



The Physical Education on the Development of Lower Limb Strength of Children Aged 3 to 6 Years—A Case Study of Qiaotou Town, Dongguan City

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Abstract

Objective: To explore the physical education on the development of lower limb strength in children aged from 3 to 6 years old and analyze the influence in detail, so as to understand the importance of the development of lower limb strength in children's growth and development, and to provide valuable teaching basis for the process of physical education. **Methods:** the research object of this paper is to adopt Qiaotou Town L & T Fitness Club 60 age 3 to 6 years old children, sports teaching before standing long jump test and record the results, after three months of sports teaching again test and record the results, we compare two results before and after, analysis of physical education teaching is influential to children of lower limb strength. This paper adopts the method of literature and teaching experiment to study. **Results:** After three months of physical exercise, children's standing long jump performance significantly improved, lower limb strength also significantly enhanced. **Research conclusion:** physical education teaching can improve children's lower limb strength, enhance children's physical quality, improve children's sports ability.

Subject Areas

Physical Education

Keywords

Lower Limb Strength, Physical Education, Children

1. Introduction

1.1. Topic Selection Basis

Know online in China, the author in “children’s lower limbs strength” as the keyword search, until February 2022, a total of retrieving the article 20 academic journals, 33 master’s theses, doctoral thesis 2, article 5 domestic meetings, children of lower limb strength research occupied the main part in the master’s thesis, shows that children’s lower limbs strength has great research value and research significance, There are still many theoretical and practical problems to be solved.

The growth and development of children are extremely rapid, and the growth and development level and health status, especially at the age of 3 to 6 years old, will directly affect their future life, study and work [1]. Strengthening children’s physical training can not only effectively improve children’s physical health level and the working ability of the organism, but also play a non-negligible role in children’s mental health, sound personality and intellectual development [2]. The research object of this paper is children from 3 to 6 years old. Children in this age group have a great difference in sports performance ability. Physical exercise within this range will have a significant exercise effect on children’s physical development. Therefore, it is of far-reaching significance to choose children from 3 to 6 years old as the research objects of this paper.

In the physical quality indicators of preschool children aged from 3 to 6, speed, lower limb explosive power, upper limb strength, sensitivity and coordination ability, balance ability and so on all show age-increasing [3]. Therefore, strengthening physical training for children can effectively improve the physical health level and organic working ability of children aged 3 to 6, which is conducive to physical and mental health and intellectual development, and has important significance and role in promoting the healthy physical development and coordinated functional development of children aged 3 to 6 [4].

1.2. Research Purpose

From 3 to 6 years old is a critical period for children’s physical growth and development. At this stage, children’s metabolism is strong, and the structure, function, intelligence and psychological development of various tissues and organs in the body have great potential and plasticity [4]. But as a result of the rapid development of economy, many families are increasingly rich, young age children have superior living conditions, causing the child to be lack of independent ability to solve the problem in their own lives, at the same time, due to the frequent city children lost events every year, many parents in order to ensure the safety of children did not dare to take children to go out to play, fear of kids running around, cause the accident to happen. All the reasons mentioned above cause the poor physical fitness level of children aged from 3 to 6 at present, with generally low sports quality indexes and weak sports ability [5]. And, at present stage most 3 years old to 6 years old children diet habits are not scientific, nutritional surplus situation is obvious, plus less exercise and sedentary at home, 3

years old to 6 years old obese children the number is also increasing. Among them, cardiopulmonary endurance, muscle strength and endurance can be used as independent factors to predict the risk of chronic diseases and other health outcomes in children, adolescents and adults, while poor physical condition will have a negative impact on individual health [6]. Physical fitness of children aged from 3 to 6 puts forward higher requirements for school PE and even preschool PE teaching. Kindergarten PE teachers play an active role in PE teaching, cultivate the sports interests and hobbies of children aged from 3 to 6, and help children aged from 3 to 6 improve their overall physical fitness [7]. At present most of the parents themselves, meanwhile, did not get into the habit of physical exercise, so they lack the awareness of leading their children to take physical exercise. Most of the time, they let their children cram school or let the children stay at home watching TV, playing mobile phone, lead to not only children myopia rate is rising in recent years, and 3 years old to 6 years old children's physical skills also stalled, Many parents are worried about their children's health and weakened immunity. In order to improve the physical quality of children, some parents will let their children participate in various sports activities. For example: let children participate in a variety of winter, summer camp activities, sports skills training classes and a variety of sports halls.

Physical fitness includes six parts: strength, endurance, speed, agility, coordination and balance. Selection of this research is to study the physical quality of the lower limb strength this part, through the sports teaching to enhance age 3 to 6 years old children of lower limb strength, judging by indirect standing long jump age 3 to 6 years old children of lower limb strength, cultivate age 3 to 6 years old children's interest in exercise, learn new skills, enhance age 3 to 6 years old children's physical health, To promote the physical and mental development of children from 3 to 6 years old, and lay a solid foundation for the future training of sports talents for the country.

1.3. Research Significance

Age 3 to 6 years old children for lower limb strength training exercises can promote bone growth, enhance the muscle strength, enhance immunity and strengthen the sport ability of the body, age 3 to 6 years old children of lower limb strength exercise is in the case of no load, practice is the main way of running and jumping, running can exercise the power and the coordination of the body, Jumping strengthens the body's ability to hold air, which is good for vestibular function. 3 years old to 6 years old children often participate in physical exercise, not only can enhance physical quality, but also cultivate their will to bear hardships and stand hard work quality. Moreover, in the exercise of lower limb strength, children aged 3 to 6 can constantly break through themselves and cultivate confidence and courage to overcome difficulties.

Selected topic basis, research purpose and research significance among the present progressive and mutual feedback relation each other, this study from the sports teaching to age 3 to 6 years old children's perspective in the research of

the development of the lower limb strength, build “topic selection basis, put forward the research hypothesis)—objectives (to determine the research value)—meaning (hypothesis) solving” three layers of structure system, Ensure the smooth progress of the teaching experiment (see **Figure 1**).

2. Research Object and Method

2.1. The Research Object

The research object is 60 children aged from 3 to 6 in Qiaotou Town, Dongguan City (as shown in **Table 1**), and the standing long jump test is conducted. The research period is from July 2019 to January 2020, and the research site is selected in Letu Children’s Physical Fitness Center. Dongguan City is a floating population with the local population distribution is a relatively homogeneous mixed city, Qiaotou is a town in Dongguan City economic development is relatively general, the number of urban population and rural population distribution is relatively uniform, come le rabbit children’s fitness hall class of young children from all over the country, choose joy rabbit children’s fitness pavilion kindergarten as the research object, has a certain universality and rationality. Among them, children from 3 to 6 years old are the critical period of school age and the enlightenment period for the formation of children’s personality. The physical and mental development in this stage plays an important turning role in the later primary school.

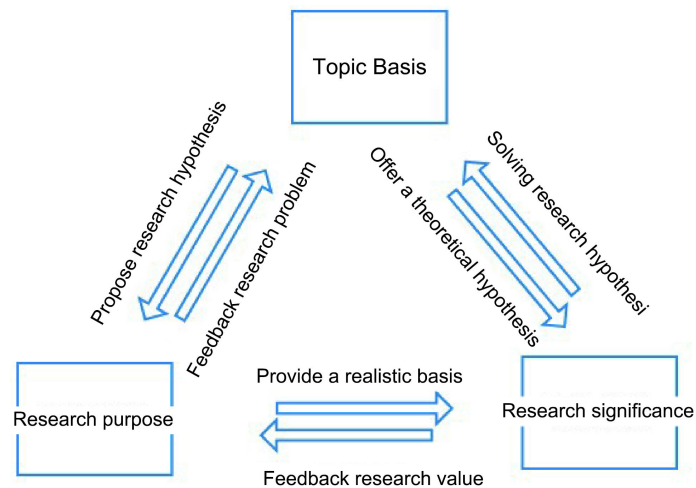


Figure 1. Research structure relationship among the basis of topic selection, research purpose and research significance.

Table 1. Children aged from 3 to 6 in Qiaotou Town, Dongguan City.

age	3 years	4 years	5 years	6 years	combined
male	3	11	13	8	35
female	5	8	7	5	25
combined	8	19	20	13	60

2.2. The Research Methods

2.2.1. Document Method

In order to provide a theoretical basis for the smooth progress of this study, we searched and read materials related to children's lower limb strength development and exercise, journals, children's physical fitness measurement and evaluation and other related literature on CNKI, Wanfang Database and VIP Chinese science and technology journal.

2.2.2. Teaching Experiment Method

1) The experiment purpose

Lower limb strength assessment is not only an important part of children's physical quality, but also can provide a strong scientific basis for the formulation of physical teaching activities and provide guidance for the development of physical health of children aged 3 to 6. For children aged 3 to 6 years, the development of the lower limb strength is more important, only the lower limb strength is strong enough, to complete its run, beating, in addition, lower extremity strength or perform other actions, the support of, therefore, to enhance age 3 to 6 years old children body quality, must first age 3 to 6 years old children of lower limb strength.

2) Subjects and records

The experimental objects were 60 children from 3 to 6 years old in Letu Children's Physical Fitness Center, Qiaotou Town, Dongguan City. The 60 children were first tested for physique before class, and then tested again after physical education for 3 months. Finally, the standing long jump indexes in the two physique tests were compared.

3) Measurement and evaluation criteria

In the evaluation standard of national physical health test, the normal value of standing long jump for children aged 3 to 6 (see **Table 2**). Grade is evaluated according to the evaluation criteria in **Table 2**. The standing long jump distance of normal children from 3 to 6 years old is within the fixed range in **Table 2**, within which they are judged as "passing". Children beyond this range of distance showed stronger lower limb strength, and were judged as "excellent"; Children below this range show weak lower limb strength and are judged "failing".

4) Experimental location: Le Tu Children's Physical Fitness Center, Qiaotou Town, Dongguan City.

5) Experiment time: From July 2019 to January 2020, the experiment lasted for 7 months. Only each newly arrived child aged 3 to 6 was selected for 3 months.

Table 2. Standing long jump distance of normal children aged 3 to 6 years unit (cm).

gender	3 years	4 years	5 years	6 years
male	43 - 69	65 - 88	80 - 102	95 - 127
female	40 - 64	60 - 80	75 - 95	87 - 116

2.3. Statistical Data Processing

Excel software was used to record the data of standing long jump of children aged 3 to 6 before and after physical education. SPSS20.0 was used to process and analyze the personal data changes before and after physical education by paired sample T test. Measurement data were expressed by ($M \pm SD$), and significance was $P < 0.05$.

3. Research Results

3.1. Analysis of the Status of Lower Limb Strength of Children Aged from 3 to 6

In the analysis of the results, standing long jump is an important indicator to reflect the strength degree of lower limb of children aged 3 to 6, and the long jump distance can reflect the strength level of lower limb of children aged 3 to 6. Among them, male children are evaluated according to male standing long jump evaluation criteria, while female children are evaluated according to female standing long jump evaluation criteria, and the results obtained are evaluated (see **Table 3**). It can be seen from **Table 3** that the standing long jump scores of most children aged 3 to 6 are within the passing range, indicating that their lower limb strength is of general level and their athletic performance needs to be improved. The standing long jump performance of a small number of children aged 3 to 6 is within the excellent range, indicating that only a small number of children can exercise, especially children aged 5, without the guidance of physical education teachers, their standing long jump performance is excellent proportion can reach 1/4, which is worth learning by children of other age groups. There are a few age 3 to 6 years old children standing long jump results within the scope of the failed, explain lower limb strength is weak, need through the right amount of physical exercise to enhance physical fitness, especially the young children age 4 and 5, make up most of the number of failed, indicating that they need to exercise more, at the same time, because this stage children's sense of self is relatively weak, Children like sports exercise more and more, so that the physical quality will become stronger, do not like sports children exercise will be less and less, resulting in physical quality will be worse and worse, so they need the correct guidance of parents and teachers.

Table 3. Analysis of standing long jump scores of children aged from 3 to 6 before physical education teaching.

age	fail	pass	good
3 years	2	5	1
4 years	2	16	1
5 years	4	11	5
6 years	4	8	1

(Note: Chi-square value is 487.062A, $P < 0.05$).

3.2. Effects of 3-Month Physical Education on Lower Limb Strength of Children Aged 3 to 6

Systematic physical education can improve children's overall physical quality from 3 to 6 years old, and improve their abilities such as strength, speed, endurance, sensitivity, coordination and balance. From **Table 4**, we can clearly see that after three months of physical education, only one person failed in standing long jump, and the number of people who passed and were excellent increased significantly, which is enough to show that physical education has a significant enhancement effect on the lower limb strength of children aged from 3 to 6.

The results of paired sample T test of SPSS20.0 software show that, within 95% confidence interval, physical education has an improvement effect on children's standing long jump performance, which indirectly reflects that physical education has an enhancement effect on children's lower limb strength at 3 to 6 years old.

4. Discussion

Life is movement, for 3 to 6 years old children, is no exception. In fact, the physical education teacher is a sports teacher with sports knowledge and personal teaching experience, and 3 to 6 years old children's age characteristics, hobbies and fun, etc to guide the age 3 to 6 years old children to participate in sports, correct age 3 to 6 years old children in motion error occurred in the action, cultivate age 3 to 6 years old children's interest in exercise for a long time. Moreover, sports are good medicine, long-term participation in sports at the age of 3 to 6 years old children than less exercise at the age of 3 to 6 years old children's physical quality and immune function is significantly stronger. From the experimental results, every child after 3 months of physical exercise, lower limb strength will be significantly enhanced, standing long jump performance will also improve. From **Table 5**, we can also see the significant difference in paired sample T test ($P < 0.05$), indicating that physical education has a significant promoting effect on lower limb strength of children aged 3 to 6. However, this result only applies to a small number of children aged 3 to 6 who participate in physical exercise, and most of them like watching TV and playing mobile phones at home. They lack physical exercise and have poor physical fitness, which is a problem that people must pay high attention to. For parents who have not attached importance to children's participation in physical exercise, we will provide some good advice to parents, so that parents can lead their children to carry out the right amount of fitness exercise, so that parents and children jointly promote physical health, and constantly improve the overall social fitness plan; For children who are lack of interest in sports, our physical education teachers should first cultivate children's interest in sports, and then slowly transition to targeted physical education after the formation of children's interest in sports, so as to comprehensively improve children's physical quality. In the face of how to correctly improve children's physical quality, the discussion mainly revolves around the following three aspects.

Table 4. Analysis of standing long jump scores of children aged from 3 to 6 after three months of physical education.

age	fail	pass	good
3 years old	0	6	2
4 years old	0	14	5
5 years old	0	10	10
6 years old	1	10	2

(Note: Chi-square value is 506.033A, $P < 0.05$).

Table 5. Relevant statistics of standing long jump scores of 60 children aged 3 to 6 before and after physical education.

Standing long jump result	N	M \pm SD
Before physical education	60	81.97 \pm 23.22
After physical education	60	91.65 \pm 20.49

(Note: Correlation coefficient of paired samples of standing long jump before and after PHYSICAL education is 0.98, $P < 0.05$).

4.1. Discuss Muscle Strength Development in Young Children

The development of lower limb strength is a sensitive and critical period between 3 and 6 years old. From the analysis of muscle thickness, from 3 to 6 years old children's muscle strength is to develop large muscle groups first, then develop small muscle groups; From the trunk and limb development analysis, 3 to 6 years old children are the first to develop the core muscle strength of the trunk, and then develop the muscle strength of the limbs; From the analysis of the development of coarse and fine movements, from 3 to 6 years old children are the first to develop the muscles of coarse movements, and then develop the muscles of fine movements. The muscle movements of children aged 3 to 6 are developed according to these three aspects, and they are developed in the intersection and independence of each other.

4.2. Discuss the Influence of Physical Education on Lower Limb Strength

Without physical exercise age 3 to 6 years old children of lower limb strength generally poor, some still don't understand at the age of 3 feet jump, the above examples can be indirectly shown that these children belong to the developmental delays, not reached the standard of normal age body development, light person can affect the physical development of children, the person that weigh will indirectly affect the development of the child's brain, Even affect children's future study, work and life. Children aged 3 to 6 who are active but have not received physical education have uneven development of muscle strength on the left and right sides of their bodies, and countless children aged 3 to 6 even exceed the normal range. For example, due to uneven development of leg muscle strength, it is easy to form long legs, X-shaped legs and O-shaped legs. In con-

clusion, systematic physical education at the age of 3 to 6 can greatly reduce the adverse effects of asymmetric muscle development. Finally, because 3 to 6 years old children's bone toughness is high, poor resistance to pressure, not easy to fracture but easy to deformation, so in physical education teachers need to pay special attention to avoid the occurrence of teaching accidents.

4.3. For the Study of Standing Long Jump Measurement to Discuss

Through the indirect standing long jump to judge the development of children's lower limb strength from 3 to 6 years old, to judge the development degree of physical education to children's lower limb strength from 3 to 6 years old. The children from 3 to 6 years old in the new gym were tested first, and then tested again after three months of physical teaching and exercise. The results of standing long jump in the two physical tests were compared, in order to illustrate the influence of physical teaching on sports results, and indirectly illustrate the influence of physical exercise on lower limb strength.

5. Conclusion and Recommendations

5.1. Conclusion

According to the experimental results, 10 children from 3 to 6 years old failed in the first standing long jump. After 3 months of physical education, only 1 child failed the standing long jump. The number of children with excellent standing long jump results increased from 8 to 19, so it can be concluded that physical education can improve the lower limb strength of children aged from 3 to 6.

5.2. Recommendation

In today's era, children aged from 3 to 6 are physically weak, so parents and kindergarten teachers should guide children to participate in sports activities and cultivate their interest in sports. For example, sports games should be used to cultivate children's interests and hobbies, and corresponding physical education should be given to children [7]. When children participate in sports, guardians should observe their physical changes in real time, so that children can do physical exercise in a healthy condition. In addition, the government can strengthen the monitoring of children's physique, increase children's sports facilities and venues, and appropriately improve the requirements for children's sports activities; kindergartens need to improve the quality and quantity of physical education teachers, add more sports games and more systematic physical education for children, so that children's physical quality can be comprehensively developed; Parents should know how to use the sports facilities and venues around the family, and lead their children to exercise for one hour a day, so that their children can grow up happily for a lifetime.

6. Lack of Research

There are still deficiencies in this study, such as: A smaller number of the survey

research object, the consulted literature and related books, in 3 months of sports teaching in the process of individual age 3 to 6 years old children cannot guarantee for each course, ignore the age 3 to 6 years old children research and development of physical education curriculum and physical education teachers will affect the physical education teaching methods and emphasis of the test results of standing long jump.

Conflicts of Interest

The author declares no conflicts of interest.

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