

Research on the Relationship between Physical Exercise and School Adaptability among Migrant Children: The Mediating Role of Self-Efficacy

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Abstract: School adaptation is a key factor in the overall social adaptation of migrant children in destination areas. From the strategic perspective of the integration of sports and education, this study explores the relationship between physical exercise and school adaptability among migrant children adaptability. Based on data from the China Education Panel Survey, this study comprehensively analyzes the influence of physical exercise on the school adaptability of migrant and non-migrant children, as well as its internal mediating mechanisms. The findings show that physical exercise has a significant and positive effect on the school adaptability of both migrant and non-migrant children, and its effect on migrant children is slightly stronger than that on non-migrant children. Self-efficacy plays a partial mediating role between physical exercise and school adaptability, and this mediating effect is stronger among non-migrant children than among migrant children. Based on the analytical results concerning the factors influencing migrant children's school adaptability, this study proposes pathways for improving their school adaptability from the perspectives of educational policy design for migrant children, optimization of school sports resources in destination areas, and the development of physical education teachers.

1. Introduction

According to the results of the Seventh National Population Census, China's migrant population in 2020 had tripled compared with 2000, reaching 376 million[1]. In addition to adult migrants, this population also includes some adolescents and children who migrate with their parents, namely migrant children. With the increase in the urban migrant population, the urban education of migrant children has also become an important issue. This population also includes some adolescents[2]. Migrant children often face less favorable living and educational environments. Due to parents' working hours and work-related pressure, it is difficult for parents to ensure normal educational support for their children. At the same time, when these children first arrive in an unfamiliar environment, they also need to adapt to that environment[3]. Although the government has introduced policies related to education and the protection of migrant children[4], which have

helped address the issue of equal access to schooling, migrant children still face more serious school adaptation problems compared with non-migrant children[5]. Therefore, how to improve migrant children's school adaptability, address the absence of family education adaptability caused by insufficient parental capacity, and identify correct and effective means of support has important practical significance for individual physical and mental development as well as for sustainable social development.

An analysis of previous studies shows that although many scholars have conducted fruitful research from the perspectives of social support, peer relationships, and family support of migrant children, there are still clear research gaps. First, traditional studies have mostly examined adolescents' school adaptation from macro-level environmental perspectives, such as school and family, while paying insufficient attention to micro-level individual factors among migrant children. Second, when analyzing school adaptation, traditional studies have often treated middle school students as a homogeneous group. They have not fully considered differences between migrant and non-migrant children in terms of family environment and other factors, and have therefore overlooked differences in school adaptability across groups. Third, against the broader background of integration of sports and education, there remains a clear lack of research on the mechanism and pathway through which physical exercise influences the school adaptability of migrant children. Based on these considerations, this study uses follow-up survey data from the 2014 to 2015 academic year of the China Education Panel Survey (CEPS), and applies multiple linear regression models to examine the influence of physical exercise on school adaptability from the perspectives of migrant and non-migrant children, respectively. The aim is to investigate the relationship between physical exercise and school adaptability among migrant children, and to reveal the mechanism underlying this relationship.

2. Literature Review and Research Hypotheses

Migrant children's school adaptation refers to the extent to which their various behaviors in the school environment are balanced, harmonious, and compatible with that environment. Most studies hold that school adaptation includes students' learning adaptation, general adaptation, teacher-student relationships, peer relationships, and degree of self-acceptance[6]. Sports serve as the primary medium for social interaction among adolescents, play an important role in their socialization process. Studies have shown that participation in sports activities helps enhance school adaptation among school-age children[7]. Sports activities can also improve peer relationships and cultivate positive psychological qualities and firm beliefs[8]. The role of sports participation in helping adolescents integrate into society is therefore self-evident. To further explore the influence of physical exercise on migrant children's school adaptability, this section reviews the relevant literature on physical exercise, self-efficacy, and school adaptation, so as to provide a basis for the hypotheses of this study.

2.1 Physical Exercise and School Adaptation

As an indispensable part of school physical education, sports have positive effects on improving students' peer relationships, strengthening their self-confidence, and cultivating strong willpower. The frequency of adolescents' physical exercise can reflect their behavioral habits. The duration of physical exercise can reflect their pursuit of self-improvement and positive psychological traits. The intensity of physical exercise can reflect their autonomous motivation and engagement in learning new things[9-10]. At the same time, group sports can promote the level of peer acceptance among migrant children. Sports provide an ideal setting for peer acceptance, and interpersonal relationships among classmates can be improved in this setting[11]. In addition, engaging in physical exercise for

1.4 to 2 hours per day can also promote academic achievement and relieve students' academic pressure[12]. Physical exercise can provide adolescents with a platform for interpersonal interaction. On this platform, they can communicate emotionally, gain happiness together, build their own interpersonal networks, and improve their social adaptability[13].

Overall, participation in sports has a certain promoting effect on adolescents' development in terms of academic learning, physical health, and self-efficacy. Although extracurricular physical exercise cannot directly affect students' school adaptation, it can significantly influence adolescents' level of interpersonal communication and learning interest. It can improve their school adaptability through the separate or chain effects of interpersonal communication and learning interest[7]. Therefore, in this study of migrant children based on CEPS data, the variables of physical exercise are selected as: which interest classes have you participated in, physical education; how long do you engage in physical exercise, how many days per week; and how long do you engage in physical exercise, how much time per day. The following research hypotheses are proposed:

Hypothesis 1: Physical exercise has a significant positive effect on the school adaptability of migrant children.

Hypothesis 2: Physical exercise has a significant positive effect on the school effect of non-migrant children.

2.2 Physical Exercise and Self-Efficacy

Adolescents' own behavioral choices are the basis and foundation of their growth and development. As an external connection for communication and interaction among adolescents, sports often influence their socialization process through the mediating role of adolescents' self-efficacy. In recent years, Chinese researchers have also paid attention to the mediating mechanism between participation in physical exercise and adolescents' personal growth and adaptation to social life. In their study on the psychological integration of migrant children, Man Jianghong et al. (2020) found that sports participation can affect migrant children's psychological integration through the mediating role of self-efficacy[14]. In his study on the influence of sports on adolescents' well-being, Xiang Mingqiang (2013) found that basic psychological needs in sports had the strongest mediating effect[15]. In their study on the relationship between extracurricular physical exercise and academic achievement among adolescents, Yan Jun et al. (2021) found that extracurricular physical exercise can promote students' academic achievement through its effects on mediators such as interpersonal communication ability and physical education learning[7]. Zhou Wei et al. (2022) found that physical exercise can significantly affect adolescents' positive emotions and learning perseverance, thereby improving the quality of affection with parents and confidence in future life[16].

The above analysis shows that the influence of physical exercise on middle school students can improve their sense of self-efficacy and further promote their mental health[17], enabling them to adapt to changes in the external environment. Based on this, the following hypothesis are proposed:

Hypothesis 3: Physical exercise has a positive effect on the self-efficacy of migrant children.

Hypothesis 4: Physical exercise has a positive effect on the self-efficacy of non-migrant children.

2.3 Self-Efficacy and School Adaptation

The focus of this study concerning the mediating mechanism is the mediating effect of self-efficacy among migrant children. Self-efficacy is an important psychological variable proposed by the American psychologist Albert Bandura. It refers to an individual's ability to engage in a certain behavior in a specific situation and achieve the expected outcome. It plays an important endogenous role in the socialization and social role identification of migrant children, and it also

has a positive impact on their individual growth and future acquisition of social status. Studies have shown that self-efficacy not only has a significant effect on adolescents' overall development, but may also play a positive role in adolescents' construction of peer relationships[18], parent-child relationships[19], and social relationships[20]. Individuals with high self-efficacy are more willing to invest time in learning than those with low self-efficacy, and they are less likely to experience learning burnout[21]. Individuals with high self-efficacy also tend to have relatively stronger empathy, which may further trigger a series of prosocial behaviors. These behaviors can effectively promote adolescents' social integration[22]. An increase in self-efficacy can significantly expand adolescents' peer networks, while a decrease in self-efficacy can reduce them[23]. Adolescents with high self-efficacy are accepted by classmates to a significantly higher degree than adolescents with low self-efficacy[24].

In summary, a review of relevant studies on physical exercise, self-efficacy, adolescents' learning motivation, and peer relationships shows that adolescents who participate in physical exercise experience improved self-efficacy. Similarly, adolescents with high self-efficacy also tend to have strong learning motivation and good peer relationships. Therefore, based on the above reasoning, it can also be hypothesized that self-efficacy affects migrant children's school adaptability. Accordingly, the following hypotheses are proposed:

Hypothesis 5: Self-efficacy has a positive impact on the school adaptability of migrant children .

Hypothesis 6: Self-efficacy has a positive impact on the school adaptability of non-migrant children .

Hypothesis 7: Self-efficacy plays a mediating role between physical exercise and school adaptation among migrant children .

Hypothesis 8: Self-efficacy plays a mediating role between physical activity and school adaptability in non-migrant children.

Based on the above research and analysis of physical exercise and school adaptability among migrant children, this study constructs its hypothesized model. The hypothesized model affects the school adaptability of migrant and non-migrant children through two pathways.

3. Data Sources and Variable Descriptions

3.1 Data Sources and Basic Information

The research data are drawn from the 2014 to 2015 academic year follow-up data of the China Education Panel Survey, CEPS, designed and implemented by the National Survey Research Center at Renmin University of China. This tracking survey included a total of 10,279 seventh-grade students. Due to the needs of this study, variables that did not meet the research requirements and variables with missing values were excluded. As a result, a sample of 6,600 respondents meeting the requirements was obtained, with ages ranging from 12 to 17. In this study, adolescents who had followed their parents or other guardians to live and study outside the township of their household registration for more than six months were defined as migrant children. Based on this definition, 1,347 migrant children were selected from the CEPS database. To better conduct comparative research, 5,253 local adolescents were also selected as the control sample.

3.2 Variable Selection and Descriptive Statistics

1) The core independent variable is physical exercise. This study uses the frequency of physical exercise to measure migrant children's participation in physical exercise. In the CEPS 2014-2015 questionnaire, respondents were asked, "How much time do you spend on physical exercise, usually how many days per week?" The value of exercise frequency ranged from 0 to 7 days.

2) The dependent variable is school adaptability. This concept was first proposed in 1973 by the American scholar Cowen. The school adaptability model (AML) proposed by Cowen indicates that school adaptation refers to students' adaptation to changes in the learning environment and academic tasks[25]. Subsequently, Ladd 1989 further pointed out on this basis that school adaptation is the condition under which students participate happily in school activities and achieve academic success in the school environment[26]. Later, Chinese scholars (Yang Kuichen et al., 2020) pointed out that school adaptation mainly refers to students' adaptation to learning activities[3]. Drawing on Yang Kuichen's method for measuring migrant children's school adaptation, this study measures migrant children's school adaptation through ten items in the CEPS questionnaire under the question, "Do you agree with the following statements about school life?". Factor analysis was conducted on these 10 items, and a common factor was extracted to obtain the variable required for the study.

3) The mediating variable is self-efficacy. In the CEPS questionnaire, the items corresponding to self-efficacy are "Do you have confidence in your future?", "Looking back on the seventh grade, I was able to persist in my interests and hobbies", and "For tasks that need to be completed, I am usually very confident." Factor analysis was performed on these three items, and one common factor was extracted to represent self-efficacy.

The control variables include individual-level, family-level, and school-level variables. Individual-level variables include gender (1=male, 2=female), age (12-17), and self-rated health (1=very poor, 2=not so good, 3=average, 4=good, 5=very good). Family-level variables include family economic status (obtained from the CEPS questionnaire item "What do you think of your family's current economic situation?"), and parental educational expectations (6=junior college, 7=undergraduate, 8=graduate education). In addition, father's educational attainment and mother's educational attainment are also controlled (1-9=no education to graduate education and above). School-level variables include school ranking (the worst=1, lower-middle=2, middle=3, upper-middle=4, the best=5), school type (public=1, privately run with public support=2, ordinary private=3, private school for children of migrant workers=4), and school location (central urban area=1, peripheral urban area=2, urban-rural fringe area=3, town outside the county seat=4, rural area=5). (See Table 1)

Table 1 Statistical analysis of each variable description

Variable	Mean/Percentage	Standard Deviation	Minimum	Maximum
Individual-level variables				
Gender (male = 1, female = 2)	1.48	0.49	1	2
Age	13.52	0.68	12	17
Self-rated health (very poor = 1)	3.87	0.92	1	5
School adaptation (dependent variable)	-0.003	0.79	-3.01	1.49
Physical exercise (independent variable)	3.39	1.93	0	7
Self-efficacy (mediating variable)	-0.002	0.66	-2.51	1.04
Household registration type (agricultural household registration = 1)	1.66	0.78	1	4
Place of household registration (outside the county = 2, within the county = 1)	1.17	0.38	1	2
Family-level variables				

Family economic status (very wealthy = 5)	2.95	0.59	1	5
Father's education attainment (graduate education and above = 9)	4.29	2.01	1	9
Mother's educational attainment (graduate education or above = 9)	3.99	2.01	1	9
Parental educational expectations (graduate education and above = 9)	6.52	1.96	0	9
School-level variables				
School ranking (the worst = 1 , lower-middle = 2 , middle = 3 , upper-middle = 4 , the best = 5)	4.01	0.83	1	5
School type (public = 1, privately run with public support = 2, ordinary private = 3, private school for children of migrant workers = 4)	1.14	0.54	1	4
School location (central urban area = 1, peripheral urban area = 2, urban-rural fringe area = 3, town outside the county seat = 4, rural area = 5)	2.55	1.64	1	5

4. Data Analysis Results

4.1 Analysis of the Effect of Physical Exercise on School Adaptability among Migrant Children

Taking school adaptability as the dependent variable, physical exercise as the independent variable, self-efficacy as the mediating variable, and relevant variables at the individual, family, and school levels as control variables, a general linear regression model was constructed:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \sum_{k=6}^{12} \beta_k X_k + \varepsilon$$

In this model, Y represents the dependent variable, namely school adaptability; X1 represents the independent variable, namely physical exercise; X2 represents the mediating variable, namely self-efficacy; Xk (k=6~12) represents the control variables respectively; β_i is the parameter to be estimated; α is the constant term; and ε is the error term. To better analyze the effects of physical exercise and mediating variables on migrant children's school adaptation, this study constructed three models. The results of the regression analysis are shown in Table 2.

Table 2 Regression model estimates of the effects of physical exercise on school adaptation of migrant and local children

	School adaptability					
	Model 1		Model 2		Model 3	
	Migrant	Non-migrant	Migrant	Non-migrant	Migrant	Non-migrant
Age	-0.284 (0.456)	0.004 (0.219)	- 0.260 (0.452)	0.003 (0.218)	- 0.024 (0.436)	- 0.002 (0.209)

Gender	0.063 *** (0.046)	0.065 *** (0.021)	0.071 ** (0.045)	0.065 *** (0.021)	0.098 *** (0.044)	0.077 *** (0.020)
Family economic status	0.103 *** (0.045)	0.620 *** (0.018)	0.103 *** (0.044)	0.056 *** (0.018)	0.097 *** (0.042)	0.051 *** (0.017)
School ranking	- 0.026 * (0.025)	- 0.124 (0.015)	- 0.031 (0.025)	- 0.008 (0.015)	- 0.047 * (0.024)	- 0.127 (0.014)
School location	-0.033 (0.016)	0.013 (0.008)	- 0.028 (0.016)	0.017 (0.007)	- 0.024 (0.015)	0.013 (0.007)
School type	-0.061 (0.028)	- 0.017 (0.024)	- 0.057 ** (0.028)	- 0.28 ** (0.024)	- 0.045 (0.027)	- 0.027 ** (0.022)
Father's educational attainment	0.005 (0.016)	0.046 ** (0.007)	0.006 (0.016)	0.042 ** (0.007)	- 0.008 (0.015)	0.036 ** (0.007)
Mother's educational attainment	- 0.009 (0.017)	0.037 * (0.007)	- 0.018 (0.017)	0.027 (0.007)	- 0.022 (0.016)	0.014 (0.007)
Self-rated health	0.262 *** (0.024)	0.195 *** (0.011)	0.254 *** (0.024)	1.89 *** (0.011)	0.191 *** (0.024)	0.116 *** (0.011)
Parental educational expectations	0.113 *** (0.012)	0.096 *** (0.005)	0.103 *** (0.011)	0.089 *** (0.005)	0.078 *** (0.011)	0.048 *** (0.005)
Physical exercise			0.122 *** (0.011)	0.113 *** (0.005)	0.094 *** (0.011)	0.078 *** (0.005)
Self-efficacy					0.261 *** (0.034)	0.288 *** (0.016)
Constant term	- 0.406 *** (1.226)	- 1.525 *** (0.590)	- 0.638 (1.218)	- 1.575 *** (0.586)	- 0.331 (1.176)	- 0.907 (0.564)
N	1 168	5 432	1 168	5 432	1 168	5 432
R2	0.122	0.077	0.136	0.089	0.195	0.161
Adjusted R2	0.114	0.075	0.128	0.087	0.187	0.159

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; standard errors are reported in parentheses.

Model 1 is the baseline model, which estimates only the control variables. It can be found that there are relatively large differences in the impact of family economic status on school adaptability between migrant and non-migrant children. There is a significant negative correlation between school ranking and school adaptability among migrant children. In other words, the better the school ranking is, the more difficult it is for migrant children to adapt to that environment, or the greater the effort required in the process of adapting to the environment. The same problem also exists among non-migrant children. School location has a negative effect on school adaptability for migrant children. The farther the school is from the urban center, the lower the requirement for their adaptability. However, for non-migrant children, the farther the school is from the urban area, the higher the requirement for their school adaptability. School type is negatively correlated with school adaptability among both migrant and non-migrant children. The difficulty of adapting to public schools is lower than that of adapting to private schools. Fathers' educational attainment has a positive impact on the improvement of migrant children's school adaptability, while mothers' educational attainment has a negative correlation with the improvement of migrant children's school

adaptability, but neither effect is significant. By contrast, parents' educational attainment can significantly and positively improve the school adaptability of non-migrant children. Parental educational expectations have a significant positive impact on the improvement of school adaptability among both migrant and non-migrant children. This means that a certain degree of encouragement from parents can improve children's school adaptability. Self-reported health has a significant positive impact on the improvement of school adaptability among both migrant and non-migrant children. Having a healthy body is the foundation for adapting to a new school environment. Regarding the results of Model 1, one point should be noted. The study finds that private schools and private schools for children of migrant workers have a negative effect on improving migrant children's school adaptability. This may not be consistent with expectations. In other words, private schools for children of migrant workers may not be suitable for them. In the future, it is necessary to increase the proportion of migrant children entering public schools and lower the threshold for migrant children's school enrollment.

Model 2 adds the variable of physical exercise on the basis of Model 1. After controlling for the influence of other factors, physical exercise can significantly improve the school adaptability of both migrant and non-migrant children. The school adaptability of non-migrant children who participate in physical exercise is 0.011 units higher than that of migrant children who participate in physical exercise. There are also differences in school adaptability between students who participate in physical exercise and those who do not. The improvement in school adaptability among migrant children who participate in physical exercise is 0.122 units higher than that among migrant children who do not participate in physical exercise. Similarly, the improvement in school adaptability among non-migrant children who participate in physical exercise is 0.113 units higher than that among non-migrant children who do not participate in physical exercise, and both are significant at the 0.01 level. This verifies Hypothesis H1 and Hypothesis H2 .

Model 3 adds self-efficacy to Model 2, a variable that reflects adolescents' subjective judgment of their ability to perform a certain behavior. The results of Model 3 also demonstrate that good self-efficacy is very important for improving the school adaptability of both migrant and non-migrant children. The higher the level of self-efficacy is, the higher the students' school adaptability will be. Specifically, after controlling for other factors, a one-unit increase in self-efficacy is associated with a 0.261-unit increase in migrant children's school adaptability. Similarly, non-migrant children's school adaptability increases by 0.288 units, and both effects are significant at the 0.01 level. This also verifies Hypothesis H5 and Hypothesis H6. Therefore, improving migrant children's adaptability to school requires not only improving the school environment, but also addressing migrant children's subjective consciousness. Their school adaptability can be improved by strengthening their behavioral motivation.

4.2 Analysis of the Mediating Effect of Self-Efficacy among Non-Migrant Children

To ensure the reliability of the above research conclusions, this study tested the robustness of the mediating effect of self-efficacy among non-migrant children. Specifically, the Sobel test and the Bootstrap test were conducted respectively. According to the Sobel test results shown in Table 3, physical exercise not only directly affects the school adaptability of non-migrant children, but also indirectly affects school adaptability through self-efficacy. The coefficient of the indirect effect is $0.056 \times 0.400 = 0.022$, and it is significant at the 1% level. According to the Bootstrap test results, the mediating effect accounts for 36.8% of the total effect. Although the results of the Sobel test and the Bootstrap test differ in the numerical values of the indirect effect, direct effect, and total effect, the overall conclusions are consistent. In other words, participation in physical exercise among non-migrant children can improve their sense of self-efficacy, thereby improving their school

adaptability. Self-efficacy plays a partial mediating role in this process.

Table 3 Self-efficacy mediation robustness test for non-migrant children

Sobel test		Bootstrap test			
Physical exercise → School adaptability (total effect α_1)	0.060 *** (0.00)	Indirect effects ($\beta_1 \times \omega_1$)	0.022 *** (0.00)	lower limit of confidence interval	0.3703444
Physical exercise → Self-efficacy (Step 1 β_1)	0.056 *** (0.00)			Upper limit of confidence interval	0.4305928
Self-efficacy → School adaptability (Step 2 ω_1)	0.400 *** (0.00)	Direct effects (ω_2)	0.038 (3.5e - 13)	lower limit of confidence interval	0.0280381
Physical exercise → School adaptability (direct effect ω_2)	0.038 *** (0.00)			Upper limit of confidence interval	0.048727
Z-test of mediating effect ($P > Z $)	1 1.03 *** (0.00)	1 2.17 *** (0.00)			
Proportion of mediating effect in total effect	37.3	36.8			

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; P values are reported in parentheses.

4.3 Mediating Effect of Self-Efficacy among Migrant Children

In this study, the robustness of the mediating effect of self-efficacy among migrant children was tested using the Sobel test and the Bootstrap test respectively. According to the Sobel test results shown in Table 4, physical exercise not only directly affects migrant children's school adaptation, but also indirectly affects school adaptation through self-efficacy. The coefficient of the indirect effect is $0.056 \times 0.382 = 0.021$, and it is significant at the 1% level. coefficient of the indirect effect is $0.056 \times 0.382 = 0.021$, and it is participation in physical exercise among migrant children can improve their sense of self-efficacy, thereby improving their school adaptability. Self-efficacy plays a partial mediating role in this process.

Table 4 Self-efficacy mediation robustness test for migrant children

Sobel test		Bootstrap test			
Physical exercise → School adaptability (total effect α_1)	0.066 *** (0.00)	Indirect effects ($\beta_1 \times \omega_1$)	0.021 (6.0e -07)	lower limit of confidence interval	0.3171522
Physical exercise → Self-efficacy (Step 1 β_1)	0.056 *** (0.00)			Upper limit of confidence interval	0.4482313
Self-efficacy → School adaptability (Step 2 ω_1)	0.382 *** (0.00)	Direct effects (ω_2)	0.044 *** (0.00)	lower limit of confidence interval	0.0217226
Physical exercise → School adaptability (direct effect ω_2)	0.044 *** (0.00)			Upper limit of confidence interval	0.0676321
Z-test of mediating effect ($P > Z $)	4.99 (5.994e-07)	5.54 (2.9e-08)			
Proportion of mediating effect in total effect	32.41	32.47			

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; P values are reported in parentheses.

5. Conclusions and Recommendations

Using data from the China Education Panel Survey for the 2014 to 2015 academic year, and based on multiple linear regression models, Sobel tests, and Bootstrap tests, this study analyzed the effects of participation in physical exercise on school adaptability of migrant and non-migrant children, as well as the internal mechanism involved. The following findings were obtained.

First, from the school level, migrant children's school adaptation is affected by factors such as school ranking, school type, and school location. Contrary to common understanding, schools with better rankings place higher demands on migrant children's school adaptability. In particular, schools with higher rankings have a significant negative effect on the improvement of migrant children's school adaptability. From the family level, consistent with most existing research, family economic status and parental educational expectations have a positive effect on improving the school adaptability of both migrant and non-migrant children. Parents' educational attainment has a significant positive effect on improving the school adaptability of non-migrant children. A healthy body can also promote the improvement of students' school adaptability. Second, after controlling for individual, family, and school-level factors, frequent participation in physical exercise can significantly improve the school adaptability of both migrant and non-migrant children. Third, when other factors remain unchanged, after the variable of self-efficacy is added, self-efficacy is found to play a partial mediating role between physical exercise and school adaptation, and can promote the improvement of migrant children's school adaptability. Based on the above research conclusions and the current situation of social policies, this study proposes the following suggestions.

First, in the design of school education policies for migrant children, greater attention should be paid to issues related to fairness in migrant children's school enrollment. How to ensure that migrant children can enroll in school smoothly is an issue that should receive focused attention in policy formulation and school teaching practice. The fairness of migrant children's enrollment is the primary practical issue that schools need to face, and it is also a research topic that should receive great attention from educators and policymakers. At present, attention should be paid not only to the high temporary schooling fees faced by migrant children in school enrollment[27], the difficulty of school application, and the complexity of required supporting documents[28], but also to the hidden barriers in the implementation of educational policies for migrant children. These barriers arise because governments in destination areas seek to protect the educational interests of local residents[29], while various interest relations and competing interests become intertwined[30]. The state should clarify the responsibilities of governments at all levels, establish an effective policy mechanism for migrant children's school enrollment in destination areas, improve the pathways through which public schools admit migrant children, regulate the mode of operation of schools for children of migrant workers, increase support for such schools, strengthen policies and school intervention measures concerning educational fairness for migrant children, reduce migrant children's school enrollment pressure, and lower the demands placed on their school adaptability. In this way, the negative effects brought about by family conditions and migration can be reduced.

Second, the role of physical exercise in improving migrant children's school adaptability should be fully utilized. In policies related to improving school adaptability, more attention should be paid to improving students' school adaptability through physical exercise. Given the current problem that migrant children generally participate in physical exercise at a relatively low level in school physical education[31], as well as problems such as school management methods, school sports resources, and the content of school physical education courses being unable to meet students' needs[32], schools should gradually optimize school sports resources. Starting from migrant children's needs for physical exercise, schools should improve school sports facilities and equipment, improve the school ecological environment for migrant children to participate in

physical exercise, and mobilize social forces to help schools for children of migrant workers establish complete sports facilities. These efforts can ensure that migrant children are able to use safe and qualified sports equipment at school. This study also found that physical exercise can further improve migrant children's school adaptability by improving their self-efficacy. Improving migrant children's self-efficacy helps promote the development of their psychological resilience[33], and also improves their degree of peer acceptance[20]. Therefore, schools and teachers should promote the construction of ideological and political education in physical education courses on the basis of improving students' confidence and beliefs. By sorting out the internal materials related to willpower and other qualities highlighted in different sports events[34], physical education courses can help migrant children establish healthy sports values. Migrant children can experience success and failure through sports, cultivate a positive psychological state and good health, face failures in learning and life with a positive attitude, and promote the development of their personality.

Finally, in addition to optimizing school sports resources, schools should further deepen the development of physical education teachers. Professional training should be provided for physical education teachers, so that they can understand migrant children's psychological characteristics and physical exercise needs in a targeted manner and design school physical education teaching content accordingly. Cultivating migrant children's interest in physical exercise should be taken as an important breakthrough point. The educational methods of physical education teachers should be improved, and the practical space of physical education classes should be expanded. The traditional form of physical education classes, which are dull and limited to practice without competition, should be changed. The idea of teaching students well, encouraging frequent practice, and organizing regular competitions should be integrated into teaching design. Migrant children should be provided with platforms for learning, practice, and skill display, and they should be encouraged to actively participate in sports competitions. Their sense of self-efficacy can then be improved through physical education classes and sports competitions.

The awareness of ideological and political education among physical education teachers should also be deepened. Teachers should explore ideological and political education materials within sports events and imperceptibly transmit correct views of life, values, and the world to students during physical education teaching. Schools should establish goals for sports development, improve the quality of physical education courses, enrich the content of extracurricular sports activities, create a good atmosphere for sports learning, coordinate the allocation of school sports resources, and give full play to the educational function of school physical education. In the process of teaching physical education classes, teachers should also teach knowledge related to sports and health, help migrant children develop a correct understanding of sports, understand the importance of sports, increase their time spent on physical exercise, cultivate lifelong habits of physical exercise, and promote the improvement of migrant children's school adaptability.

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