

REVIEW OF THE INFLUENCE OF DIFFERENT SPORTS ACTIVITIES ON PRESCHOOLER'S PHYSICAL FITNESS

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Abstract. *Good physical fitness plays a positive role in work and life: first, it is the basis of people's lives and work; second, it helps to master complex technical movements and improve sports performance; third, it supports heavy-load training or high-intensity work. In recent years, the development of sports activities can promote the improvement of preschooler's physical quality and reduce the obesity rate and a series of physical health problems induced by obesity. At present, there are various sports activity courses in and outside kindergarten for parents and preschoolers to choose. By consulting the CNKI, Web of Science and other databases about sports intervention and preschooler's physical fitness, this paper summarises the findings of some studies on the influence of different sports activities (including preschool football, basketball, Taekwondo, roller skating and fitness courses) on children's physical quality in the last 10 years. The results show that different sports have different effects on the development of preschooler's physical fitness, and each has its own focus. This paper provides some reference for the research of the related courses for preschool children in the later period. When parents plan the physical education course in combination with the actual physical activities of preschoolers, the conclusion of this review has certain practical significance.*

Keywords: *sports activities, preschooler, physical fitness, review.*

Introduction

Having a good physical quality can help preschoolers have better energy, better resistance, reduce the number of diseases and thus get more robust growth. Physical fitness is one of the indicators of preschooler's physical strength and weakness and is the physiological aspect of physical components and the basic component of physical research (Liangliang et al., 2015). Physical fitness includes various skills and abilities such as speed, endurance, strength, flexibility, proprioception, coordination of different types (Young & Yuting, 2016). China's research on the physical fitness of preschool children began in 1975. Chinese preschoolers from 16 provinces and cities were involved in a large-scale physical testing work, and then, in 1985, 1991, 1995, 2000, 2005, 2010, 2014 and 2018, a national research work on their physical health was conducted. Analysing the national physical fitness monitoring reports for the period between 2005 and 2010, it is concluded that the physical fitness of China's preschoolers in these five years has a downward trend and their lower limb strength shows only a slight increase. Therefore, it is recommended to strengthen the physical exercise of preschool children. (Xiaohong & Peng, 2012)

The age of 3 to 6 years is the key stage of early childhood development. The current

situation of preschooler's physical fitness provides a basis for later growth. There is still a lot of space for change in China's overall physical fitness of preschoolers. The physical quality of preschool children is related to their physical and mental health development. More attention should be paid to providing a variety of sports activities to promote the development of preschooler's physical fitness. Daily physical activity has the potential to improve health and wellbeing, yet worldwide surveillance of physical activity levels indicates that a growing number of preschoolers and adolescents do not meet current physical activity recommendations (Jakubowski et al., 2015). As an integral part of improving the individual's overall wellbeing, the sports industry, with the support of national policies and people's enthusiasm to actively participate in sport, is constantly moving forward. The number of various sports and health clubs and sports training institutions in China has significantly increased, and preschool sports (including football, basketball, Taekwondo, roller skating and fitness), as an important part of developing preschooler's physical literacy, are booming. Given that the content of different sports activities is not identical, the promotion of physical fitness for preschool children is not the same. So far, much literature has been written about the effect of various types of physical activity on the physical fitness of preschoolers, but comparative studies for different types of sports activities are less numerous.

This article aims to identify the effects of different physical activities (including preschool football, basketball, Taekwondo, roller skating and fitness) on children's physical fitness by comparing and finding out the focus of five major projects on the development of physical fitness in preschoolers.

Topic Addressed

The effect of physical training on the physical fitness of preschoolers

The physical training project for preschoolers aims to develop their physical fitness and cultivate their basic motor skills. Because it involves fun and diversity, preschool children always love it. Many parents will let preschoolers start from the physical training curriculum before accepting special sports to enhance their children's physical fitness and cultivate their interest in sport. Physical fitness courses should promote the growth and development of preschoolers and improve their physical level (Yao, 2019). Physical training of preschool children can not only increase their physical coordination and control abilities, but can also effectively promote the healthy development of their psychological quality, regulate their psychological activities and cultivate their personality development based on positive traits so as to build their competitive consciousness and tenacious self-esteem.

The effects of fitness courses on preschooler's physical fitness have been addressed by several researchers who have agreed that these courses represent a comprehensive training model. According to Shijie (2019), different training programmes and models were able to

improve the physical fitness of preschoolers, and the results of experimental groups were generally better than those of control groups; however, the current shortcoming is that these different training programmes lack comparison with each other. In the study by Krombholz (2012), positive effects were found on the development of motor skills in preschoolers by doing more physical exercise. In a control experiment conducted by Ganhui et al. (2019), the experimental group performing physical training achieved better results than the control group in the six measured indicators, namely 10-meter backward run, standing long jump, tennis long shot, double-foot continuous jump, seated forward bend and balance beam walk (for regular teaching). The above authors mentioned that the difference in results was highly significant ($p < 0.01$). Congshan (2014) also conducted a three-month physical training experiment on preschoolers aged 5-6 years (randomly assigned to boys and girls). After the experimental intervention, it was found that the six test scores of the experimental group for the 10-meter backward run, standing long jump, tennis long shot, double-foot continuous jump, seated forward bend and balance beam walk were better than those of the control group. The research by Zeliang (2019) shows that the impact of physical training on the development of preschooler's athletic ability is generally greater than that of extracurricular sports classes, especially in terms of speed, coordination and balance; therefore, the physical training effect is usually better than the training effect induced by after-school sports classes. Cong (2015) selected 60 preschoolers aged 5-6 years and divided them into experimental and control groups (15 boys and 15 girls in each group). The experimental group performed physical fitness exercises based on ball games, while the control group performed the physical education programme according to the kindergarten curriculum. Through the 12-week experiment, the physical fitness of the experimental group improved significantly compared to the control group ($p < 0.05$). Yulan (2015) selected 5-6-year-old preschoolers (20 each in the experimental and control groups) for three months of physical training. The first stage was aimed at developing speed, proprioception and balance abilities. The second stage developed speed, flexibility, strength and associated weaknesses. The third stage was focused on developing comprehensive quality. The six national physical fitness tests (for early childhood) indicated that the experimental intervention had a more significant role in developing the physical fitness of preschoolers ($p < 0.05$). Chunshan (2016) also selected 5-6-year-old preschoolers (30 each in the experimental and control groups) to follow a four-month Integrated Fitness Training (IFT) model for early childhood. The model included functional training, training against resistance and cardio and lung training in the comprehensive mode. Experimental results showed that the IFT intervention had a significant effect on the proprioception, coordination and endurance of preschool children.

The effect of football on the physical fitness of preschoolers

In the context of vigorously playing football on campuses, this sport has become more

visible for Chinese parents and students. In March 2019, the General Office of the Ministry of Education of China issued a Notice on the Pilot Work of Football-Specific Kindergartens. This notice calls for the development of a wide range of football-related skills in children, thus arousing their interest in popular preschool football games. The government should provide various physical activities suitable for the age characteristics of preschoolers in order to promote the comprehensive development of their basic motor skills. In recent years, there have been more and more football training programmes inside and outside kindergartens, and therefore related academic research has gradually increased. Anying (2019) highlights that preschool football (but mainly football games), under the scientific guidance of coaches, can facilitate the development of bones, joints and muscles during early childhood. Jingyi (2019) states that vigorously promoting the participation of preschoolers in football courses can improve their physical fitness indicators and gradually strengthen their physiological function.

In an intervention study regarding the effects of early childhood football on the physical fitness of preschoolers, Xianhua (2019) divided 50 children into two groups (10 girls and 15 boys in each group). After 12 weeks of experiments as part of the football course, the physical fitness index of preschool children participating in football activities was much improved. The three indicators measured for standing long jump, double-foot continuous jump and balance beam walk were significantly better. The study showed that football interventions were particularly effective in developing leg strength and physical coordination in preschoolers. Guoqiang (2019) divided 76 preschoolers aged 5-6 years into two groups that were provided continuous intervention for 10 weeks. The experimental group had 30 minutes of football lessons three times a week, while the control group had regular outdoor sport lessons. The results showed that the lower limb strength, flexibility, coordination, proprioception and balance abilities of preschoolers in the experimental group were all well developed. Xuenan (2019) conducted a four-month teaching experiment on 40 children aged 6 years. The experimental group was taught football for 40 minutes twice a week, while the control group performed regular sports activities. Experimental results showed that football games had a significant effect on children's waist strength, lower limb strength and body coordination. Researchers conducted a 12-week experimental intervention in football teaching for 60 preschoolers aged 5-6 years. The experimental group adopted the course based on the football design scheme as a teaching content, while the control group adopted the classroom learning content required by the half-yearly kindergarten teaching plan. The results showed that preschoolers in the experimental group had significant improvements for two quality indicators, 10-meter backward run and single-leg stance; this reveals that football practice also improves children's proprioception and balance abilities. Through group training applied for a period of 6 months to 46 preschoolers aged 9-10 years, Alesi et al. (2015) found that children in the experimental group increased their coordinated explosiveness and leg strength.

The effect of basketball on the physical fitness of preschoolers

Preschool basketball programmes are popular among both parents and children. First of all, they can enhance the physical fitness of preschoolers. Second, basketball programmes can help preschool children learn to work as a team in sports and better adapt to the group. As a leisure sport, basketball is popular all over the world. It enhances cardio-metabolic health and strengthens bone structure while controlling the risk of injury (Rátgéber et al., 2019). The content of basketball practice for young children is relatively rich, including walking, running, jump shot and other various movements. According to Peng (2015), current basketball courses for preschoolers mainly include mobile content with the ball, such as dribbling, passing, throwing, catching, as well as other learning content.

Within the basketball project, the research conducted by Xitong (2019) showed that, after 12 weeks of experimental intervention, the experimental group had better results in the 20-meter speed run, 4 x 1.5-meter backward run and sandbag throwing, with significant differences compared to the control group. The research findings indicate that preschool basketball has a positive effect on the development of speed, proprioception and upper-limb muscle strength in children aged 5-6 years. Lei and Zhenjie (2013) conducted a three-month basketball experiment on 40 preschoolers. Through the number of mistakes in one minute, the number of repeated side slides in 20 seconds and the number of 10-second stand-up completions for coordination tests, the above authors have shown that preschool basketball is very helpful for improving the coordination ability of preschoolers. In a comparative experiment (Jiao & Zhiqiang, 2020), younger children participating in a basketball game ran 10-meter backwards along the balance beam significantly faster than non-participating children. This indicated that the balance, coordination and strength of preschoolers involved in the basketball game were better than in the case of non-participating children.

The effect of Taekwondo on the physical fitness of preschoolers

Taekwondo is a sport with a long history. It uses the boxing method and the leg attack and defence method as the core, and the competition and leg method as the basic form of expression (Lianghua & Xiangren, 2020). In addition to enhancing the physical fitness of preschoolers, this sport can also effectively improve their psychological quality. Taekwondo teaching pays great attention to etiquette, so it allows preschool children to learn to get along better with others during practice.

Within the Taekwondo project, Wanyou (2013) conducted a study where children were divided into experimental and control groups by randomly selecting them from the training hall. After one year of practice, the differences in physical fitness between the experimental and control groups were compared, and that the experimental group had significantly better results than the control group for indicators such as height, weight, seated forward bend,

standing long jump, 30-second backward run, etc. Therefore, Taekwondo training has an obvious stimulating effect on the growth, development and physical fitness of preschoolers. Lianghua and Xiangren (2020) applied physical fitness tests to children practising Taekwondo (30 each in the experimental and control groups) and, after four months of practice, their lower limb strength had significantly increased ($p < 0.01$). Yong (2013) suggests that Taekwondo exercise has a positive impact on the growth, development and physical fitness of preschoolers. Taekwondo leg method improves children's flexibility. Using 200 participants, the above researcher found significant increases in the bone density, muscle strength, flexibility and body coordination of post-school-age children after a period of training. This study shows that Taekwondo has a certain effect on the growth, development and physical fitness of school-age preschoolers. Wei (2015) made an experimental comparison of Taekwondo training and found that the flexibility of the right and left legs was significantly higher in the experimental group compared to the control group. The author points out that the training of Taekwondo motor skills not only enhances leg flexibility, but also contributes to developing the left and right hemispheres of the preschooler's brain. This is conducive to a more balanced development of children's motor skills involving the left and right sides of the body and can enhance their coordination and proprioception abilities. The research by Zhibao (2018) shows that Taekwondo can improve torso and lower limb flexibility, proprioception and explosive leg power in preschoolers.

The effect of roller skating on the physical fitness of preschoolers

Roller skating is a common sport for preschoolers, who show a strong interest in it. For them, both the roller skating gear and the gliding process are very interesting. Second, it is easy to carry out: children only need roller skates, appropriate protective gear and a flat ground to practise. Although roller skating is a dangerous sport, it can help the preschooler to develop a better sense of self-protection. Many parents believe that it can develop their children's ability to cope with setbacks. Roller skating exercises (standing, stepping, stopping, straight-track taxiing, backward slipping, arc gliding, etc.) significantly improve balance control in preschoolers. Overall, it has a positive contribution to the development of preschooler's athletic ability (Yong & Lei, 2014).

Researchers (Wei & Yong, 2012) involved in the Early Childhood Roller Skating Program noted that preschool children were able to adjust their bodies more quickly to their posture as they constantly corrected their movements. This can effectively ensure postural balance in preschoolers. Qifu (2016) points out that the roller skating exercise is systemic: not only does it develop the external muscle strength, but also increases joint flexibility; it can improve system function, metabolism, balance and coordination. Roller skating is also a healthy aerobic exercise. Jia et al. (2012) describe roller skating as an aerobic exercise during which preschoolers use all their muscles to complete technical movements in the learning process.

Long-term aerobic roller skating training is highly important for a preschooler's body shape, physical fitness and cardiopulmonary function. The study by Lehang (2017) showed that roller skating could significantly improve the physical fitness of preschoolers, as revealed by various test items. The roller skating project has an obvious effect on improving single-leg stance or balance ability in preschoolers. Yang (2015) analysed preschool children (40 each in the experimental and control groups) who performed roller skating exercises and found that, after three months of practice, there was a very significant improvement in their manner and speed of walking on the balance beam. After 6 months of experiments with two groups of 5-year-old children (40 in each group), Zhouyou (2011) found that roller skating training could improve their leg strength, as well as speed and balance abilities.

Comparison and analysis of the effects of each project on the physical fitness of preschoolers

To sum up, we can see that different forms of exercise have a positive influence on the physical fitness of preschoolers. Because physical activity has different content, the physical fitness and motor development of preschool children will also be different.

The physical fitness project includes a comprehensive set of exercises, so the development of children's physical fitness is also comprehensive. Almost all studies have shown that physical fitness programmes indicate an overall improvement in preschooler's physical fitness. Currently, there are two main categories in the field of physical training for preschoolers: the first focuses on the development of action-oriented physical training and includes walking, running, jumping, throwing, kicking and other basic motor skills; the second is guided by the physical fitness of preschoolers and includes balance, flexibility, agility, coordination, speed (Shijie, 2019) and so on. The goal and content of physical training are aimed at developing children's skills and physical fitness in a comprehensive way, so the resulting training effect is also to promote the development of preschooler's physical fitness.

Football programmes can improve lower limb strength, body coordination, agility and balance in preschool children. Football players always need to be able to react promptly when they receive the ball, when making long shots or when their defence is out of position. This skill puts high demands on the player's explosiveness (Maobai, 2020). During the game, athletes also need the ability to quickly change positions (Xiaoqi, 2020). Given that football players are not allowed to touch the ball with hands or arms, other body parts such as the head or chest become important weapons when dribbling or receiving the ball. Players need a high level of physical control so that they can flexibly use every part of their bodies during the game (Maobai, 2020). Therefore, football programmes can develop preschooler's lower limb strength, body coordination, agility and balance.

Basketball programmes can develop children's coordination, proprioception, speed and upper limb strength. Basketball involves a lot of athletic intensity and requires players to

quickly change direction and avoid opponents (Yuhao, 2018). Athletes need to focus on their upper wrists to improve finger control and fight for the ball. Therefore, through long-term basketball practice, this sport can develop physical control ability and muscle explosiveness in children while improving their coordination, proprioception and speed.

Taekwondo projects can develop preschooler's physical flexibility, lower limb strength and proprioception. Taekwondo is a leg-based sport. Due to competition requirements, rules and restrictions, Taekwondo techniques mainly consist of leg attack (accounting for about 70%). It includes technical actions such as cross kicks, splits, backward kicks, whirlwind kicks, etc. (Gang, 2019). Taekwondo is a combative sport, so athletes need to stay focused all the time (Benli, 2016). Therefore, the Taekwondo project can successfully develop lower limb strength and flexibility. Because it requires athletes to constantly change movements, their proprioception can improve significantly.

Roller skating can develop balance and lower limb strength in preschoolers, as well as their overall coordination and control ability. In the preparatory stage and the learning process, roller skating can exercise body strength. The programme also requires the athlete to perform some difficult movements in complex and variable situations (Mingyue, 2014). Therefore, roller skating exercises can lead to the development of preschooler's lower limb strength. As this sport constantly improves the body control ability, it can also help preschoolers improve their overall coordination and balance.

At the same time, it can be seen that different sports correspond to different methods of learning motor skills due to different curricular contents. Therefore, different projects promote physical fitness in different ways. For example, the football project focuses on preschooler's running, jumping and kicking skills, and physical fitness results show that it can significantly improve preschooler's lower limb strength. In basketball, racket and dribble skills are fundamental, and the results show that it can improve preschooler's upper limb strength. In the fitness project, skill learning is multifaceted, which is why the corresponding promotion of physical quality is also multifaceted.

There is a certain correlation between the development level of motor skills and the physical fitness of preschoolers. Scholars have conducted some research on this topic. Thus, there is a positive correlation between the overall development level of preschooler's physical fitness and basic motor skills ($r = 0.15$, $p = 0.05$), and the higher the preschooler's physical fitness ability, the better the fine operation ability of their hands ($r = 0.17$, $p < 0.05$). In the individual physical fitness test, the muscular strength and balance ability shown in tennis shots and balance beam walk also have a strong correlation with the fine motor skills and the hand-eye coordination ability (Liu, 2019). Exercises for gross motor skills can improve agility, explosiveness, balance, coordination, leg, waist and abdomen muscle strength in preschoolers, but they have no practical significance for the development of flexibility in their case (Tao, 2017). Studies have shown that there is a moderately positive correlation between physical fitness scores and motor skill scores in preschool children (the first

canonical correlation coefficient: 0.585 for boys and 0.582 for girls), and the overall level of motor skills can explain 12% of the variation in the overall level of physical fitness. The overall level of motor skills involves different interpretation abilities for each individual item of physical fitness. Among them, the interpretation ability for balance beam items is the best (the coefficient of determination is about 0.25), and the interpretation ability for body flexion is the worst (the coefficient of determination is less than 0.1). The explanatory ability for shuttle run, standing long jump, tennis long shot and double-foot continuous jump is 0.1-0.2. Running, hopping, sliding, bouncing and hitting are closely related to the physical fitness of young children (the correlation coefficient is greater than 0.4). (Huan et al., 2019)

Conclusion

Regarding the choice of sports activities for preschoolers, first of all, they should experience a variety of sports activities. Secondly, in addition to considering their sports interests, parents should take into account the actual physical quality of their children when choosing a professional sports activity for them to learn. If the child's overall physical fitness is weak, it is recommended to choose physical training projects for preschoolers. If the development of lower limb strength, agility and speed is intended for the child, football projects are preferable. If the focus is on the development of physical flexibility and lower limb strength, the preschooler is recommended to engage in the Taekwondo project. If the development of upper limb strength and coordination is targeted, the early childhood basketball programme is the best. If the child's balance and overall coordination abilities are weak, the roller skating project is the most appropriate. Of course, when choosing a physical activity programme, the child's interests should also be greatly considered, because it is the key to whether the child will continue to practice or not.

From the perspective of sports science research on preschoolers, this paper compares and finds that the emphasis of different sports activities on the development of physical fitness in preschoolers is determined by the inductive analysis of the effects of these activities on children's physical fitness. Because the experimental groups and methods are different, this paper can only summarise the results with universality. Scientists still need to further study the quantitative differences in the effects of different types of physical activity on preschooler's physical fitness by using the same groups and research methods. At the same time, the learning of sports skills corresponding to different sports activities is different, and the final promotion of physical fitness is also different. At present, due to the lack of research on skill learning and physical fitness assessment in preschoolers, it is impossible to clarify the specific correspondence between the learning of each skill and physical fitness promotion. Further research should focus more on the experimental analysis of these two aspects, skill learning and physical fitness development, so as to better promote the improvement of preschooler's overall athletic ability.

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