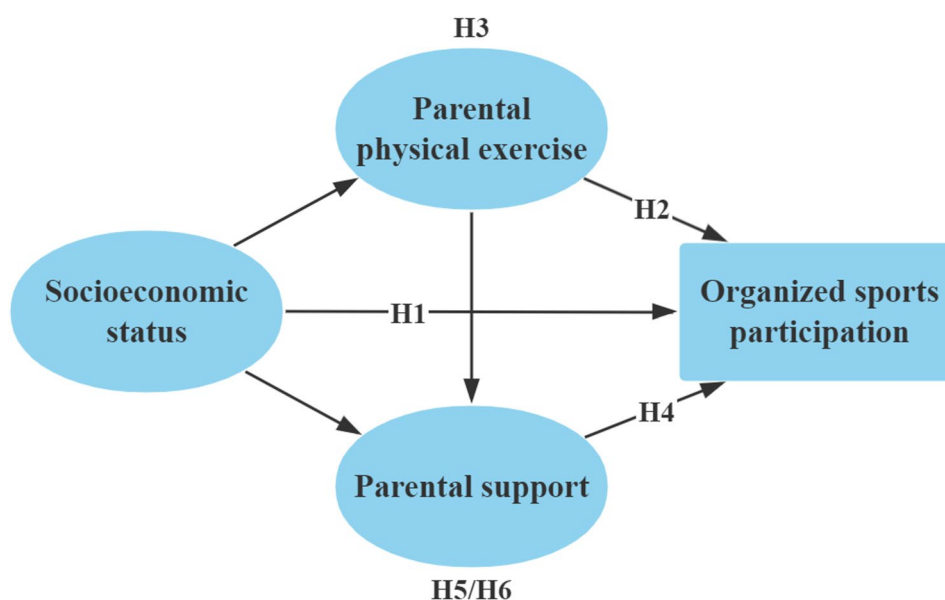


Fig. 1 Conceptual model

including: (1) too many identical answers; (2) less than 3 s of average time to fill in each question; and (3) not passing “trap” questions, such as “If you are reading this question carefully, select 5”. Based on the sample size estimate proposed by Bentler et al. that the sample size for structural equation modeling needs to be the number of items multiplied by 5, the sample size for this study needs to be 220 [42]. Eventually, the electronic questionnaire received 2039 completions during the survey period, and after excluding questionnaires that did not meet quality criteria, a total of 1512 participants were included in this study. The effective response rate was 74.15%.

Measurements

Socioeconomic status

SES can be measured by a combination of several indicators, such as parental occupation prestige, parental education and household income [43, 44]. In this study, parental occupational prestige and education were measured according to the Socioeconomic Status Scale for Large Cities in China by Li [45]. Since the original scale was revised in 2002, the following modifications were made to the measure of parental education in this study: “illiterate or minimally literate” was deleted, and the highest scoring item, “master degree or higher” was subdivided into “master degree” and “doctoral degree”. Parental education and parental occupational prestige were measured by the higher parent (father or mother) as a representation of the family [46, 47]. The classification criteria for household income are based on the 2017 disposable income level grading of residents published by the Shanghai Municipal Bureau of Statistics and combined with the disposable income growth rate of Shanghai residents in recent years to estimate the household income classification criteria used in this study (2021). Parental occupation prestige, education and household income are on a 7-point Likert scale, and the SES measures used in this study and the related rationale have been uploaded in Supplementary file 1. In structural equation modeling, we use “socioeconomic status” as a latent variable and “occupational prestige”, “household income per annum” and “education” as three observed variables. The common variance of the three observed variables (i.e., household income, parental occupational prestige, and education) is used to represent “socioeconomic status”. Preliminary analyses revealed that the standardized factor loadings of the confirmatory factor analyses for “parental occupational prestige” “household income” and “parental education” were 0.46, 0.73, and 0.64, respectively, which can basically meet the factor loading requirement of 0.50 [48].

Parental physical exercise

The Physical Activity Rating Scale (PARS-3) of Liang [49] was used to assess physical exercise among participants in this study. The scale has three items, including exercise intensity (how much intensity do you participate in physical exercise each time), exercise frequency (how many times do you participate in physical exercise per week), and exercise duration (how many minutes do you participate in physical exercise each time). The scale is based on a 5-point Likert scale for each item. In this study, the Cronbach's α of this scale was 0.775.

Parental support for organized sports

The Parental Support for Children's Sports Training Scale (PSCSTS) developed by Zheng [50] was used to measure parental support for OS participation among Chinese children and adolescents in this study. The scale is based on a socio-ecological framework that integrates parental support through the characterization of parental behaviors/attitudes across dimensions, e.g. use parental knowledge of policies related to OS to reflect “policy support”, use parental support for their children's purchase of sports equipment to reflect “family support”, etc. The scale has total 7 dimensions and 37 items and is scored on a 5-point Likert scale. In this study, the results of this scale's confirmatory factor analyses were able to meet the recommended criteria, indicating that the scale had good validity in this study [51]: $\chi^2/df = 2.805 < 3$, RMSEA = 0.035 < 0.08, GFI = 0.935 > 0.9, IFI = 0.937 > 0.9, TLI = 0.932 > 0.9, CFI = 0.937 > 0.9.

Organized sports participation

Previous studies have measured OS participation via self-reported measures, including participation in the past year or days and duration of participation per week [52–54]. Based on previous studies, this study measured OS participation through three question items, including days of participation per week (range 1–7, coded 1–7), duration of each session (range 0.5 h and under – 2 h and over, coded 1–5) to reflect OS participation in the short term, and years of participation (range 1 year and under – 4 years and over, coded 1–5) to reflect OS participation in the long term. OS participation was calculated as follows: days per week \times duration of each session \times years of participation. In addition, if the participant chose “never participated” in the previous item, these questions were skipped and coded as 0.

Statistical analysis

SPSS 26.0 was used to analyze the demographic, SES, and physical exercise characteristics of the participants, t-tests and chi-square tests were used to analyze differences in the characteristics of different genders, and exploratory factor analyses were used to calculate

common method bias. AMOS 24.0 was used to calculate latent variable correlations via the maximum likelihood method, structural equation modeling was used to test the model fit and direct effects, the mediating effects were tested via the bootstrap method, and hypotheses were further tested via multigroup structural equation modeling to test the results across children and adolescents of different genders.

Results

Common method bias test

In this study, the procedural control method was adopted for ex ante control of common method bias, and Harman's single factor method was adopted for post hoc testing [55].

Procedural controls included emphasizing the anonymity and confidentiality of the study, designing "trap" questions, defining the concepts of OS in general terms and providing examples in the instructions to help participants better understand this study's survey. The Harman's single factor test was performed in SPSS 26.0 software to include all the question items, and the results revealed that there were 11 factors with feature roots greater than 1, which explained a total of 58.72% of the variance, with the first factor explaining 23.14% of the variance less than the 40% criterion [55]. The above results indicate that there is no serious common method bias in this study.

Characteristics of participants

The characteristics of the participants demographic, physical exercise, and SES variables are shown in Table 1. A total of 1512 participants in this study, including 866 males (57.3%) and 646 females (42.7%), with an average age of 42.29 ± 2.71 years. In the physical exercise score, participants' physical exercise intensity score was 3.60 ± 0.98 , physical exercise frequency score was 3.83 ± 1.02 , and physical exercise duration score was 3.59 ± 1.09 . Among the ethnicity, the majority of participants were Han Chinese (97.0%). Among the urban-rural residence, the majority of the participants (73.0%) live in the central urban area. Among the family structure, the majority of families (96.4%) are two-parent family (biological parents). Among the only child family, the majority of participants reported "yes" (58.1%). Among the gender of the child, 702 (46.4%) were only male, 506 (33.5%) were only female, and 304 (20.1%) were both have. Among the SES variables of the participants, the majority reported bachelor degree ($n=1045$, 69.1%) as the level of education, the majority reported 200,001–300,000 ($n=377$, 24.9%) as the household income per annum, and the majority reported general management versus general professional and technical staff ($n=388$, 25.7%) as occupational prestige. The analysis of participants of different genders showed statistically significant

differences only in the physical exercise intensity ($P<0.001$), physical exercise frequency ($P<0.001$), and the gender of the child ($P=0.044$).

Correlation analysis and reliability and validity tests

Means and standard deviations between variables were calculated via SPSS 26.0, and correlation coefficients, Composite Reliability (CR), and Average Variance Extracted (AVE) between all variables were calculated via the maximum likelihood method in AMOS 24.0. The results are shown in Table 2, and all the variables were significantly positively correlated. In the discriminant validity test, only the AVE root value of parental physical exercise was slightly smaller than the correlation coefficient between it and parental support; the discriminant validity of the remaining variables met the criterion; the CR value of the variables was in the range of 0.648–0.903, which was greater than the recommended criterion of 0.6 [56]; and the AVE value of the variables was in the range of 0.388–0.582, which was able to meet the acceptable criterion of 0.36 and the recommended criterion of 0.5 [57].

Model fit test

In this study, model fit was assessed via χ^2/df , RMSEA, SRMR, GFI, IFI, TLI, and CFI; χ^2/df should be less than 3; RMSEA should be less than 0.08; SRMR should be less than 0.05; and GFI, IFI, TLI, and CFI should be greater than 0.9 [51]. The results showed that the model fit was able to meet the criteria (Table 3).

Direct effects between variables

Structural equation modeling was used to test the direct effects among the variables: the direct effect of SES on OS participation was significant ($\beta=0.184$, $P<0.001$); the direct effect of parental physical exercise on OS participation was not significant ($\beta=0.055$, $P=0.285>0.05$); the direct effect of parental support on OS participation was significant ($\beta=0.254$, $P<0.001$); the direct effect of SES on parental physical exercise was significant ($\beta=0.318$, $P<0.001$); the direct effect of SES on parental support was significant ($\beta=0.201$, $P<0.001$); and the direct effect of parental physical exercise on parental support was significant ($\beta=0.696$, $P<0.001$). On the basis of the above results, Hypothesis 2 was unsupported, and Hypotheses 1 and 4 were supported (Table 4).

Mediating effects between variables

In accordance with the recommendation of Preacher et al. [53], a bias-corrected bootstrap method was used to test the mediating effects of parental physical exercise and parental support in SES and OS participation. The bootstrap iterations was set to 5000, and the Confidence

Table 1 Descriptive characteristics of participants

Variable	Total (n = 1512)	Male (n = 866)	Female (n = 646)	P
Age	42.29 ± 2.71	42.24 ± 2.70	42.37 ± 2.72	0.298
Physical exercise				
Physical exercise intensity	3.60 ± 0.98	3.71 ± 0.89	3.46 ± 1.08	<0.001
Physical exercise frequency	3.83 ± 1.02	3.95 ± 0.92	3.66 ± 1.12	<0.001
Physical exercise duration	3.59 ± 1.09	3.62 ± 0.98	3.54 ± 1.21	0.202
Ethnicity				0.478
Han	1466 (97.0)	842 (97.2)	624 (96.6)	
Others	46 (3.0)	24 (2.8)	22 (3.4)	
Urban-rural residence				0.204
Central urban area	1104 (73.0)	647 (74.7)	457 (70.7)	
Transitional suburban area	142 (9.4)	74 (8.5)	68 (10.5)	
Outer suburban/rural area	266 (17.6)	145 (16.7)	121 (18.7)	
Family structure				0.626
Two-parent family (biological parents)	1457 (96.4)	837 (96.7)	620 (96.0)	
Two-parent family (step-parents)	27 (1.8)	13 (1.5)	14 (2.2)	
Single parent family	28 (1.9)	16 (1.8)	12 (1.9)	
Only child family				0.252
yes	878 (58.1)	492 (56.8)	386 (59.8)	
no	634 (41.9)	374 (43.2)	260 (40.2)	
Gender of the child				0.044
male	702 (46.4)	426 (49.2)	276 (42.7)	
female	506 (33.5)	274 (31.6)	232 (35.9)	
both have	304 (20.1)	166 (19.2)	138 (21.4)	
Education				
primary school or below	5 (0.3)	2 (0.2)	3 (0.5)	
secondary school	21 (1.4)	10 (1.2)	11 (1.7)	
high School	70 (4.6)	36 (4.2)	34 (5.3)	
postsecondary degree	179 (11.8)	92 (10.6)	87 (13.5)	
bachelor degree	1045 (69.1)	593 (68.5)	452 (70.0)	
master degree	176 (11.6)	121 (14.0)	55 (8.5)	
doctoral degree	16 (1.1)	12 (1.4)	4 (0.6)	
Household income per annum (yuan)				0.140
80,000 and below	104 (6.9)	51 (5.9)	53 (8.2)	
80,001-120,000	195 (12.9)	104 (12.0)	91 (14.1)	
120,001-160,000	231 (15.3)	130 (15.0)	101 (15.6)	
160,001-200,000	270 (17.9)	164 (18.9)	106 (16.4)	
200,001-300,000	377 (24.9)	212 (24.5)	165 (25.5)	
300,001-500,000	249 (16.5)	147 (17.0)	102 (15.8)	
500,001 and above	86 (5.7)	58 (6.7)	28 (4.3)	
Occupational prestige				0.259
temporary workers, unemployed	19 (1.3)	9 (1.0)	10 (1.5)	
manual workers or employees of enterprises and institutions	362 (23.9)	191 (22.1)	171 (26.5)	
self-employed workers or business or service technicians	129 (8.5)	76 (8.8)	53 (8.2)	
general office staff	264 (17.5)	145 (16.7)	119 (18.4)	
general management versus general professional and technical staff	388 (25.7)	238 (27.5)	150 (23.2)	
middle management and mid-level professionals and technicians	301 (19.9)	179 (20.7)	122 (18.9)	
senior management and senior professional and technical staff	49 (3.2)	28 (3.2)	21 (3.3)	

Note. Education and occupational prestige, whichever is highest among the parents

Table 2 Descriptive statistics, correlation analysis, reliability and validity tests

Variable	1	2	3	4	CR	AVE
Socioeconomic status	0.623				0.648	0.388
Parental physical exercise	0.318***	0.730			0.774	0.533
Parental support	0.422***	0.760***	0.762		0.903	0.582
Organized sports participation	0.308***	0.306***	0.373***	-	-	-

Note. Diagonal for AVE root value. *** $P < 0.001$

Table 3 Model fit indices

Model Fit Indices	χ^2/df	RMSEA	SRMR	GFI	IFI	TLI	CFI
Criteria	<3	<0.08	<0.05	>0.9	>0.9	>0.9	>0.9
Result	2.735	0.034	0.043	0.925	0.927	0.921	0.927

Table 4 Structural equation modeling of socioeconomic status, parental physical exercise, parental support, and organized sports participation

Hypothesis	Path	β	S.E.	C.R.	P	result
1	SES→OSP	0.184	0.032	5.750	<0.001	support
2	PPE→OSP	0.055	0.044	1.250	0.285	not support
4	PS→OSP	0.254	0.048	5.292	<0.001	support
-	SES→PPE	0.318	0.035	9.086	<0.001	-
-	SES→PS	0.201	0.033	6.091	<0.001	-
-	PPE→PS	0.696	0.024	29.000	<0.001	-

Note. SES, socioeconomic status; PPE, parental physical exercise, PS, parental support, OSP, organized sports participation; β , Standardized path coefficient; S.E., standard error; C.R., critical ratios

Table 5 Results of the mediation effect test based on the bootstrap

Hypothesis	Path	β	Bootstrap95%CI		Effect ratio	Result
			Lower	Upper		
3	SES→PPE→OSP	0.017	-0.010	0.046	5.52%	not support
5	SES→PS→OSP	0.051	0.030	0.079	16.56%	support
6	SES→PPE→PS→OSP	0.056	0.034	0.084	18.18%	support
-	total indirect effect	0.125	0.097	0.157	40.58%	-
-	direct effect	0.184	0.119	0.247	59.74%	-
-	total effect	0.308	0.250	0.362	100.00%	-

Interval (CI) was set to 95%, with a significant effect if the 95% CI did not include 0.

The results of structural equation modeling indicate that the total effect ($\beta = 0.308$, 95%CI [0.250, 0.362]), direct effect ($\beta = 0.184$, 95%CI [0.119, 0.247]) and total indirect effect ($\beta = 0.125$, 95%CI [0.097, 0.157]) of SES on OS participation were significant. The analyses of the mediating effects of parental physical exercise and parental support indicated that the simple mediating effect of parental physical exercise on SES and OS participation was not significant ($\beta = 0.017$, 95%CI [-0.010, 0.046]); the simple mediating effect of parental support on SES and OS participation was significant ($\beta = 0.051$, 95%CI [0.030, 0.079]), accounting for 16.56% of the total effect; and the chain mediating effect of parental physical exercise and parental support on SES and OS participation was significant ($\beta = 0.056$, 95%CI [0.034, 0.084]), accounting for 18.18% of the total effect. On the basis of the above results, Hypothesis 3 was not supported, and Hypotheses 5 and 6 were supported (Table 5; Fig. 2).

Multigroup structural equation modeling on the basis of the gender of children and adolescents

Multigroup structural equation modeling was used to analyze differences in regression coefficients for hypothetical paths for samples of children and adolescents from different gender groups. The total sample with multiple children and mixed gender samples was excluded ($n = 304$), and multigroup structural equation modeling was conducted using the male group sample ($n = 702$) versus the female group sample ($n = 506$). The baseline model fit was $\chi^2/df = 1.852$, RMSEA = 0.027, SRMR = 0.049, GFI = 0.885, IFI = 0.913, TLI = 0.907, and CFI = 0.911. The difference between genders in each hypothesis was further analyzed by using the Z value as the basis for determining the difference in regression coefficients, with $|Z| \geq 1.96$ indicating a significant difference between groups [58].

The results indicate that the support for each hypothesis across genders was consistent with the total sample, the regression coefficients for parental physical exercise

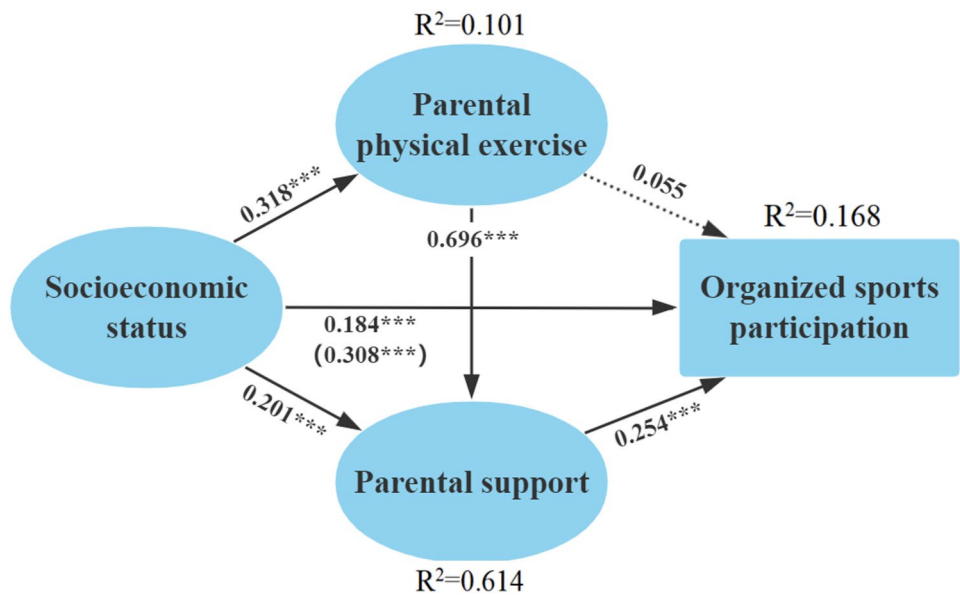


Fig. 2 Mediation model of parental physical exercise and parental support in socioeconomic status and organized sports participation. *Note.* The values in brackets are the total effects

Table 6 Multigroup path comparison of children and adolescents of different genders

Path	male(<i>n</i> = 702)		female(<i>n</i> = 506)		$\Delta\beta$	Z value
	β	<i>P</i>	β	<i>P</i>		
SES→OSP	0.192	<0.001	0.207	<0.001	0.015	0.452
PPE→OSP	0.077	0.278	0.020	0.803	0.057	-0.503
PS→OSP	0.221	0.003	0.313	<0.001	0.092	0.577
SES→PPE	0.335	<0.001	0.257	<0.001	0.078	-0.758
SES→PS	0.211	<0.001	0.187	<0.001	0.024	0.238
PPE→PS	0.666	<0.001	0.685	<0.001	0.019	1.409

and OS participation were not significant in the male group ($\beta=0.077$, $P=0.278$) versus the female group ($\beta=0.020$, $P=0.803$), and the regression coefficients for the rest of the paths were significant in both groups (Table 6). In the comparison between groups, the Z value did not reach a significant level, indicating that there was no significant difference in the coefficients of the paths across the different gender groups. The above analysis shows that the results of the path analysis are consistent across the different gender groups among children and adolescents.

Discussion

This study examines the influence of SES on OS participation among children and adolescents and the mediating role of parental physical exercise and parental support in the Chinese context. Specifically, our study findings help to complement the relationship between SES and OS participation among children and adolescents in the Chinese context, and to better understanding of how SES influences OS participation. First, SES positively predicts OS participation. Second, SES can influence OS

participation among children and adolescents through the simple mediation of parental support and through the chain mediation of parental physical exercise and parental support. Third, we did not find gender differences across each hypothesis, suggesting that the results of this study may not be influenced by the gender of the children and adolescents.

Direct effects of socioeconomic status on organized sports participation

The results suggest that SES positively predicts OS participation among children and adolescents (i.e., children and adolescents with high SES were more likely to have long-term OS participate), which we validated in the Chinese context, consistent with findings from developed countries and in support of hypothesis 1 [12, 18, 35]. OS, as a specific form of PA, usually requires a series of expenses around the OS activity compared to other leisure time PA [18], including not only the registration fee (membership) and equipment but also the selection of a suitable sports environment and a team of professional coaches, which is a series of resource needs that

corresponds directly to the economic resources available in the family [1, 34]. Families with high SES have higher economic resources, children and adolescents from these families are more likely to be participating in organized sports for a long period and have a lower probability of dropout [11]. In addition, another aspect that explains the positive prediction of SES for OS participation among children and adolescents is the community environment. Low SES communities may have fewer sports facilities and fewer organized sports activities than high SES communities [59, 60]. These community environmental factors may directly contribute to the fact that children and adolescents with low SES never or rarely participate in OS. In conclusion, SES in the Chinese context remains an important predictor of OS participation among children and adolescents.

Simple mediating effects of parental support

The results showed that there is a simple mediating effect of parental support between SES and participation in OS, i.e., SES can influence OS among children and adolescents through parental support, which supports Hypotheses 4 and 5, suggesting that parental support is a “bridge” that connects SES with OS participation among children and adolescents. Compared with unorganized PA, participation in OS usually requires periodic financial expenditures, as well as a relatively stable time and place. Adequate parental support is an important safeguard for school-aged children and adolescents to participate in an OS over time, and parental support tends to be more tangible and instrumental and includes a range of financial and transportation supportive behaviors [18]. Parents of high SES tend to be more supportive of their child’s participation in OS, and these children are at lower risk of dropout [11]. In addition, SES is often closely related to the family physical environment, and the constructed family physical environment is an important reflection of parental support for OS participation. Several studies have indicated the presence of higher screen time and sedentary behaviors in lower SES family, whereas children and adolescents in higher-SES family environments with more PA and available physical facilities have reported more OS participation [61, 62]. Thus, parental support has a simple mediating effect between SES and OS participation among child adolescents.

Chain mediating effects of parental physical exercise and parental support

The results showed that the direct effect between parental physical exercise and OS participation was not significant, which led to the simple mediating effect of parental physical exercise, but the chained mediating effect of parental physical exercise and parental support was significant, rejecting Hypotheses 2 and 3 and supporting

Hypothesis 6. This finding indicates that parental physical exercise can serve as a mediating variable linking SES to OS participation among children and adolescents and that its influence effects are reflected mainly in parental support. Two studies have examined the relationship between parental PA and OS participation among children and adolescents [25, 26], and this study was consistent with their findings and further revealed that SES was a common predictor variable for both, and that parental support may partially explain the relationship between parental PA and OS participation among children and adolescents. Parental physical exercise as a leisure time PA, one study noted that individuals with high family SES have more active PA in their leisure time [63], that active parents can provide more instrumental and emotional support for OS participation, and children and adolescents in higher parental support environments have a higher probability of longer term participation in OS [26]. Thus, parental physical exercise and parental support have a chain mediating effect between SES and OS participation among children and adolescents.

Multigroup analysis of children and adolescents by gender

The results showed that the results of hypotheses 1–6 did not differ across genders among children and adolescents, i.e., there was invariance across genders, which is consistent with the results of two previous studies [39, 64]. The results indicate that children and adolescents of different genders are equally influenced by SES and parental support in OS participation. One possible explanation for this is that in recent years, Chinese entrance and regular examinations have increased the testing of specific sports skills, resulting that the learning of specific sports skills through organized sports has become a common need among children and adolescents. Thus, there were no significant gender differences in the relationship between SES, parental support, and parental physical exercise on OS participation among Chinese children and adolescents. In addition, this result is not consistent with two studies in developed Western countries [40, 41]. The possible reasons for this are twofold, the primary reason being the cultural context; Chinese children and adolescents are generally involved in academic-related activities during their leisure time, and the decision to be able to participate in OS is more influenced by exams and parental requirements, so gender differences in OS participation may not yet be prominent. Second, this study used a self-reported method to collect information from participants, and the results may have been influenced by social desirability, leading to increased measurement bias and weakening gender differences, this finding needs to be treated with caution. In summary, gender differences in OS participation among children and adolescents in the Chinese context need to be further examined.

Implications

The findings of this study have several important practical implications for policymakers and educators.

First, SES has a direct effect on OS participation among children and adolescents after the inclusion of mediating variables, which suggests that OS participation is directly affected by SES among children and adolescents in China, which is consistent with evidence from western developed countries [12]. Policymakers should prioritize SES differences in OS participation among Chinese children and adolescents, and relevant policies should be prioritized in favor of children and adolescents from families with low SES. A potentially effective measure would be to reduce the fees for membership of sports clubs for low SES participation, and free sports equipment could be provided. Cost reductions may promote participation in OS among children and adolescents with low SES, thereby reducing the negative impact of SES on OS participation. Second, considering the low participation rates and SES differences in OS among Chinese children and adolescents, schools may have an important role to improve low participation rates in OS. School sports fields and sports equipment have important potential value after school hours. And using schools as important places for organized sports can help children and adolescents with low SES save money on transportation. Policymakers should prioritize increasing OS in schools (e.g., by using after-school or weekend hours) rather than in society. Finally, improved parental physical exercise and parental support may have reduced SES disparities in OS participation among children and adolescents. Policymakers could consider increasing the number of sports fields around the community and providing free sports equipment and gear in the community to promote physical activity for parents and child together during leisure time. It is also important to increase awareness of the health benefits of OS through community and school-based platforms to increase parental support for OS participation.

Limitations

Some limitations of this study should be acknowledged. The cross-sectional design of this study limits inferences about causal relationships between variables. Future research could adopt cross-lagged modeling to test time-varying relationships among variables. Second, we conducted the survey only in Shanghai due to resource and practice constraints. As a more developed city in China, the sample in Shanghai is not nationally representative. Future research needs to expand the sample size and conduct studies in different regions of China. Third, as a preliminary study of OS factors of influence in China, the reliability and validity of the measurement tools used in this study still need to be improved. Future research

will also need to continue to revise the measurement tools related to OS participation. Finally, this study used participants' self-reported data; self-reported results may not be precise and may be influenced by social desirability, so future research needs to measure participants' data objectively.

Conclusions

This study reveals the influence and mechanisms of SES on OS participation among children and adolescents in the Chinese context. SES can influence OS participation both through the simple mediation of parental support and through the chain mediation of parental physical exercise and parental support. Furthermore, there were no gender differences in the influence of SES, parental physical exercise, or parental support on OS participation among children and adolescents.

Abbreviations

OS	Organized sports
PA	Physical activity
SES	Socioeconomic status
CR	Composite reliability
AVE	Average variance extracted
CI	Confidence interval
RMSEA	Root mean square error of approximation
SRMR	Standardized root mean square residual
GFI	Goodness-of-fit index
IFI	Incremental fitting index
TLI	Tucker-lewis index
CFI	Comparative fit index

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-025-23187-0>.

Supplementary Material 1

Acknowledgements

The authors sincerely thank all the participants in this study as well as the school teachers who helped in distributing the questionnaire.

Author contributions

ZN collected & analyzed data, wrote manuscript text, and the corresponding modifications are made.

Funding

This research received no external funding.

Data availability

The datasets used and analyzed in this study are available on reasonable request from the corresponding author.

Declarations

Ethics approval and consent to participate

The study was conducted in strict accordance with the Declaration of Helsinki and was initiated after approval was obtained from the Ethics Committee of Shanghai University of Sport. Informed consent was obtained from all participants, and they were informed of the purpose of this study and anonymized.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Received: 18 January 2025 / Accepted: 14 May 2025

Published online: 26 May 2025

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