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# Study on intervention strategies of kindergarten physical activities based on preschool children's physical fitness monitoring

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**Abstract.** In 2025, a systematic physical fitness health monitoring was conducted on 1,598 preschool children aged 3 to 6 in 6 kindergartens in ST Street, which objectively and clearly identified such problems as insufficient upper limb muscle strength, poor balance ability, weak lower limb muscle endurance, and stiff muscles and ligaments on the posterior side of the body. On this basis, kindergarten intervention strategies and a new semester physical exercise plan were proposed in a natural and appropriate manner, and implemented by means of creating a supportive environment, gamified training, and home-kindergarten co-education, so as to effectively promote the development of preschool children's physical fitness. Therefore, the new semester physical exercise plan is highly targeted and scientific, and can serve as a reference blueprint for kindergarten physical education.

**Keywords:** preschool children's physical fitness monitoring, intervention strategies, physical exercise plan

## 1. Introduction

Early childhood is a critical period for human growth and development, as well as a sensitive period for the development of basic motor skills and physical fitness. A comprehensive physical fitness health monitoring was carried out on 1,598 preschool children aged 3 to 6 in 6 kindergartens in ST Street from March to November 2024. The monitoring content included morphological indicators such as height, weight, body composition and chest circumference, as well as functional indicators such as grip strength, sit-and-reach test, balance beam, standing long jump, continuous two-foot jump and 15-meter obstacle run. The items with low compliance rates were grip strength, sit-and-reach test, 15-meter obstacle run and balance beam. An analysis and summary revealed prominent problems among the monitored children, including poor upper limb muscle strength, insufficient balance ability, weak lower limb muscle endurance, and stiff muscles and ligaments on the posterior side of the body.

A clear and reliable longitudinal analysis of various indicators from 2024 to 2025 shows that the growth and development indicators such as children's height and weight have increased normally, and motor abilities such as standing long jump and continuous two-foot jump have improved significantly, but balance ability has shown a downward trend, chest circumference indicators have a slight decrease, and the improvement of

flexibility is not obvious. Therefore, it can be naturally and appropriately concluded that there exist the problems of emphasizing skills over physical fitness and focusing on outcomes over processes in the current physical activities of kindergartens.

From the perspective of gender differences, it can be clearly and reasonably seen that male children have a slightly larger range of progress in indicators such as strength and explosive power than female children, while the two genders have basically the same progress in coordination and agility items. Therefore, gender differences should be taken into account in intervention to adopt targeted measures based on gender.

## 2. An in-depth analysis of the causes of preschool children's physical fitness health problems

### 2.1. Restricted activity environment and sports opportunities

Due to the limited living space in modern urban areas, preschool children have scarce outdoor activity spaces. Thus, it can be naturally and appropriately found that the average daily outdoor activity time of children in kindergartens in ST Street is less than 1.5 hours, 0.5 hours lower than the national recommended standard of 2 hours. More seriously, the indoor and outdoor activity facilities of kindergartens are monotonous, lacking specialized equipment conducive to the development of muscle strength, resulting in an acute shortage of actual muscle stimulation for children. Many kindergartens restrict large muscle activities such as running, jumping and climbing from a safety perspective, which directly reduces the opportunities for children's muscle strength development.

Similar problems can be clearly seen in the family environment: at present, the vast majority (more than 60%) of children engage in sedentary activities (watching TV, playing mobile phones, etc.) in their spare time, while less than 30% of children have truly regular outdoor activities every day. Therefore, the sedentary lifestyle directly leads to retarded development of children's muscle strength, with obvious weakness in upper limb grip strength and lower limb endurance.

### 2.2. The influence of upbringing methods and behavioral habits

Excessive protection is very common in modern family education, so parents often restrict children from engaging in sports games with obvious risks such as climbing and running for fear of their injuries, which directly hinders the development of children's balance ability and reduces their risk avoidance ability. It can be clearly seen from the existing monitoring data that there is a correlation between the declined performance in the balance beam test (increased completion time) and this phenomenon.

At the same time, since kindergarten teachers pay more attention to the cultivation of children's awareness of rules and collective concept when organizing physical activities, they seldom take the initiative to focus on the development of children's individual motor skills. Therefore, children with retarded motor skill development in group games are easily marginalized and cannot obtain sufficient and appropriate practice opportunities, which naturally leads to an increasingly obvious individual difference. More specifically, about 30% of children occupy 70% of activity resources in physical activities, and the remaining children have very limited practice opportunities.

### 2.3. Nutritional and sleep factors

It can be clearly and hierarchically seen from the current monitoring data that although children's height and weight have increased normally, the chest circumference has a slight decrease, which is most likely caused by

the inadequate development of respiratory muscles. The more fundamental reason is that children's diet overemphasizes high-protein and high-nutrition foods while neglecting the cultivation of chewing ability, thus affecting the development of facial and respiratory muscle groups.

In addition, since the sleep duration and sleep quality of children are of great significance, it can be clearly and definitely seen from the existing data that about 40% of children in kindergartens in ST Street sleep less than 10 hours every night, which affects the secretion of growth hormone and muscle recovery, and more directly hinders the positive promotion effect of the rapid eye movement sleep stage on the development of children's nervous system and motor coordination ability.

## 3. Comprehensive intervention strategies and implementation measures for kindergartens

### 3.1. Preventive intervention strategy: creating a supportive environment

Preventive intervention is the most effective way to solve the physical fitness health problems of preschool children [1]. Therefore, kindergartens should take the initiative to optimize the physical environment in a planned way, arrange activity spaces reasonably, and make the activity areas safe, spacious and diverse. Specific measures include adding multi-functional sports equipment such as climbing frames, balance beams and throwing targets, dividing the venue into strength training area, balance training area and flexibility activity area in a natural and reasonable way, and ensuring a sufficient quantity of various equipment to prevent children from losing interest due to long waiting.

The creation of the environment should have a clear and sufficient educational awareness. Kindergartens should post demonstration diagrams of standard movements on the walls and arrange interesting sports tracks on the ground to guide children to carry out physical activities in a natural and reasonable way. More importantly, it is necessary to create a "challenging environment" and set up activity areas of different difficulty levels according to children's different ability levels, so that each child can find activity items consistent with their own development level [2] and effectively gain a sense of accomplishment and self-confidence from participating in activities.

The creation of a psychological environment is of clear and great significance [3]. Teachers should take the initiative to create a class atmosphere where children dare to try and do not fear failure, and give timely verbal encouragement and specific and appropriate non-verbal support when children attempt new movements, thus helping children establish a positive sports self-concept in a natural and appropriate manner. Empirical evidence also shows that a positive psychological environment is conducive to the development of preschool children's initiative and persistence in physical activities.

### 3.2. Targeted intervention strategy: gamified training programs

To address the problem of weak grip strength, it is advisable to design life-oriented and gamified hand muscle training activities: first, organize the "Little Porters" game, letting children carry building blocks, bean bags and other items by lifting, grasping, holding, clipping and other methods; then carry out "Creative Kneading and Molding" activities, naturally exercising children's small hand muscles by playing with plasticine and crumpling paper; finally organize an "Equipment Grasping Competition", letting children hang on a bar with one hand for as long as possible. These activities are connected with each other, which is not only conducive to enhancing children's hand muscle strength, but also to the development of their hand-eye coordination ability.

To solve the problem of poor balance ability, it is necessary to design progressive balance games in a planned and hierarchical way: first, carry out the "walking along a straight line" game, then "walking on a low balance beam", followed by "carrying objects while walking on a balance beam", and finally conduct "group balance cooperation games". All games are naturally and appropriately integrated into daily outdoor activities, lasting 10 to 15 minutes each time [4]. There is clear and reliable evidence that systematic balance training for 12 to 16 consecutive weeks can improve preschool children's balance ability [5-7]. Therefore, it is also advisable to introduce traditional games such as "Hopscotch" and "Shuttlecock Kicking" in a timely manner, which are not only popular with children, but also can well promote the development of balance abilities such as single-leg standing and body control.

In view of the weak lower limb muscle endurance, interesting lower limb strength training can be designed in a natural and reasonable way: first, carry out the "Animal Imitation" game, letting children imitate movements such as frog jumps, rabbit hops and pony runs; then conduct the "Obstacle Challenge" activity, organizing practice of stride jumps and two-foot jumps with obstacles of different heights; then launch "group relay games". It is important that all activities should advance in an orderly manner and avoid being eager for quick success, so as to prevent sports injuries.

For the stiff muscles and ligaments on the posterior side of the body, targeted flexibility games and activities should be designed: first, carry out the "Object Reaching Game", letting children take the initiative to reach for objects a little far away; then conduct the "Body Imitation Game", letting children imitate the postures of various animals (such as a kitten stretching); then compile "flexibility exercises" and carry out whole-body flexibility exercises in a natural and hierarchical way with music. Most importantly, flexibility activities should be arranged after warm-up.

### 3.3. Home-kindergarten co-education strategy: forming an educational synergy

The family is the most natural and important place for children's activities, so home-kindergarten co-education has a direct and significant impact on consolidating the intervention effects of kindergartens [8]. Kindergartens should take the initiative to establish a home-kindergarten coordination mechanism, feed back the development of children's physical fitness to parents in a planned and systematic way, and provide family exercise guidance plans. Specifically, kindergartens can compile the Family Physical Fitness Game Manual to guide parents to carry out simple physical activities by making use of the family environment, and record children's daily activity performance and progress with home-kindergarten contact books.

Organize parent-child sports activities such as parent-child sports meets and Outdoor Adventure Days in a planned and systematic way every month, allowing parents to directly experience the fun and value of children's physical activities, master scientific guidance methods, and make parents naturally become good role models for children's physical exercise [9]. In addition, kindergartens can organize health lectures and parent workshops in a planned and systematic way, and naturally invite pediatricians and physical training experts to systematically and scientifically explain the importance of preschool children's physical fitness health and the promotion methods to parents. Existing research also confirms that parents' attitudes towards physical activities are directly related to children's activity interest and physical fitness development [10] (see Table 1).

**Table 1.** Key implementation points of kindergarten intervention strategies

| Intervention Type | Main Objectives | Specific Measures | Implementation Time | Expected Effect |
|---|---|---|---|---|
| Preventive Intervention | Create a supportive environment | Optimize space layout and add multi-functional equipment | Long-term implementation | 30% increase in children's activity opportunities |
| Targeted Intervention | Enhance muscle strength | Gamified training and life-oriented operations | 20-30 minutes every day | 0.5-1kg increase in grip strength |
| Home-Kindergarten Co-education | Form an educational synergy | Parent-child activities and family guidance | 1-2 times a week | 50% increase in family activity time |

# 4. Formulation and implementation of the new semester kindergarten physical exercise plan

## 4.1. Design of a systematic training program

The new semester physical exercise plan should implement the principles of comprehensiveness, progressiveness and interest, and take into account the balanced development of various physical fitness indicators. Therefore, based on the results of preschool children's physical fitness monitoring, it is advisable to strengthen the training of upper limb strength, balance, lower limb endurance and flexibility in a conscious and planned way.

Design of morning activities: Arrange 15-20 minutes of light and gentle whole-body activities every morning, which are naturally and reasonably divided into three parts: (1) Preparatory activities (5 minutes): Do rhythmic exercises and imitative exercises to first awaken the body and arouse emotions, and then appropriately raise the body temperature. (2) Thematic activities (8-10 minutes): Carry out key activities according to the content specified in the weekly plan, such as hand muscle training on Monday and balance practice on Tuesday. (3) Relaxation activities (3-5 minutes): Do simple stretching exercises to make the body transition to a quiet state in a natural and steady way. Morning activities should be full of interest, accompanied by cheerful music and created game scenarios to effectively arouse children's enthusiasm for participation.

Design of outdoor activities: Ensure at least one hour of outdoor activity time every day, which is divided into free activity and group activity. The free activity time is 20-30 minutes, during which children can freely choose activity items and partners, and teachers mainly provide individual guidance; the group activity time is controlled within 30-40 minutes, mainly goal-oriented game activities, such as "Squirrels Transporting Food" (for grip strength training), "Ponies Crossing the River" (for balance practice), "Frogs Jumping on Lotus Leaves" (for lower limb strength training), etc. In addition, attention should be paid to arranging outdoor activity time according to seasons, avoiding the noon heat in summer and making the most of sunny periods for outdoor activities in winter as much as possible.

Design of indoor activity areas: For days when outdoor activities are not possible due to bad weather, kindergartens should arrange various multi-functional activity areas in the classroom in a planned and hierarchical way: place large building blocks in the construction area to develop children's grasping and carrying abilities; provide paper tearing and bead stringing materials in the art area to exercise children's small hand muscles; place cushions in the reading area for children to do flexibility exercises. At the same time, it is necessary to make rational use of space and effectively do a good job in safety protection.

## 4.2. Personalized and differentiated adjustment

There are obvious individual differences in the physical fitness development of preschool children, so the physical exercise plan should naturally and reasonably take into account age differences and ability levels at each stage: the junior class (3-4 years old) focuses on basic motor skill learning and simple games, with the key to cultivating motor standardization and participation interest; the middle class (4-5 years old) appropriately raises the requirements for motor complexity and coordination to consolidate motor skills; the senior class (5-6 years old) should strengthen motor proficiency and application ability, and appropriately introduce competitive and cooperative elements.

Preschool children with weak physical fitness have special development needs, so teachers should design individualized guidance plans for them, reasonably reduce the difficulty of activities, extend the time of individual tutoring, and naturally and appropriately establish a "Buddy Help System", letting children with strong abilities drive the participation of children with weak abilities, so as to promote communication and effectively improve activity effects.

Since male children make relatively fast progress in strength and explosive power, it is advisable to appropriately increase challenging activities, while female children have obvious advantages in flexibility and coordination, so teachers should design various types of activities to promote the balanced development of physical fitness of children of different genders.

## 4.3. Establishment of a monitoring and evaluation system

To ensure the smooth and effective implementation of the physical exercise plan, it is advisable to establish a scientific and rational monitoring and evaluation system: conduct a simple evaluation of children's physical fitness every month, a formal assessment at the end of each month and a comparative analysis with baseline data, and a systematic and comprehensive summative evaluation at the end of the semester.

Evaluation tools should include: teachers use observation records to systematically and plannedly record children's interest, attitude and behavioral performance during activities; use skill assessment forms to clearly evaluate various motor skills and objectively record children's motor skill development levels; use physical fitness monitoring data to regularly measure children's grip strength, standing long jump, sit-and-reach test and other indicators and their changing trends; use the work analysis method to collect children's paintings, handicrafts and other works in activities, which can naturally and appropriately reflect the development of small muscles. At the same time, the system of regularly feeding back children's progress and providing parents with family exercise suggestions can effectively promote the development of preschool children's physical fitness health (see Table 2).

**Table 2.** The new semester physical exercise plan (senior class example)

| Week | Morning Activities | Outdoor Activities | Indoor Activities | Key Development Objectives |
|---|---|---|---|---|
| 1-2 | Hand exercises, grasping games | Equipment climbing, throwing target practice | Bead stringing, paper tearing activities | Enhance upper limb muscle strength |
| 3-4 | Balance exercises, walking along a straight line | Low balance beam, single-leg jump games | Walking on tiptoes, hand balance practice | Improve balance ability |
| 5-6 | Jumping exercises, imitative jumps | Standing long jump, obstacle jump | In-situ jumps, rope skipping | Develop lower limb strength |
| 7-8 | Flexibility exercises, sit-and-reach test | Gymnastics games, stretching activities | Yoga imitation, stretching exercises | Improve body flexibility |

# 5. Discussion and suggestions

## 5.1. Expected effects and influencing factors

Since the proposed intervention measures and the designed physical exercise plan are very reasonable, the following effects can be expected in a natural and appropriate way: the enhancement of children's upper limb muscle strength will lead to an increase of 0.5-1kg in grip strength indicators; the obvious improvement of balance ability will result in a 20%-30% reduction in the completion time of the balance beam test; the enhancement of lower limb muscle endurance will bring a 15%-25% improvement in the performance of the obstacle run and continuous jump; the body flexibility will also be improved accordingly, with an expected 2-4cm improvement in the sit-and-reach test results.

However, since the intervention effect is affected by various factors, it can be naturally and appropriately analyzed from the perspective of teachers' professional literacy: teachers' attitudes towards physical activities, guidance ability and innovative awareness are all important variables, so kindergartens should consciously and plannedly strengthen the training of teachers' ability to organize and guide physical activities. Similarly, the level of family support has a direct and clear impact on the intervention effect, and parents' attitudes, participation and cooperative behaviors are all related to the cultivation of children's physical activity habits. Kindergarten facilities, curriculum arrangements and social resources also play corresponding roles.

## 5.2. Implementation challenges and coping strategies

Two clear and hierarchical problems are inevitably encountered in the implementation process: first, safety factors restrict activity content, especially balance and climbing activities, so it is necessary to take active and sufficient safety protection measures, namely appropriately lowering the height of equipment, adding protective mats and strengthening adult supervision. Second, teachers' work pressure leads to inadequate implementation of intervention measures, so it should be solved by rationally distributing work tasks, providing sufficient teaching resources and establishing a teacher cooperation mechanism.

Since individual differences exist objectively, children make progress at different speeds. Therefore, teachers should take the initiative to observe carefully, adjust the difficulty and requirements of activities in a timely and appropriate manner, provide individualized guidance for children, attach importance to children's progress rather than results, and thus naturally and appropriately establish a positive encouragement mechanism.

## 5.3. Multi-angle suggestions

From the perspective of educational administrative departments, it is necessary to actively and effectively guide the physical education work of kindergartens, establish and improve an evaluation system for physical education work, and increase investment in physical education funds, so as to create sufficient conditions for kindergarten physical activities. In terms of kindergarten management, it is advisable to clearly incorporate the promotion of preschool children's physical fitness health into the kindergarten development plan, arrange the curriculum reasonably, ensure the daily physical activity time, and pay close attention to teacher training.

From the perspective of teacher development, teachers should take the initiative to learn the theory and methods of preschool physical education, effectively improve their abilities to design, organize and guide physical activities, and pay attention to observation and recording, as well as timely reflection and improvement, so as to naturally and reasonably improve their professional level. From the perspective of parental participation, parents should establish a correct view of health, actively cooperate with the work of kindergartens, and create a good family sports atmosphere.

## 6. Conclusion

Based on the analysis of the physical fitness monitoring data of 1,598 children in ST Street, this paper puts forward kindergarten intervention strategies and a new semester physical exercise plan in a natural and hierarchical way: first, clarify the problems of preschool children such as insufficient upper limb muscle strength, poor balance ability, weak lower limb muscle endurance and poor body flexibility; then propose intervention methods such as creating a supportive environment, gamified training and home-kindergarten co-education; finally design a systematic and personalized physical exercise plan.

The promotion of preschool children's physical fitness health is a systematic project requiring the joint efforts of kindergartens, families and society. Therefore, in the future, it is advisable to develop effective intervention methods based on the laws and characteristics of preschool children's physical fitness development, effectively improve the theory of preschool physical education, and thus naturally and appropriately promote the all-round development of preschool children.

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