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Designing a Fundamental Movement Training Program to Improve Basketball Skills in Elementary Schools' Student

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Abstract

Background and Aim: Elementary school children have a strong curiosity and basketball is one of the most interesting sports for them. At the same time, basketball has a large number of complex movements, and the level of proficiency is often indicative of the level of skill. Therefore, this research was to design a fundamental movement training program and study the effects of a fundamental movement training program on basketball skills in primary school students, by comparing basketball skills in primary school students before training, after 3 weeks of training, and after 6 weeks of training.

Materials and Methods: This study is an experimental type of study to improve basketball skills by training 30 primary school students in fundamental movement skills. The duration for training is 6 weeks, 5 days a week, 80 minutes of training per day, through the test data before the experiment, after 3 weeks, after the test, through statistical analysis.

Results: The steady increase in basketball skill scores of the 30 primary school students aged 8-10 years old who participated in the basketball classes tested before, after three weeks, and after six weeks of the experiment can be concluded that fundamental movement training improves the basketball skills of primary school students.

Conclusion: In this experiment, compare mean comparison of TGMD, shooting, Dribbling, and Passing with pre-test After 3 weeks and post-test by way of ANOVA repeated measurement and post hoc with Bonferroni. Through the statistical analysis of the results of this experiment, we will find that they compared with the match pair of TGMD in shooting, dribbling, and passing. All pairs showed significant differences and each value steadily increases with training. So, fundamental movement training can effectively improve the efficiency of learning basketball skills.

Keywords: Fundamental Movement Skills; Basketball Skills; Primary School Students

Introduction

In recent years, China has made great efforts to develop the sport of basketball and has introduced a series of policies and documents, one important step being the introduction of basketball into schools. Thousands of special basketball schools have been set up in China and formal school basketball tournaments are held annually in various provinces and cities to improve the economic level and enthusiasm of basketball players. At the elementary school level, China has an annual National Youth Basketball Open, which was founded in September 2017, under the guidance of the National Sports Administration's 13th Five-Year Plan for Youth and the Chinese Basketball Association's "Little Basketball Rules". The tournament was established in September 2017 under the guidance of the National Sports Administration's 13th Five-Year Plan for Youth and the China Basketball Association's "Little Basketball Rules". Its purpose is not only to popularize and improve basketball starting from primary school students but also to enable primary school students who participate in basketball to improve their physical fitness and grow healthily while improving their basketball skills. Primary basketball training promotes physical fitness.

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Basketball is a fast, flexible, and versatile sport and it is not easy to excel in basketball, so for elementary school students, focusing on basketball fundamentals will have a positive impact on their skills later in life. Ge (2023) concluded that through small basketball training, 8-12-year-old children's cardiorespiratory fitness, flexibility, explosive power, and reaction ability are improved, and also play a good positive effect on the strengthening of strength. For children in the "twitching period" of growth, it not only strengthens the body and enhances the immune system, but also promotes the quality development of blood circulation and brain and other body functions and promotes the healthy development of the body and mind. In China today, elementary school students are much less fit than they used to be, which makes it more difficult for them to master good basketball skills. Therefore, improving the physical fitness of elementary school students is something we need to do urgently. At the elementary school level, we encourage students to participate in various sports to improve their physical fitness and health, especially in the more comprehensive sports such as basketball and football, but these sports are often complex and variable, making it difficult to master the correct technical movements. Any physical activity requires the participation of fundamental movements, and movement development research has classified movement skills into fundamental movement skills, transitional movement skills, and specialized competitive sports based on the difficulty and sequential nature of movement patterns (Zhu, et al, 2019).

The fundamental movements are the basis for learning other complex movements and are linked to basketball in terms of running, jumping, throwing, and control of things. This research was conducted the fundamental movement training on basketball skills. This research aimed to improve the fundamental motor skills of students participating in the basketball program at Guo Long Elementary School aged 8-10 years old, by testing the level of basketball skills before and after the training, to determine whether fundamental movement training contributes to improved performance in their basketball abilities. Through a practical and efficient experiment, this study will utilize well-documented and realistic experimental data to analyze and draw conclusions regarding the impact of fundamental movement training on the basketball skills of elementary school students.

Objectives

1. To study the effects of a fundamental movement training program on basketball skills in primary school students.
2. To design a fundamental movement training program to improve the basketball skills of primary school students.
3. To compare the effects of a fundamental movement training program on basketball skills in primary school students before training, after 3 weeks of training, and after 6 weeks of training.

Literature Review

Fundamental Movement Skills

Fundamental Movement Skills refer to the body's ability to coordinate and use fundamental movements and can be seen as the basis for the development of specific movement skills (Ma & Song, 2017).

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Led by Professor Barnett from Deakin University in Australia, academics from physical education, competitive sport, biomechanics, and public health backgrounds from Australia, the United States, the United Kingdom, and other European countries have redefined Fundamental Movement Skill (FMS) in 2016. Fundamental movement skills are defined as the non-naturally occurring Fundamental movement learning mode of the human body, which is the foundation of complex physical activities and sports activities. The operational definition is based on three subcategories of kinetic energy-related actions; (1) Mobile skills: specific forms of movement such as walking, running, jumping, sliding, etc; (2) Object control skills, such as grasping, throwing, kicking, catching, hitting, etc; (3) Stability skills such as rotating, turning, bending, etc. It can be seen that according to the definition of this operation, the measurement system of Fundamental movement skills can be divided into “Movement skills", "object control skills", and "stability skills" which are three measurement dimensions (Li, 2022).

The teaching of fundamental movement skills for children in China is focused on displacement skills, neglecting the development of object control and stability skills. Teachers or coaches spend a lot of time and energy on teaching children individual movement skills with a higher safety factor, such as walking, running, jumping, and throwing, and less on developing children's stability skills and object control through gymnastic activities such as handstands, tumbling, spinning, crawling and grasping, as a result, the fundamental movement training of children in China is limited in its role as an aid to the training of specific motor skills later in life (Yi, 2022).

Basketball skills

Basketball skills are specialized combinations of movements and their variations used by athletes to achieve offensive and defensive objectives in competition. (Sun, 2007). Basketball skills are centered on offensive and defensive confrontation, the use of the technique is open and non-periodic, and technical movements are often used in non-routine combinations, showing a combination of paradigms and variations. In terms of similarity of the purpose of movement combinations, basketball techniques are classified into 5 categories: technical fundamentals, shooting techniques, ball acquisition techniques, ball domination techniques, and one-on-one techniques (Li, J.K, 2008).

Principle of training

Tian (2010), author of "Sports Training", updated the Fundamental principles of training in his article on dialectical thinking about sports training principles, namely, the principles of guiding motivation and health protection training, the principles of competitive needs and differentiated treatment of training, the principles of systematic persistence and periodic arrangement of training, the principles of appropriate load and timely recovery of training, forming a theoretical system of dialectical and cooperative sports training principles for scientific guidance of sports training activities.

Human Development for Child

The HDI consists of three Fundamental indices, namely the Health Index, the Education Index, and the Income Index, and the HDI is calculated by taking the geometric mean of the three Fundamental indices (Hao, 2020). Children's development is a reality that takes place in everyday situations and is more complex, contextualized, and presents a wider range of perspectives than traditionally researched accounts(Dahlberg, G., Moss, P., & Pence, A. R, 1999).

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The book Introduction to Child Development states that "development" refers to "the process of development, growth, differentiation, maturation, and change in the physical, physiological, psychological and behavioral aspects of an individual". Broadly speaking, "development" refers to "the process of continuous changes in the individual's body and mind as a whole, not only quantitative changes, but more importantly qualitative changes, such as changes in the proportions of the various parts of the body, and psychological changes such as changes in the structure of the intellect, changes in emotions, etc.". mainly refers to the process from immaturity to maturity, which is an integral part of the development of an individual throughout his or her life. (Qin, 2008)

Lu (2020) defined child development as a child's acquisition of new skills and abilities, increased adaptability, and attainment of behavioral and functional maturity through learning from the theories of scholars, which is manifested in the four main areas of children's physical, cognitive, linguistic, and social development. In this study child development refers to child development outcomes in a narrow sense, including child language development, cognitive development, and social cognitive development.

Related Research

Localize research

The research on children's FMS in China started relatively late. In 2005, scholars such as Li Jing introduced the American Large Muscle Movement Development Test (TGMD-2) based on introducing the development of Fundamental movement skills- globalize (international /outside your country) (Li &Liang, 2005).

The development of Fundamental movement skills has a positive impact on children's physical activity. (Ma & Song, 2017)

In the Fundamental skill training of basketball, targeted training on the characteristics of attention, muscle motion sensation, and the ability to respond to movement objects can effectively improve the basketball technical level of young athletes. In the process of becoming familiar with and mastering Fundamental techniques, it is of far-reaching significance to gradually increase the complexity, difficulty, and variability of training, while improving Fundamental techniques and enhancing the tactical awareness of juvenile basketball (Wang, 2009).

Some scholars in China believe that basic motor skills are the building blocks of movement and the most important means of exploring the world and that they have a positive impact on the development of physical activity habits and healthy weight control as children grow up. Learning fundamental movement skills is a prerequisite for learning to dance, play, participate in sports, compete, and so on (Fu, 2022).

The only way to improve students' fundamental movement skills is to reinforce and optimize the learning of fundamental movement skills in the early years of primary school. Improving movement skills in Years 3 to 9 in combination with gamified sport and physical activity learning makes it possible to use the knowledge and skills already acquired in sport to participate in sport, solve real sporting problems, and enhance students' core literacy in movement skills (Pan, 2022).

Fundamental movement skills contribute to sport-specific skills in several ways: firstly, they help to develop children's physical fitness. The learning of fundamental movement skills builds up children's physique, which provides strong physical motivation for the learning of sport-specific skills; secondly, it helps to improve children's movement accumulation. Secondly, it helps to improve children's movement accumulation. The fundamental movements accumulated during the

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learning of basic motor skills may be repeated in specialized motor skills, so the learning of fundamental movement skills lays the movement foundation for specialized motor skills; thirdly, it helps to stimulate children's interest in sports.

Foreignize research

The first person to introduce the terminology of Fundamental movement skills was the American scholar Beisman, who, in his investigation of the effects of rhythmic accompaniment on movement learning, first referred to the movements of change of direction running, throwing, jumping, catching, balancing, straddling, tapping the ball, climbing, and hitting were collectively referred to as Fundamental movement skills (Beisman, 1967).

Movement skills are the integration of a range of movement skills, and Fundamental movement skills are used as the foundation for movement skills. Fundamental movement skills are the unnaturally occurring Fundamental movement learning patterns of the human body it are the basis for performing complex physical activities and sporting activities (Barnett, et al, 2016).

The 'peak theory' of movement skill development suggests that Fundamental movement skills are the cornerstone of active participation in organized and unorganized physical activity for children, young people, and adults (Clark, & Metcalfe, 2002). Fundamental movement skills may seem simple, but they do not automatically develop as children grow older and develop physically (Clark, 2005). Careful teaching, practice, and reinforcement are needed for children to understand and master(Goodway & Branta, 2003). Studies have shown that no more than 40% of children can master Fundamental movement skills well in the absence of effective skill transfer from teachers (Okely & Booth, 2004).

Until the age of 12, the development of basic motor skills can be divided into a formative stage and an application stage. Only when basic motor skills are acquired during this period can children adapt to different sports in the future and increase their sense of self-efficacy in sports (Clark, & Metcalfe, 2002).

Poor development of fundamental movement skills in early childhood will hurt the development of basic motor skills in the future. Failure to acquire fundamental movement skills in childhood can have a serious negative effect on physical activity participation (Barnett, et al, 2016).

E. Clark has considered the development of motor skills from a lifelong developmental perspective and has proposed a sequence of motor skills development and cumulative characteristics, which was elevated to the "mountain of motor development" theory in 2002. The theory suggests that children's basic motor skills are formed between the ages of 1 and 7 and that children's fundamental movement skills are used between the ages of 7 and 12. Only when children master their basic motor skills during this period can they adapt flexibly to different sports and sporting environments in their future school life and lifelong sporting activities, increase their confidence in sports, and increase their willingness to participate in physical activity on their own (Clark, & Metcalfe, 2002).

Summary of Literature Review

Through a series of domestic and international content related to fundamental movement skills training, we know that the concept of fundamental sports training is relatively consistent in all countries, and all countries in the world still attach more importance to fundamental movement training, but due to the different development time of fundamental movement training in each

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country, resulting in obvious gaps in the relevant theory and practical research on fundamental movement training, among which Canada, the United States, the United Kingdom, etc. Western countries have developed earlier, the fundamental theory is relatively mature, and the relevant training experiments are systematic and perfect.

From the relevant literature at home and abroad, fundamental movements are the basis for participation in all sports and do not naturally improve with age, they are a skill that needs to be interfered with, and as young children are a fast-growing group and a critical period of growth, interfering with their fundamental movement during this period will help them to better improve their mobility and will also have a positive impact on their participation in various sports. It will also have a positive impact on their participation in all sports.

Conceptual Framework

The conceptual framework for this research is as follows:

1. The independent variable is the fundamental movement training program.
2. The dependent variable is the improvement of basketball skills of 8-10-year-old students.

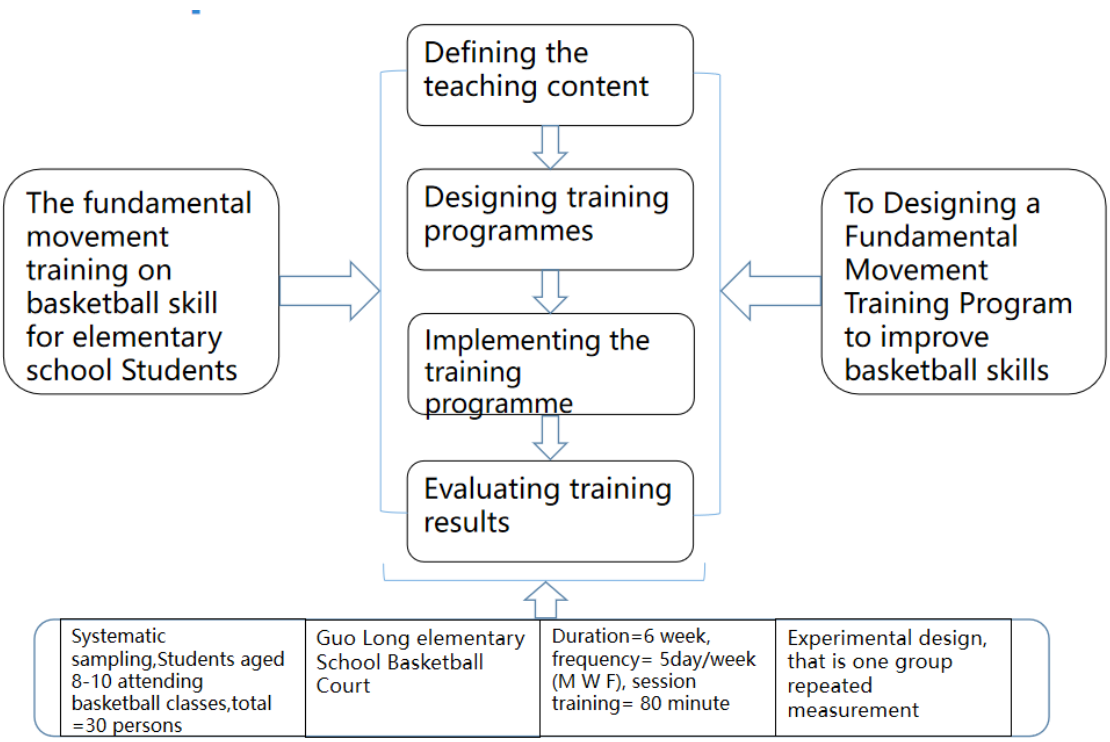

Figure 1: Conceptual framework of the research

Methodology

1. Research Tools

Training program: the program consisted of a 6-week duration with a frequency of 5 days a week for 80 minutes each time, including fundamental movement skills and basketball skills.

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2. Population and Sample

Subject selection: a certain number of participants were recruited who should have a certain level of basic motor skills in basketball to ensure comparability of results.

Population: 220 students of the 8-10 years old in elementary school students. This study refers to 8-10-year-old students who select an elect basketball class.

Sample: through the systematic sampling method, students aged 8-10 were sampled to attend basketball classes with a total of 30 persons.

3. Data collection

All participants were tested using standard basketball skill testing tools (e.g., shooting percentage, dribbling speed, passing accuracy, etc.) before the start of the trial, three weeks later, and at the end of the trial, and the data were recorded.

3.1. Observational and expert interview methods were used to design the fundamental movement training program.

3.2. Pre-testing using the TGMD test, and the basketball skills test was carried out and test data was collected before the start of the experiment.

3.3. Then train using the basic sports training program.

3.4. After 3 and 6 weeks of training, the test was conducted according to item 2 and the test data were collected.

5. The data collected were prepared for statistical analysis and analysis of the results of the experiment.

4. Data analysis

Comparison and statistical analysis of test results before the start and at the end of the trial to assess the effectiveness and impact of the training program.

3.1. Mean and Standard deviation

3.2. One-way ANOVA repeated measures: a statistical test used to analyze the differences between three or more related groups. It is specifically designed for situations where the same individuals or groups are measured under multiple conditions or time points.

3.3. Bonferroni post-hoc test: The Bonferroni post-hoc test is a statistical method used to make pairwise comparisons between multiple groups after analyzing variance (ANOVA). It adjusts the significance level to account for the increased probability of making a Type I error when performing multiple comparisons. The test helps identify specific group differences that are statistically significant.

3.4. In this study, a significance level of 0.05 was employed. The significance level, also known as alpha (α), is a predetermined threshold used to determine the statistical significance of results. By setting the significance level at 0.05, it indicates that there is a 5% chance of observing a significant effect or difference purely by chance. Results with a p-value less than or equal to 0.05 are considered statistically significant and provide evidence to reject the null hypothesis in favor of the alternative hypothesis.

Remark: This research's ethical approval has been granted by the Bangkokthonburi University ethical committee certificate no.128/2566.

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Results

The researcher has prepared the data and used it for statistical analysis to answer the research objectives and presented it as an accompanying table as follows.

Table 1 Mean and Standard Deviation of TGMD, Shooting, Dribbling and Passing (n=30)

Variables	Pre-test Mean± SD	After 3 Weeks Mean± SD	Post-test Mean± SD
TGMD (score)	13.83±3.03	16.03±2.70	18.80±2.99
Shooting (score)	14.40±3.42	16.50±3.24	21.13 ± 4.27
Dribbing (score)	11.93±2.65	14.00±2.05	16.43±2.03
Passing (score)	11.37±2.30	13.27±2.35	15.87±2.10

From the table 1, it was found that mean and standard deviation of Pre-test, after 3 weeks and post-test, TGMD (13.83+3.03,16.03+2.70 and 18.80+2.99), Shooting (14.40+3.42,16.50+3.24 and 21.13 + 4.27 score), Drubbing (11.93+2.65, 14.00+2.05 and 16.43+2.03) and Passing (11.37 +2.30,13.27+2.35 and 15.87+2.10) respectively.

Table 2 Compare Mean comparison of TGMD, shooting, Dribbling, and Passing with pre-test After 3 weeks and post-test by way of ANOVA repeated measurement and post hoc with Bonferroni.

Variables	Source	Type III sum of Squares	df	MS	F	sig
TGMD	Test	371.62	2	185.81	186.74	.00*
	Error	57.71	58	0.99		
	Total	429.33	60	186.80		
Shooting	Test	712.16	2	356.08	155.08	.00*
	Error	133.18	58	2.30		
	Total	845.34	60	358.38		
Dribbling	Test	304.42	2	152.21	148.18	.00*
	Error	59.58	58	1.03		
	Total	364	60	153.24		
Passing	Test	306.20	2	153.10	150.17	.00*
	Error	59.13	58	1.02		
	Total	365.33	60	154.12		

*P<0.05

From table 2, it was found that all variables were TGMD, shooting, dribbling, and passing. There were at least 1 pair significantly different at0.05.

Table 3 Compare with the match pair of TGMD, shooting, dribbling, and passing by Bonferroni.

Variables	Test	Pretest	After 3 Weeks	Post-test
TGMD	Pretest	xxx	2.20*	4.97*
	After 3 Weeks		xxx	2.77*
	Post-test			xxx
Shooting	Pretest	xxx	2.10*	6.73*

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Variables	Test	Pretest	After 3 Weeks	Post-test
	After 3 Weeks		xxx	4.63*
	Post-test			xxx
Dribbling	Pretest	xxx	2.07*	4.50*
	After 3 Weeks		xxx	2.43*
	Post-test			xxx
Passing	Pretest	xxx	1.90*	4.50*
	After 3 Weeks		xxx	2.60*
	Post-test			xxx

*P<.05

From table 3, it was found that they compared with the match pair of TGMD in shooting, dribbling, and passing. All pairs showed significant differences.

After 6 weeks of fundamental movement training, the 30 primary school pupils in the basketball class showed a steady improvement in both their fundamental movement skills and their basketball skills, both as a result of the visual increase in the actual measurements and as a result of the significant differences in the statistical analyses.

Therefore, it can be concluded that the fundamental movement training program designed by the researcher had a contributory effect in improving the basketball skills of primary school students.

Conclusion

In this experiment, we trained 30 basketball class students in fundamental movement skills, and the measured data of this experiment shows that not only the students' fundamental movement skills are steadily improving, but their basketball skills are also significantly improved. This is consistent with the theory of Tian, et al (2022) in their paper, that is, the learning of fundamental movement skills exercises children's physical fitness, provides strong physical motivation for the learning of specialized movement skills, and helps to perfect the accumulation of children's movements. The fundamental movements accumulated in the learning of fundamental movement skills may be repeated in the learning of specialized movement skills, so the learning of fundamental movement skills lays the foundation for the learning of specialized movement skills. Basketball is a flexible and versatile sport, and mastering fundamental movement skills can lay the foundation for the learning of basketball skills and improve the learning effect.

The experimental results of this basic motor skills training and the related literature show that it can be seen that the learning of basic motor skills not only improves the ability of body movement, body balance, and object control but also lays a solid foundation for participating in specific sports and makes the training more efficient. Adolescence is a critical period for learning basic motor skills, and we need to intervene adequately during this period to improve their basic motor skills.

Discussion

In this experiment, we trained 30 basketball class students in fundamental movement skills, and the measured data of this experiment shows that not only the students' fundamental movement skills are steadily improving, but their basketball skills are also significantly improved. This is consistent with the theory of Tian, et al (2022) in their paper, that is, the learning of fundamental

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Recommendation

I will describe how to improve the basic motor skills of primary school students from the following aspects.

1. It is suggested that primary schools with the necessary conditions can carry out the teaching of basic sports according to local conditions, for example, by making up their curricula and incorporating activities such as games and competitions, to enrich the contents of physical education teaching in primary schools.

2. In the process of actual implementation, various forms of sports should be combined, and basic sports skills suitable for primary schools should be selected according to the characteristics of students' physical and mental development, to promote the development of students' physical qualities and basic motor skills, with the lower grades playing games as the main form of implementation.

3. Regularly carry out special training for physical education teachers. To successfully carry out the basic motor skills program, physical education teachers must master the relevant motor knowledge and skills, and only teachers with solid basic knowledge and rich teaching experience can efficiently complete each lesson, only in this way can students learn the knowledge and skills slowly in each training course.

4. Focus on teaching students rather than teaching activities. Primary school students' learning and knowledge of basic motor skills is the focus of teaching. Therefore, the teaching should be organized according to the specific situation of the students, and the teaching should be based on teaching students how to learn and master basic motor skills, and communicating with the students in time and feedback, instead of organizing the teaching activities of the motor skills in a one-way direction for the sake of teaching a certain motor skill.

5. Focus on family education and encourage families to help students develop their basic motor skills. The family is a child's second school, and the behavior and habits of parents affect the development of their children's personalities. Parents need to pay attention to their children's physical and mental development, develop exercise habits, and discover their favorite sports. Children's basic motor skills are developed through community venues or specialized clubs to enhance problem-solving skills in everyday life.

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