

A Study on the Impact of Different Sports Programs on the Self-esteem and Social Skills of Children with Intellectual Disabilities

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Abstract: The study aimed to explore the effects of different sports on the self-esteem and social skills of children with intellectual disabilities and to analyze the way they work. In a special school in Jiangsu Province, researchers randomly selected 32 children with mild intellectual disabilities and assigned them equally to a basketball group, an aerobics group, an athletics group and a control group. The three intervention groups underwent a 12-week sports and games intervention, while the control group maintained its original teaching schedule. The study used the Rosenberg Self-Esteem Scale and the Social Skills Rating Scale for Children with Intellectual Disabilities, which was modified and validated by experts, to collect data before and after the intervention, and compared the four groups by mixed-factor ANOVA. The results showed that there were significant differences in the group main effect, the number of measurements main effect, and the interaction effect of group and time with respect to self-esteem and social skills. Simple effects showed that before the intervention, there were significant differences between the control group and the three intervention groups, whereas after the intervention, there were no significant differences between the control group and the athletics group in terms of self-esteem and social skills, but there were significant differences between the control group and the other two groups. Overall, physical education had a positive impact on self-esteem and social skills of children with intellectual disabilities, with the degree of

impact varying from sport to sport.

Keywords: Sports Programs, Intellectual Disabilities, Self-esteem, Social Skills

1. Introduction

Mental retardation is a common neurodevelopmental disorder in the field of child development that manifests itself in significantly lower levels of intelligence than peers and is accompanied by deficits in adaptive skills. [1] Children with intellectual disabilities have weaker cognitive and learning abilities and often experience difficulties in the areas of academics, socialization, and self-development. This predicament can lead to damage to their self-esteem and impeded development of social skills. [2] Therefore, it is important to provide appropriate rehabilitation and educational programs for these children. Over the past few decades, researchers and educators have proposed a wide variety of rehabilitation and educational strategies to help children with intellectual disabilities overcome their difficulties and promote holistic development. Among these, physical education programs, a widely accepted and implemented intervention, are believed to have a positive impact on children with intellectual disabilities. Physical activity can provide a positive and fun environment that enables children to engage in different types of physical movement and develop their coordination, flexibility, strength and endurance. [3] In addition, physical education programs provide opportunities to interact and cooperate with others, thereby promoting the development of social skills.

However, despite the fact that information about the positive effects of physical education programs on children with intellectual disabilities has been widely recognized, current research still has some limitations in this area. First, most studies have focused on exploring the effects of physical activity on physical fitness and motor skills, with limited understanding of the specific effects of different programs on the self-esteem and social skills of children with intellectual disabilities. [4] Second, the diversity of methods and measurement instruments in the available studies limits the synthesis and comparative analysis of results. [5]

The results of this study can provide an important empirical basis for rehabilitation and educational programs for children with intellectual disabilities and provide useful guidance for educational policy makers and rehabilitation professionals. By improving the self-esteem and social skills of children with intellectual disabilities, we can help them better integrate into society and improve their quality of life. In addition, this study helps to promote understanding of the holistic development of children with intellectual disabilities and provides references and insights for future related studies.

2. Methods

2.1. Participants

The study was conducted in a special school in Jiangsu Province, which selected 32 children with mild intellectual disability disabilities, including 20 boys and 12 girls (Table 1). The average age was 9.08 years old. Inclusion criteria for the study subjects: age 7-12 years old; children with mental retardation meet the criteria for mild identification; able to complete the instructions required for the experiment, such as being able to understand the teacher's intentions, the classroom rules described by the teacher, and obeying the teacher's arrangements. Exclusion criteria: contraindications to exercise; severe heart disease, lung disease, etc.; visual impairment, hearing impairment, etc. 32 subjects were randomly divided into basketball, aerobics, track and field, and control groups according

to the ratio of 1:1:1:1, with $n=13$ in each group (e.g., Table 1). Before the experiment, the researchers communicated with the parents of the subjects. After detailed understanding of the purpose and process of the study, they voluntarily participated in sports competitions for the intervention and signed an informed consent form.

Table 1. Basic Conditions of the Test Subjects

		groups				total
		Basketball	Aerobics	athletic	control	
genders	male	6	5	4	5	20
	female	2	3	4	3	12
total		8	8	8	8	32

2.2. Research Hypothesis

The hypothesis of this study is that different physical education programs can have different effects on self-esteem and social skills of children with intellectual disabilities.

2.3. Research Tools

Self-esteem scale, this questionnaire adopts Rosenberg Self-esteem Scale (SES) as the basis for modification, and after expert judgment and post-validation to form the self-esteem scale [6]. Some studies have proved the feasibility and validity of this scale in measuring the self-esteem level of persons with intellectual disabilities through Rasch analysis. The internal consistency reliability of the scale in this study was 0.716.[7]

Social Skills Rating Scale for Children with Intellectual Disabilities (SSRS), this questionnaire is modified on the basis of , and the scale is formed after expert evaluation and post-validation. The questionnaire contains 50 items, which are divided into 5 factors, namely, social tendency, social cognition, social communication, social participation, and self-regulation, and it is pointed out by some studies that this questionnaire can measure the social deficits of children with intellectual disabilities, and can also partially reflect the content of social skills. It has been pointed out that this questionnaire can measure the social deficits of children with mental retardation on the one hand, and partially reflect the connotation of social skills on the other hand, which has a good validity correlation validity. The internal consistency reliability of the scale in this study was 0.92.[8]

2.4. Experimental Environment

The intervention was implemented in a special education school's basketball court, aerobics gym, and athletic field, which was fully equipped with all sports equipment. Six graduate students in physical education, two experts in physical education and training, and two medical experts participated in the intervention. The physical education and training specialists and the medical specialists had specialized knowledge and experience in training children with mental retardation, and the six graduate students were familiar with each other after attending classes with children with mental retardation in the early stages of the program, so they did not reject each other.

The testing environment for this intervention was fun, encouraging, and comfortable, like playing a game with children. Test subjects need to avoid any threatening behavior and conversations to reduce test anxiety and allow the subjects to enjoy being tested. [9,10]

2.5. Experimental Design

In this study, the experiment utilized a multifactorial mixed experimental design. The independent variables were basketball program intervention, aerobics program intervention, track and field program intervention, and non-use of sports program intervention, and the dependent variables were self-esteem and social skills of children with intellectual disabilities. The intervention cycle was 12 weeks. The experiment was divided into two phases, the pre-intervention phase and the intervention phase.

Pre-Intervention Phase: the pre-intervention phase of this research project. The graduate students and students participating in the study will attend classes together and get to know each other. At this stage, no intervention will be conducted, and after two weeks, the graduate students participating in the study will collect data on the children with intellectual disabilities through the <Rosenberg Self-Esteem Scale> and <Social Skills Rating Scale for Children with Intellectual Disabilities> under the guidance of experts.

Intervention phase: the control group had teaching activities according to the school teaching schedule, while the experimental group received different physical education

sessions in addition to the school teaching activities. Due to the pedagogical schedule of the school teaching group, this phase of the intervention lasted 12 weeks, with one lesson per week on Mondays, Wednesdays and Fridays, attending a 45-minute physical education program, for a total of 36 sessions. Upon completion, the graduate students involved in the study will collect data from the children with intellectual disabilities through the <Rosenberg Self-Esteem Scale> and <Social Skills Rating Scale for Children with Intellectual Disabilities> under the guidance of experts.

2.6. Control Variable

No changes were made to the participants, experimental setting, or experimental time for this study. After consultation and consensus with all parties, the original program was kept the same during the experiment, and the physical education program was added for the intervention, and participants were also asked not to participate in other trainings or interventions or to take other medications, and subjects were to persist in participating in each intervention.

2.7. Data Analysis

The experimental data were statistically analyzed using SPSS 26.0 statistical software. All data were described as $\bar{X} \pm S$. A series of one-way ANOVAs were conducted to see if there was a significant difference between the two groups of subjects in terms of their innovative thinking characteristics. To test for intervention effects, a mixed factor ANOVA was conducted with group as the between-subjects factor and time as the within-subjects factor. If an interaction was found to be statistically significant, comparisons of marginal linear predictions were conducted as post hoc analyses to test for changes in group differences over time. Regardless of whether the main or interaction effect of group was significant, changes in the outcome variable over time were examined within each subject's group. [11]

3. Intervention Programs for Children with Intellectual Disabilities

3.1. Intervention Design Ideas for Different

Programs in the Physical Education Curriculum

Based on the characteristics of children's physical education classes such as sport, education, fun and relevance, combined with the physical and mental characteristics of children with mental retardation, there are certain communication difficulties, the core of physical education classes to enhance self-confidence and encourage interaction as the goal of the design. Based on the following principles: to provide a pleasant environment and situation for children to participate; to promote children's unique point of view; to strengthen children's initiative to participate;

to encourage the expression of emotions; to encourage the formation of unusual ideas and relationships. One-to-one, one-to-many, many-to-one, and small group interventions are utilized based on subject ability and content requirements.

3.2. Methods of Intervention

The intervention process in this study was divided into four phases (Table 2), each of which lasted for three weeks, with a 45-minute physical education program intervention on Mondays, Wednesdays, and Fridays after school for a total of 36 sessions.

Table 2. Physical Education Program Intervention Content and Schedule

Time	basketball	aerobic	athletic
1-3 weeks	Practice basic dribbling skills, including one-handed and two-handed dribbling	Basic movement training, including arm swings and leg movements	Warm-up with running, stretching and joint mobilization
4-6 weeks	Shooting drills, starting at close range, teach proper shooting form and hand coordination	Balance exercises and flexibility training to improve coordination and suppleness through different exercises	Running exercises for sprint training to improve speed and endurance.
7-9 weeks	Spatial awareness training with passing exercises to develop spatial perception in children with intellectual disabilities.	Musical accompaniment, matching various movements to music, develops musical perception and sense of rhythm in children with intellectual disabilities.	Running exercises for sprint training to improve speed and endurance.
10-12 weeks	Basketball tournaments allow them to apply the skills they have learned in actual games and increase their sense of competitiveness.	Aerobics performance with mini-showcase	Throwing events to practice throwing sports (e.g., shot put, javelin, etc.) to improve strength and accuracy.

4. Results

From the data collected by repeated measures ANOVA, Table 3 we can see that during the intervention process, the data related to self-esteem showed that: the main effect effect of group was significant, $F=31.70$, $P=0.00^*$, $\eta^2=0.77$; the main effect effect of the number of measurements was significant, $F=300.15$, $P=0.00^*$, $\eta^2=0.94$; and the interaction effect between group and the number of measurements was significant $F=34.271$, $P=0.00^*$, $\eta^2=0.79$. Data related to social skills showed a significant main effect effect effect of group, $F=10.31$, $P=0.00^*$,

$\eta^2=0.52$; a significant main effect of number of measurements, $F=1,250.09$, $P=0.00^*$, $\eta^2=0.98$; and a significant interaction effect of group and number of measurements, $F=67.58$, $P=0.00^*$, $\eta^2=0.92$. In order to better mine the analyzed data, we conducted a simple effects analysis of self-esteem and social skills data.

4.1. Analysis of the Simple Effects of Self-Esteem

From Table 4, we know that before the intervention, the simple effect of groups was not significant, $F=37.543$, $P=0.064$ ($P > 0.05$), $\eta^2=0.801$; in the intervention, the

simple effect of groups was significant, $F = 32.113, P = 0.000 (P < 0.05), \eta^2 = 0.775$; in the post-intervention, the simple effect of groups was significant, $F = 26.657, P = 0.000 (p < 0.05), \eta^2 = 0.748$.

Table 5 shows that in pairwise comparisons, there is no significant difference in the data between the control group in the intervention and the basketball and track and field groups, respectively, and the rest of the comparisons between the groups are highly differentiated. There was no significant difference in the data between the control group and the track and field group in the post-intervention period, and the rest of the comparisons between the groups were highly differentiated. As can be seen in Figure 1, the slope of the control

group is relatively flat, and there is a crossover trend between the control group and all the other groups, indicating that there is no significant change in the data of the control group, and there is a large change in the data of the rest of the groups.

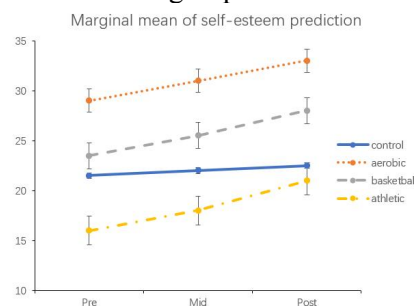


Figure 1. Marginal Mean of Self-esteem Prediction

Table 3. Repeated-measures ANOVA Results of Physical Education Class Interventions for Self-esteem in Children with Intellectual Disabilities

		pre-intervention	Mid-intervention	Post-Intervention	groups	time	Group* Time
		M±SD	M±SD	M±SD			
self-respect	control	21.80±2.53	22.13±3.27	22.38±4.14	F=31.70 P=0.00* $\eta^2=0.77$	F=300.15 P=0.00* $\eta^2=0.94$	F=34.27 P=0.00* $\eta^2=0.79$
	aerobic	29.50±2.45	31.50±2.45	33.5±2.45			
	basketball	23.50±2.45	25.75±2.82	28.75±2.82			
	athletic	16.50±2.45	18.50±2.45	21.50±2.45			
social skill	control	19.75±2.82	20.75±2.82	21.75±2.82	F=10.31 P=0.00* $\eta^2=0.52$	F=1250.09 P=0.00* $\eta^2=0.98$	F=67.58 P=0.00* $\eta^2=0.92$
	aerobic	23.38±3.46	25.88±3.19	29.00±3.46			
	basketball	20.50±2.45	23.88±2.03	27.25±2.31			
	athletic	16.88±2.03	19.50±1.85	22.00±2.00			

Note: *. Differences in means are significant at the .05 level.

Table 4. Single Variable Test

time		square sum	df	mean square	F	P	η^2
Pre-intervention	compare	687.344	3	229.115	37.543	.064	.801
	mistake	170.875	28	6.103			
Mid-intervention	compare	737.594	3	245.865	32.113	.000*	.775
	mistake	214.375	28	7.656			
Post-intervention	compare	768.594	3	256.198	27.657	.000*	.748
	mistake	259.375	28	9.263			

*. The difference in mean values is significant at the .05 level.

Table 5. Pairwise Mean Differences in Self-esteem

		aerobics	basketball	athletic
Pre-intervention	control	-7.63	-1.63	5.38
	aerobic		6.00	13.00
	basketball			7.00
Mid-intervention	control	-9.375*	-3.625	3.625
	aerobic		5.750*	13.000*
	basketball			7.250*
Post-intervention	control	-11.125*	-6.375*	0.875
	aerobic		4.750*	12.000*
	basketball			7.250*

*. The difference in mean values is significant at the .05 level.

Table 6. Multi-variable Calibration

groups		value	F	P	η ²
control	Pillai's Tracking	.063	.900a	.418	.063
aerobic	Pillai's Tracking	.810	57.600a	.000	.810
basketball	Pillai's Tracking	.926	170.100a	.000	.926
athletic	Pillai's Tracking	.937	201.600a	.000	.937

From Table 6, we know that before the intervention, the simple effect of the number of measurements was not significant in the control group, F=0.900, P=0.418 (P>0.05), η²=0.063; the simple effect of the number of measurements was significant in the aerobics group, F=57.600, P=0.000 (P< 0.05), η² = 0.748; and a significant simple effect of number of measurements in the athletics group, F = 201.600, P = 0.000 (P < 0.05), η² = 0.748.

Table 7 Pairwise Mean Differences in Self-Esteem Table 2

	Time	2	3
control	1	-0.25	-0.5
	2		-0.25
aerobic	1	-2.00*	-4.00*
	2		-2.00*
basketball	1	-2.5*	-5.25*
	2		-3.00*
athletic	1	-2.00*	-5.00*
	2		-3.00*

*. The difference in mean values is significant at

Table 8 Single Variable Test

Time		square sum	df	mean square	F	P	η ²
Pre-intervention	compare	171.250	3	57.083	7.602	.068	.449
	mistake	210.250	28	7.509			
Mid-intervention	compare	202.750	3	67.583	10.557	.000	.531
	mistake	179.250	28	6.402			
Post-intervention	compare	325.000	3	108.333	14.797	.000	.613
	mistake	205.000	28	7.321			

Table 9. Table of Paired Mean Differences in Social Skills

		aerobics	basketball	athletic
Pre-intervention	control	-3.62	-0.75	2.87
	aerobics		2.87	6.50
	Basketball			3.63
Mid-intervention	control	-5.13*	-3.13	1.25
	aerobics		2	6.38*
	Basketball			4.38*
Post-intervention	control	-7.250*	-5.500*	-0.25
	aerobics		1.75	7.000*
	Basketball			5.250*

*. The difference in mean values is significant at the .05 level.

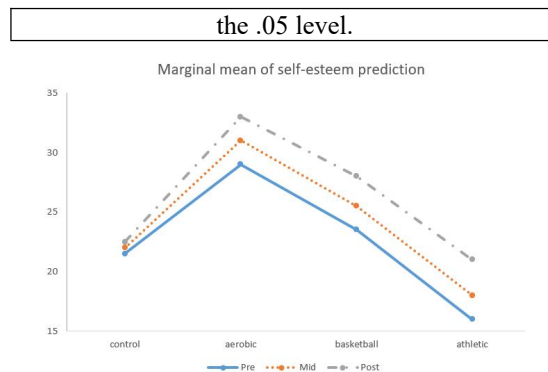


Figure 2. Mean of Predicted Margins of Self-esteem

As can be seen from Table 7, in pairwise comparisons, in the control group, there was growth in the mean value before and after each measurement, but there was no variability in the data, and in the other groups, before and after each measurement, there was greater growth in the data, and all of them had variability, in which the basketball group had the highest growth in the data before and after the intervention, which grew by 5.25, followed by the track and field group with a growth in the data of 5.00, and then by the aerobic group with a growth in the data of 4.00, and the control group with only a growth of As can be seen in Figure 2, the control group's three measurements were concentrated in one area, while the other three groups had a greater dispersion of three measurements up and down, with more growth data.

4.2. Social Skills Simple Effects Analysis

From Table 8, we know that in the pre-intervention phase, the simple effect of groups was not significant, $F=57.083$, $P=0.068$ ($P>0.05$), $\eta^2=0.449$; in the mid-intervention phase, the simple effect of groups was significant, $F=10.557$, $P=0.000$ ($P<0.05$), $\eta^2=0.531$; in the post-intervention phase, the simple effect of groups was significant, $F=14.797$, $p=0.000$ ($p<0.05$), $\eta^2=0.613$.

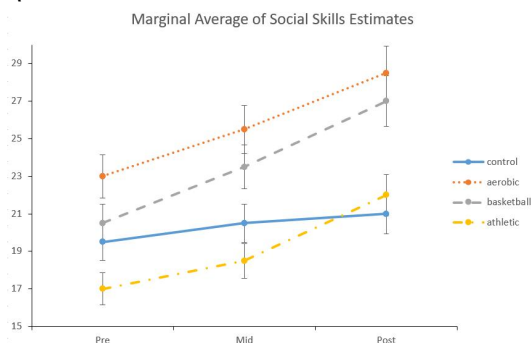


Figure 3. Marginal Average of Social Skills Estimates

As can be seen from Table 9, there is no significant difference in the pairwise comparison of the groups in the pre-intervention phase data; in the mid-intervention phase there is no difference in the data between the control group and the basketball and track and field groups, respectively, and there is no significant difference in the data between the aerobics group and the basketball group, with significant differences in the rest of the pairwise data; and in the post-intervention phase there is no significant difference between the data between the control group and the track and field group, and there is no significant difference in the data between the aerobics and the basketball groups, and The rest of the paired data had significant differences. As can be seen in Figure 3, the slope of the control group is relatively flat, and there is a crossover trend between the control group and all other groups, suggesting that there is no significant change in the data of the control group, and that the data of the rest of the pairs are more variable.

Table 10. Multivariable Calibration

groups	value	F	P	η^2
control Pillai's Tracking	.796	52.745a	.000	.796

aerobic	Pillai's Tracking	.968	414.226a	.000	.968
basketball	Pillai's Tracking	.978	600.802a	.000	.978
athletic	Pillai's Tracking	.963	347.457a	.000	.963

As can be seen in Table 10, the control group had a significant difference in the simple effect of number of measurements, $F=52.745$, $P=0.000$ ($P<0.05$), $\eta^2=0.796$; the aerobics group had a significant difference in the simple effect of number of measurements, $F=414.226$, $P=0.000$ ($P<0.05$), $\eta^2=0.968$; the basketball group had a significant difference in the simple effect of number of measurements, $F=600.802$, $p=0.000$ ($p<0.05$), $\eta^2=0.978$; significant difference in simple effects for number of measurements in the track and field group, $F=347.457$, $p=0.000$ ($p<0.05$), $\eta^2=0.963$.

Table 11. Social Skills Pairwise Mean Differences Table 2

	Time	2	3
control	1	-1.00	-2.00
	2		-1.00
aerobics	1	-2.500*	-5.625*
	2		-3.125*
Basketball	1	-3.375*	-6.750*
	2		-3.375*
athletic	1	-2.625*	-5.125*
	2		-2.500*

*. The difference in mean values is significant at the .05 level.

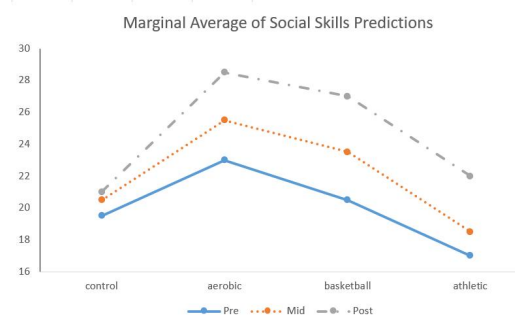


Figure 4. Marginal Average of Social Skills Predictions2

As can be seen in Table 11, the control group had an increase in the mean value of the data before and after the intervention, but it was not significantly different, the remaining three groups had a larger increase in the data before and after the intervention, and all of them had a significant difference in pairwise

comparisons, with the basketball group having the highest increase in data of 6.75, followed by the aerobics group having an increase in data of 5.625, and then the track and field group having an increase in data of 5.125. As can be seen in Figure 4, all the data in the four groups had an increase in the three measurements, but the data dispersion was smaller compared with the other three groups. The data of all four groups have increased in three measurements and the dispersion of the data is more obvious, but the control group is smaller compared to the other three groups.

5. Discussions

In this study, self-esteem and social skills of children with intellectual disabilities were differently affected by different program interventions in physical education classes. From the above data we can find:

5.1 Physical Education Program Interventions Have a Greater Impact on the Self-esteem and Social Skills of Children with Intellectual Disabilities.

Comparing the intervention group with the control group, the growth of self-confidence and social skills of children with intellectual disabilities was higher in the intervention group. Through participation in sports, children with intellectual disabilities can enhance body awareness and self-image, and develop positive attitudes and emotional regulation. At the same time, participating in sports with other students can promote communication and cooperation, and improve their teamwork and social skills. Some scholars believe that physical education programs provide an opportunity for holistic development and help promote the integrated development of children with intellectual disabilities. [12,13]

However, there are some scholars who have reservations or offer different perspectives on the impact of physical education programs on children with intellectual disabilities. They argue that while physical activity may provide some opportunities for children with intellectual disabilities, the impact may not be as expected. [14,15] These scholars point out that children with intellectual disabilities may face limitations in their physical abilities, may not be able to fully adapt to some physical

activities, and may face frustration and difficulties with self-evaluation in a competitive environment. In addition, they emphasize the existence of individual differences, suggesting that children with different intellectual disabilities respond differently to physical education programs. [16,17]

It should be noted that there is still relatively limited research on the impact of physical education programs on children with intellectual disabilities, and there is some inconsistency in the findings. Therefore, when assessing the impact of physical education programs on children with intellectual disabilities, the views of different scholars and the results of related studies need to be taken into account. In addition, factors such as individual differences, teaching methods and environments should also be taken into consideration to better understand the potential impact and applicability of physical education programs on children with intellectual disabilities.

5.2 Different Program Interventions in a Physical Education Curriculum Produce Different Effects on Self-esteem and Social Skills in Children with Intellectual Disabilities.

Research has found that basketball, a team sport, has the greatest impact on the self-esteem of children with intellectual disabilities.

Through improved basketball skills and success in competition, children with intellectual disabilities can increase their self-confidence and self-esteem. In the process of teamwork, they can gain recognition and a sense of belonging, which in turn enhances their self-esteem. In addition, basketball develops their social skills and teamwork ability, which enables them to better integrate into society. [18]

Next is the track and field program. Athletics is an individual-oriented sport that may be more accessible to some children with intellectual disabilities for a sense of accomplishment and pride. Individual progress and accomplishments are more easily quantified and evaluated in track and field events, which can bring about recognition and a boost in self-esteem for the individual. [19]

Aerobics, on the other hand, improves the body control and coordination of children with intellectual disabilities by learning and performing complex movements. By showcasing their performances, they can gain praise and recognition from others, thus increasing their self-confidence and self-esteem.

However, it is important to note that the above conclusions do not apply to all children with intellectual disabilities. Each person's individual differences and interests will affect how they respond to and experience different sports programs. Therefore, when providing sport support and guidance to children with intellectual disabilities, individualized programs need to be provided based on their individual differences and interests. [20]

In addition, other scholars may hold different views. Some scholars believe that other sports, such as swimming, soccer, or tennis, have a greater impact on the self-esteem of children with intellectual disabilities because they may offer more opportunities and challenges in different ways. [21] Some argue that matching individual adaptations and interests is key, and that anything that inspires enthusiasm and active participation in children with intellectual disabilities has the potential to have a positive impact on their self-esteem. At the same time, the sport program itself is not the only influencing factor; factors such as coaching, family support, and social environment also need to be taken into account. [22]

Physical activity has a positive impact on the self-esteem of children with intellectual disabilities. Basketball, athletics and aerobics may have a positive impact on their self-esteem, but the exact degree of impact varies according to individual differences and interests. In actual implementation, individualized sports support and guidance should be provided to children with intellectual disabilities according to their characteristics and needs in order to promote the development of their self-esteem. [23] The results of this study are important for enhancing the mental health and social integration of children with intellectual disabilities.

The greatest impact on the social skills of children with intellectual disabilities in this study was basketball, followed by aerobics

and then track and field.

Basketball as a team sport has many positive effects. Firstly, basketball requires close cooperation among players, and children with intellectual disabilities need to work in concert with their teammates, thus developing their sense of teamwork and communication skills. [24] Second, interaction with teammates and opponents can help children with intellectual disabilities learn how to build social relationships, understand others' emotions and intentions, and improve their social skills. In addition, during games, children with intellectual disabilities have the opportunity to develop leadership skills, such as guiding their teammates and formulating tactics, which can help improve their self-confidence and social skills. [25]

Aerobics can also have a positive impact on the social skills of children with intellectual disabilities. By learning and performing complex movements, children with intellectual disabilities can demonstrate their individuality and uniqueness, thus enhancing their self-confidence and sense of self-identity. In addition, aerobics is usually performed in groups, and children with intellectual disabilities need to cooperate with other participants to complete the movements together, which helps to develop cooperation and coordination, and promotes the development of social skills. Meanwhile, through training and practice, children with intellectual disabilities can enhance body awareness and further improve self-confidence and social skills. [26]

In contrast, track and field has less of an impact on the social skills of children with intellectual disabilities. Although track and field events may promote the development of self-concept and self-esteem through individual achievement and standardized evaluations, the lack of teamwork and social interaction elements limits their direct impact on social skills.

However, it is important to note that different scholars may have different views on this idea. Factors such as individual differences, interests, and environmental background also influence the preference and adaptation of children with intellectual disabilities in choosing sports programs. In addition, coaching and family support play an important role in the development of social

skills in children with intellectual disabilities by sports. Good coaching and family support can provide a positive learning environment and guidance for children with intellectual disabilities and further promote their social skill development. [27]

Basketball, aerobics and track and field have an impact in the development of social skills in children with intellectual disabilities. However, it is crucial for different individuals to choose sports programs that suit their interests, abilities and needs. In order to maximize the social skill development of children with intellectual disabilities, we need to provide specific guidance and support, including good coaching and family support, so that they can learn and grow in a positive environment. This will help children with intellectual disabilities to better integrate into society and improve their quality of life. This study is an important reference for educational institutions, families and relevant policy makers, and provides new ideas and directions for future research.

5.3 At the Post-intervention Stage, None of the Data from the Control and Athletic Groups of Children with Intellectual Disabilities were Significantly Different in Terms of Self-esteem and Social Skills.

This may be due to a combination of several factors such as poor choice of intervention method, differences in sample characteristics, and failure to consider other environmental factors. First, the choice of intervention method has a significant impact on the results. The sports intervention method chosen in this study was an athletics program, but it failed to positively affect the self-esteem of children with intellectual disabilities. This suggests the need for more individualized, sustained, and adaptable intervention methods to meet the needs of different children. Second, sample characteristics and differences may also have an impact on the results. Self-esteem in children with intellectual disabilities is influenced by a variety of factors, including cognitive ability, self-concept, and family environment. And in the current study, there may be differences in these characteristics between the samples, which may have led to the lack of significant differences in the self-esteem data between the control group and the athletic group. In addition, other

scholars have put forward some ideas to explain this phenomenon. They argue that intervention methods should be more individualized to meet the needs of different children with intellectual disabilities. [28,29] Also, environmental factors such as family support and teacher attitudes may have a significant impact on self-esteem. However, these factors may not have been adequately considered or controlled for in the current study, leading to non-differentiated results. In addition, the choice of measurement instrument may also have an impact on the results, thus there is a need to ensure that the appropriate measurement instrument is chosen to accurately assess the self-esteem status of children with intellectual disabilities.

In summary, the effects of sports interventions for children with intellectual disabilities on their self-esteem were not significant, which may be due to a combination of several factors such as poor selection of intervention methods, differences in sample characteristics, and other environmental factors. Future research could focus on the development of individualized and effective intervention methods, taking into account the selection of environmental factors and measurement tools to better promote the development of self-esteem in children with intellectual disabilities. This is important to improve their quality of life and social participation. However, this study was limited by the choice of intervention methods, differences in sample characteristics, and environmental factors, and future research should focus more on personalized intervention methods, comprehensive consideration of environmental factors, and selection of appropriate measurement tools to assess the self-esteem status of children with intellectual disabilities.

6 Conclusions

Based on the design of this study, this experiment significantly improved the self-esteem and social skills of children with intellectual disabilities after 12 weeks of intervention with different sports programs in the physical education curriculum. The results of the study showed that the physical education program had an effect on the self-esteem and social skills of children with intellectual disabilities, and that different

sports programs had different effects based on their different characteristics. Since this experiment only explored 32 students in a special school, the experimental sample was small and the ratio of male to female was not balanced. In future studies, the sample can be enlarged to include interventions on self-esteem and social skills of children with intellectual disabilities in terms of gender, region, and school environment.

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