

Intervention effect of physical exercise on social anxiety of left-behind children

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Abstract

The purpose of this study is to determine the intervention effect of physical exercise on left-behind children's social anxiety. 600 kids from grades 3 to 9 who were left at home by their parents were surveyed by questionnaire at six rural primary and secondary schools in Liaoning province. There were 590 valid questionnaires gathered, with an effective rate of 98.3 per cent. The ages of the participants ranged from 9 to 15, with an average of (11.58 1.83) years. The study was conducted anonymously in a classroom setting. Physical activity scale scores were negatively correlated with social anxiety ($P < 0.01$), while psychological capital was positively correlated with physical activity ($P < 0.01$). Social anxiety was negatively correlated with psychological capital ($P < 0.01$). Regression analysis revealed that psychological capital mediated the relationship between physical activity and social anxiety in rural left-behind children, with a mediating effect value of -0.049. (-0.254). The findings indicate that awareness of social support has a substantial regulatory influence on the connection between physical activity and social anxiety ($P < 0.05$). On the one hand, physical exercise can directly reduce social anxiety in left-behind youngsters; on the other hand, it can indirectly reduce social anxiety by developing their psychological capital.

Key words: Physical exercise; Social anxiety; Left behind children

Introduction

Social anxiety is a prevalent psychiatric condition among adolescents, characterised by persistent worry and apprehension about specific or many social interactions or expressive events. Social anxiety has a significant negative impact on an individual's physical and mental wellbeing. Among the numerous aspects affecting an individual's mental health, the beneficial effect of physical activity has garnered increasing attention and acknowledgement. The researchers noted that participating in sports activities can help individuals acquire good psychological characteristics such as self-efficacy, self-confidence, and mental toughness, contributing to overall mental health improvement. Loneliness is one of the primary negative emotions experienced by abandoned children. Loneliness is a subjective emotional experience characterised by feelings of isolation, loneliness, loss, alienation, and unhappiness based on children's self-perceptions of their social and friendship status within peer groups. It is an adverse emotional reaction. This bad emotional experience will cause youngsters to endure severe agony, particularly during their childhood years of loneliness. It is linked to social anxiety and desertion, leaving youngsters with no sense of social belonging (Chi et al., 2021; Modini & Abbott, 2017; Zhang et al., 2021).

As illustrated in Figure 1, social anxiety can cause people to avoid social situations, resulting in loneliness and negatively impacting their mental health. Social anxiety is

revealed to have a substantial positive association with and predictive effect on primary school pupils' loneliness. This shows that it is critical to understand the elements that contribute to social anxiety to alleviate individual social stress and loneliness. Among the numerous aspects determining social anxiety, self-esteem is a critical one. It refers to individuals' good self-esteem and perception of self-worth due to socialisation, which has a protective role in their mental health. Previous research has established a large negative association between self-esteem and social anxiety and a significant negative predictive influence on social anxiety, implying that persons with high self-esteem experience less social anxiety. It can be concluded that increasing an individual's self-esteem helps them cope with social anxiety. Additionally, it is worth emphasising that self-esteem and loneliness have a considerable negative link. Self-esteem has a substantial negative predictive effect on loneliness, implying that the greater one's self-esteem, the less individual loneliness there is (Bhugra & Bhugra, 2021; Comer et al., 2021; Wu et al., 2021). This demonstrates that self-esteem on loneliness among rural left-behind students in grades 4-6 is mostly determined by social anxiety. Children who are left behind with high levels of social anxiety exhibit increased social avoidance and fear of unfavourable appraisal, which results in a lack of self-confidence and diminished self-esteem, aggravating their inner loneliness experience (Kalvin et al., 2021; Khan et al., 2021; Rasti-Emad-Abadi et al., 2017). This inspires us to begin alleviating left-behind children's loneliness by

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enhancing their social ability, exercising and cultivating their social skills, effectively alleviating their social anxiety, allowing them to seek self-confidence in social communication, promoting self-esteem development, and mitigating the negative impact of loneliness. The development of social skills enables left-behind children to develop more peer friendships. Thus, they maintain a high level of self-esteem and balance the loneliness experienced due to their separation from their parents, which is critical for improving and maintaining the mental health of left behind children.

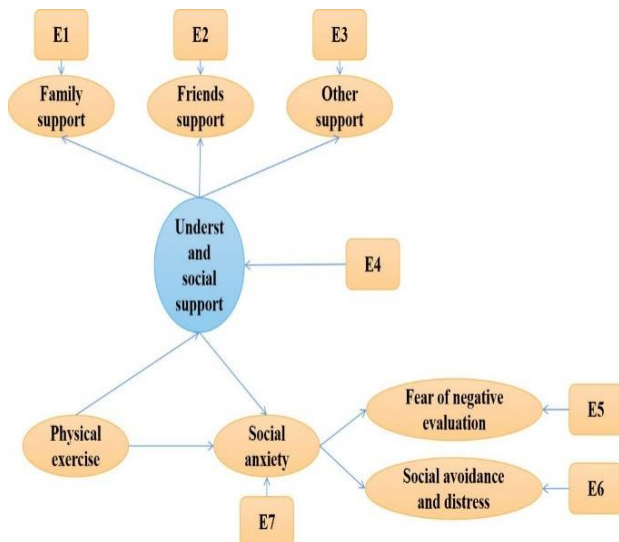


Figure. 1 Intermediary model of left-behind children's sense of social support

Literature review

Psychological capital refers to an individual's positive psychological state, which provides sufficient psychological resources to cope with a negative external environment and is a critical factor in navigating a crisis and maintaining mental health successfully. Enhancing one's psychological capital has always been a major scholarly focus. Additionally, the relationship between sports and psychological capital has been examined and established. According to the research, sports activities have a considerable favourable influence on the psychological capital of middle school pupils and left-behind children. On the other hand, relevant research have discovered a negative association between psychological capital and social anxiety, but this relationship requires further investigation in rural left-behind youth.

Among the numerous variables affecting an individual's mental health, the beneficial effect of physical exercise has gained increasing attention and recognition. The researchers emphasise that individuals can build good psychological characteristics such as self-efficacy, self-confidence, and psychological toughness through physical

activity, critical for enhancing mental health. Although there is a shortage of research on the effect of physical exercise on the social anxiety of left-behind youngsters, several studies conducted at home and abroad using teenagers as subjects demonstrate that physical activity can alleviate social stress to a degree. Baseball, softball, and sand table sports all successfully lower social anxiety, according to the waters l study (Webster & Showers, 2011). Modini M and colleagues also confirmed that group sports can help children overcome social anxiety (Charmaraman et al., 2021; Kaloeti et al., 2021; Modini & Abbott, 2017). According to Hajiabolhasani Nargani Z, the more intense the sport, the lower the prevalence of social anxiety (Hajiabolhasani-Nargani et al., 2016). This article presents a strategy for examining the effect of physical exercise on the social anxiety of rural left-behind children and the intermediary role of psychological capital based on existing research (Figure 1 and Figure 2). The physical activity scale (Table 1), the perceived social support scale (Tables 2 and 3), and the children's social anxiety scale (Table 4) were all used in a questionnaire survey of 600 kids in grades 3 to 9 at six rural primary and secondary schools in a province. 590 valid surveys were collected at a rate of 98.3 percent effectiveness. The ages of the participants ranged from 9 to 15, with an average of (11.58 1.83) years. The study was conducted anonymously in a classroom setting.

Subjects and methods

Subjects

From October to November 2020, 600 students from grades 3 to 9 in 6 rural primary and secondary schools left-behind at home by their parents in Liaoning province were selected for the questionnaire survey. 590 valid questionnaires were collected, and the effective rate was 98.3%. The age ranged from 9 to 15 years, with an average of (11.58 ± 1.83) years.

Experimental method

Physical exercise rating scale

Physical Activity RatingScale-3 (PARS-3) was used to measure the Physical exercise of left-behind children in rural areas. The scale consists of 3 questions, which examine the intensity, time and frequency of exercise. The 5-level scoring method is used for evaluation. 1-5 points are scored for exercise intensity and frequency, respectively, and 0-4 points are scored for exercise time on the 1-5 scale. Exercise intensity, exercise time and exercise frequency are multiplied to get the amount of exercise. The amount of exercise is between 0 and 100 points. Minor exercise: 0-19 points; Moderate exercise: 20-42 points; Heavy exercise: 43-100 points.

Perceived social support scale (PSSs)

PSSs was used to evaluate the social support of rural left-behind children. The scale includes 12 questions in three dimensions: friend support, family support and other support. The likert grade 7 scoring method (1 ~ 7 points) was adopted, with a total score of 12 ~ 84. The higher the score, the more social support. The scale was optimised, and the "colleagues, relatives and leaders" in the question was changed to "classmates, relatives and teachers" so that the scale was suitable for measuring students.

The α coefficient is 0.877, and the α coefficients of the three dimensions are 0.820, 0.742 and 0.798, respectively.

Social anxiety scale for children (SASC)

SASC was used to evaluate the social anxiety of left-behind children. The scale includes two dimensions: fear of negative evaluation, social avoidance and distress, with a total of 10 questions. A 3-level scoring system is adopted, 0-never, 1-sometimes, 2-always. The lowest total score is 0 (the lowest possibility of anxiety), and the highest is 20 (the highest possibility of anxiety). The α coefficient of the scale is 0.807, and the α coefficients of the two dimensions are 0.770 and 0.689 respectively.

Table 1

Correlation between physical exercise, social anxiety and psychological capital

	1	2	3	4	5	6	7
Exercise intensity							
Exercise time	0.206						
Motion frequency	0.051	0.165					
Physical exercise score	0.564	0.824	0.348				
Fear of negative evaluation	-0.087	-0.241	-0.078	-0.242			
Social avoidance and distress	-0.035	-0.178	-0.104	-0.192	0.497		
Social anxiety	-0.089	0.291	-0.068	-0.254	0.900	0.834	
Psychological capital	0.147	0.367	0.078	0.321	-0.196	-0.178	-0.217

The intermediary role of psychological capital

The first step is to take physical exercise as an independent variable and social anxiety as a dependent variable. The second step is to take physical exercise as an independent variable and psychological capital as a dependent variable. The third step takes physical exercise and psychological capital as independent variables and social anxiety as dependent variables. The results of mediation effect test show that the results of the three steps are statistically significant ($P < 0.05$). Therefore, it can be seen that

Questionnaire on psychological capital of rural left-behind children

A total of 5 dimensions were scored using Likert 5-scale scale, ranging from "completely disagree =5" to "completely agree =1". The higher the score, the higher the level of psychological capital.

Statistical analysis

The study uses SPSS 26.0 and AMOS 25.0 for analysis. Quantitative data are expressed in $X \pm s$. Pearson was used to analyse the correlation of variables, multiple linear regression method and structural equation model were used to test the intermediary effect of variables, and hierarchical regression method was used to analyse the regulatory effect. $P < 0.05$ was statistically significant (Danacı et al., 2015; MİRAY et al., 2015).

Results

Correlation analysis

Physical exercise is negatively correlated with social anxiety ($r=-0.206$, $P<0.01$). It is positively correlated with psychological capital ($r=0.348$, $P<0.01$); Social anxiety is negatively correlated with psychological capital ($r=-0.348$, $P<0.01$).

psychological capital plays a partial mediating role between physical exercise and social anxiety of left-behind children. See Table 2.

Bootstrap method was used to test the significance of the intermediary effect. The results showed that the total effect of physical exercise on social anxiety of left-behind children was -0.329, of which the direct effect was -0.279, accounting for 80.71% of the total effect, and the indirect effect through psychological capital was -0.071, accounting for 19.29% of the total effect. See Table 3.

Table 2

Analysis of the intermediary role of psychological capital in the relationship between physical exercise and social anxiety

Dependent variable	Independent variable	Non sstandardised		sStandardisation coefficient	t	P
		coefficient				
		B	Standard error			
Social anxiety	Physical exercise	-0.076	0.011	-0.284	-8.402	<0.001
Psychological capital	Physical exercise	0.030	0.002	0.377	8.579	<0.001
Social anxiety	Physical exercise	-0.068	0.004	-0.315	-4.691	<0.001
	Psychological capital	-2.001	0.296	-0.251	-5.212	<0.001

Table 3

Intermediary effect of psychological capital

Effect	Effect value	95% confidence interval		P value
		Lower limit	Upper limit	
Direct effect	-0.279	-0.120	-0.284	0.010
Indirect effect	-0.071	-0.055	-0.029	0.010
Total effect	-0.329	-0.311	-0.371	0.010

In order to further test the mediating role of perceived social support, regression analysis was carried out with social anxiety as the dependent variable and physical exercise and perceived social support as the independent variables. The results show that physical exercise can affect social anxiety

through three intermediary paths: friend support, family support, family support, and other support. In summary, in the process of physical exercise affecting social anxiety, understanding social support factors has some mediating effects (Marofi m, 2018). See Table 4.

Table 4

Regression analysis of variables in the mediating model of children's sense of social support

Dependent variable	Independent variable	Non sstandardised coefficient		sStandardisation coefficient	T value	P
		B	Standard deviation			
Social anxiety	Constant	31.22	0.605		40.351	<0.01
	Physical exercise	-1.162	0.331	-0.234	3.879	<0.01
	Support from friends	-0.118	0.044	-0.287	4.568	<0.01
Social anxiety	Constant	20.779	0.511		37.003	<0.01
	Physical exercise	-1.590	0.247	-0.324	6.078	<0.01
	Family support	-0.133	0.029	-0.341	4.596	<0.05
Social anxiety	Constant	21.209	0.511		39.476	<0.01
	Physical exercise	-1.089	0.251	-0.174	4.398	<0.01
	Other support	-0.110	0.024	-0.149	4.282	<0.01

The test results of each path are shown in Figure 2. The model fitting index is $\chi^2 / DF = 0.2942$, lower than the minimum allowable value of 3, indicating that the analysis result is acceptable. Root mean square approximation error < 0.001, is lower than the minimum allowable value of 0.08. The comparison fitting index = 1, incremental fitting index = 1, goodness of fit index = 0.997, and the adjusted goodness of fit index = 0.992, all of which are > 0.9, indicating that the model fits well with the data. According to the principle of regulatory effect analysis, it is assumed that understanding social support is a

regulatory variable, physical exercise is an independent variable, and social anxiety is a dependent variable. Firstly, the independent variables and regulatory variables are decentralised. Then, construct the product of scentralised independent variables and regulatory variables (physical exercise scentralisation \times perceived social support centralisation). Finally, hierarchical regression analysis is carried out. The results show that understanding social support has a significant regulatory effect on the relationship between physical exercise and social anxiety ($P < 0.05$).

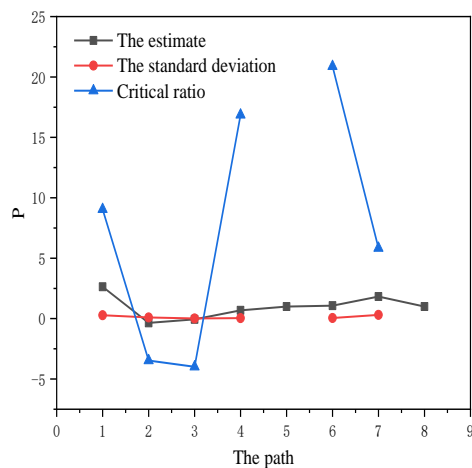


Figure .2 Test of mediating effect of children's sense of social support

Discussion

The results of this study indicate that physical activity is highly associated with social anxiety. If the participation of left-behind children in physical activity is greater, the level of social anxiety will be lower, which is consistent with the research findings. Exercise frequency, duration, and intensity were all favourably associated with teenagers' mental health, but were negatively associated with depression and anxiety. Physical activity may lessen social anxiety by increasing individual self-efficacy. Regarding the relationship between physical exercise and self-efficacy, relevant research indicates that, on the one hand, self-efficacy is a significant factor influencing individual participation in physical exercise.

On the other hand, physical exercise can increase physiological arousal, a component that significantly affects individual self-efficacy. If the individual's self-efficacy is high, their capacity to manage interpersonal connections will be greater. If the positive self-evaluation is better, the social anxiety will be lower (Manne et al., 2016). This survey indicates a significant positive link between physical exercise and family and friend support, implying that the more physical exercise a child receives, the more left behind youngsters comprehend social support. According to research, social support from family, parents, and friends significantly impacts teenagers' physical activity involvement.

On the contrary, active participation in physical activity might contribute to an individual's sense of social support to a certain level. A significant factor is that many physical fitness programmes allow teenagers to communicate with their peers, which helps them gain the support of their peers. The findings of this study indicate that perceived

social support mediates and regulates the link between physical activity and social anxiety in rural left-behind children. First, for youngsters who have a strong sense of social support, for example demonstration and positive encouragement from friends can help raise their drive to participate in physical activity and the regularity with which they exercise. Second, social support from family and friends helps build positive psychological capital in left-behind children, ensuring that they have sufficient psychological resources and self-efficacy to participate in group physical activity and receive positive feedback and have a positive impact. Finally, left-behind children with a strong feeling of social support have greater psychological resources to deal with interpersonal connections and a more positive attitude toward unfavourable appraisal, which helps them cope with social anxiety (Hasanpour-Dehkordi et al., 2016).

On the contrary, left-behind youngsters with low social support are more prone to social anxiety when confronted with unknown social contact and unfavourable appraisal. They lack sufficient psychological resources and positive cognitive self-evaluation. In summary, the survey results demonstrate the effect of physical exercise on rural left-behind children's social anxiety and its mechanism. It analyses the multiple effects of social support on social anxiety, and further establishes that physical exercise effectively alleviates social anxiety in rural left-behind children.

Additionally, this study discovered a substantial positive link between physical exercise and psychological capital, showing that physical exercise benefits teenagers' psychological capital development. This study demonstrates that group physical exercise intervention can considerably improve children's positive psychological quality and lessen children's emotional behaviour problems. The following factors may contribute to physical exercise's beneficial effect on children's positive psychological capital. To begin, physical activity can help children develop their sense of strength, patience, and muscle flexibility and reduce their risk of obesity and other problems while also increasing their self-confidence, optimism, and other positive psychological characteristics and decreasing their anxiety. Second, physical exercise helps youngsters develop their ability to regulate their emotions, and the good influence on positive emotions has been demonstrated to be sustainable. Persons' emotional responses to diverse events in everyday life are critical for building good psychological capital and maintaining mental health. Physical exercise is extremely useful for individuals actively dealing with stressful life situations (Ramasamy et al., 2018). Thus, physical exercise can help

children develop positive self-awareness, pleasant emotions, and increased response efficiency to stressful circumstances, all of which contribute to children's positive psychological capital.

Additionally, the data indicate a substantial negative link between psychological capital and social anxiety, indicating that the more positive psychological capital left-behind children have, the less social anxiety they have. This finding is consistent with prior research showing that positive psychological capital is a critical protective factor in preventing adolescents from developing emotional and behavioural issues. Children's psychological health is critical in reducing their vulnerability to harmful social processes, and psychological capital is a critical positive psychological attribute. Additionally, social networks aid in the improvement of adolescents' mental health. Psychological capital is defined in this study as the social network within which abandoned children can acquire positive psychological support. Specifically, psychological capital's self-efficacy assists left-behind youngsters in reducing their vulnerability to external negative judgement and boosting their self-confidence. Psychological capital resilience can aid left-behind youngsters in recovering from setbacks in the face of social anxiety, thereby enhancing their psychological recovery capacity. Psychological capital also reduces left-behind children's dread and worry about future social engagement and establishes a sense of hope for future social interaction. Psychological capital optimism is a significant personality component influencing social anxiety.

Additionally, the findings indicate that physical activity can have an indirect influence on the social anxiety of left-behind children via the intermediary effect of psychological capital. Both personal psychological characteristics and the external environment can influence their social anxiety, but external environmental factors can also exert an influence via personal psychological characteristics. Physical exercise can strengthen left-behind children's peer relationships, assist them in obtaining additional psychological support, alter their negative self-concept, and increase their feeling of self-efficacy, all of which can help minimise social anxiety. According to research, persons who engage in vigorous physical activity have a lower level of social anxiety. This finding reaffirms the buffering impact of physical exercise on social anxiety reduction. Additionally, physical activity contributes significantly to developing an individual's positive psychological capital. Individuals' psychological capital is a critical resource for coping with life stressors, particularly negative feedback in social interactions (Radley et al., 2017).

Conclusion

Through the mediating effect of psychological capital, sports activities can also indirectly influence the social anxiety of left-behind youngsters. While both personal psychological characteristics and the external environment can influence social anxiety, external environmental elements can also be mediated by personal psychological characteristics. Sports activities can assist foster peer relationships for left-behind children, increase psychological support for left-behind children, alter negative self-cognition in left-behind children, increase self-efficacy, and aid minimise social anxiety. If the physical training is more intense, the level of social anxiety will be lower, confirming the buffering effect of physical activity on social anxiety reduction. Additionally, physical activity contributes significantly to developing an individual's positive psychological capital. Psychological capital is a critical coping resource for individuals when confronted with difficult life events, particularly negative feedback during the social engagement. As a result, schools should implement appropriate policies and procedures to assist left-behind children in avoiding discrimination and cultivating a warm, open, and accepting campus environment for all faculty and students. On the other side, we should prioritise mental health education in schools, with expert mental health teachers' assistance, to address children's concerns. Psychological timely supervision, guidance, and cultivation of left-behind children establish positive psychological qualities, a faultless and mature mental health education system, and better serve students' physical and mental health development.

Implementation

Theoretical Implementation

This study adds to the body of knowledge by addressing the theoretical gap that physical exercise can alleviate social anxiety in children left-behind. It is critical to note that while prior research has emphasised the function of physical exercise in enhancing mental comfort and social anxiety, no study has specifically examined the impact of physical exercise on social anxiety in left-behind children. Thus, the study develops a relationship between physical exercise and left-behind children, including fear of unfavourable assessment, social avoidance, and distress, to give thorough theoretical literature on the role of social disparity in left-behind children. Additionally, this study examines the topic of left-behind children and identifies the elements that contribute to their social anxiety and the strategies that can be used to alleviate it.

Practical Implementation

This study also contributes to the practical gap by highlighting the importance of providing equal opportunity for children who have difficulty reducing their social anxiety to grasp the association between physical activity and social anxiety reduction. Physical exercise is critical for all children's mental comfort and health, but especially for the left-behind children, as it helps to build their stamina and integrate them into practical activity, as well as provides them with a proper sense of their relationship within society. When left-behind children integrate into society and their interactions with other people develop, they become active in physical exercise and other sporting activities to maintain contact with society. Additionally, their relationship with society and participation in social activities and physical sports enable them to broaden their experience and comprehend the variables contributing to their social anxiety. Similarly, physical exercise strengthens the mind of left-behind children, allowing it to be transferred into a creative way, allowing them to be fearless in the face of any problem. At

the same time, their willing power is strengthened, allowing them to rely on their own decisions to be proactive members of society.

Future Directions

Future researchers should go for the role of sports, and the development of mental health to reduce social anxiety because mental health is directly influencing the growth of the mind. When children's mental health grows, they become an active part of society. Therefore, the focus of future research should be to address the social anxiety of left-behind children from the perspective of support and their mental health.

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