

# Importance of physical activity in children

## 1. Present status of lifestyle and fitness among children

### (1) Physical Activity Guidelines for Children Around the World

The decline in physical fitness among today's children can partly be attributed to the decrease in physical activity in their daily lives. To address this problem, the WHO and many countries have published physical activity guidelines for children.



Based on Early Childhood Exercise Guidelines Guidebook (Ministry of Education, Culture, Sports, Science and Technology, 2012)

Figure 1 Physical Activity Guidelines for Children Around the World

All these guidelines recommend a total of at least 60 minutes of moderate- to vigorous-intensity physical activity daily for the sound development of body and mind. How to ensure this daily physical activity is the key for the healthy development of children.

The guidelines for the recommended level of children's physical activity have changed over the years with the changes in the social environment. The minimum required level of physical activity has gradually increased to reflect the trend of the times.

Recommending organization (year)	Intensity	Duration	Frequency
US President's Council (1961)	Vigorous-intensity physical activity	≥15 min	Daily
American College of Sports Medicine (1995)	Moderate-intensity physical activity	≥30 min	Daily
WHO (2010)	Moderate- to vigorous-intensity physical activity	≥60 min	Daily

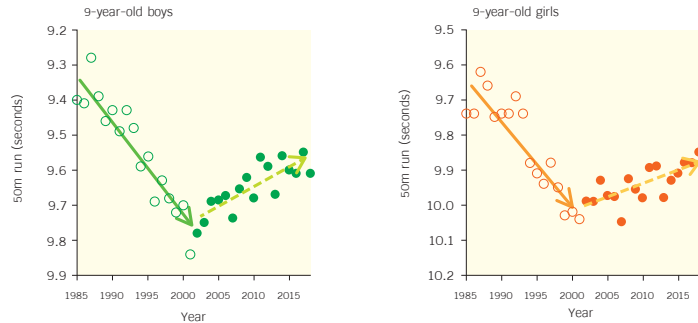
Table 1 Physical activity guidelines for children in the world (historical)

With these guidelines in place, we have promoted the Active Child Program (ACP) to provide opportunities for children to experience various physical movements and most importantly, enjoy physical activity. These initiatives are expected to foster children who engage in physical activity.

## (2) The present status of Japan

According to the Japan Sports Agency, Japanese children's physical fitness peaked in 1985 and declined sharply thereafter until around 2000. After that, while some categories in the annual physical fitness test showed improvement, the scores of many test items have still remained lower than those reported around 1985 when the overall level of Japanese children's physical fitness was the highest. This trend is especially obvious in fundamental motor ability such as running, jumping and throwing for elementary school children.

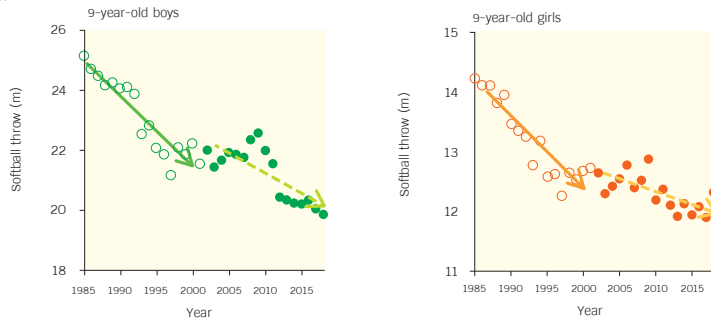
### Running: 50m



### Jumping: standing long jump



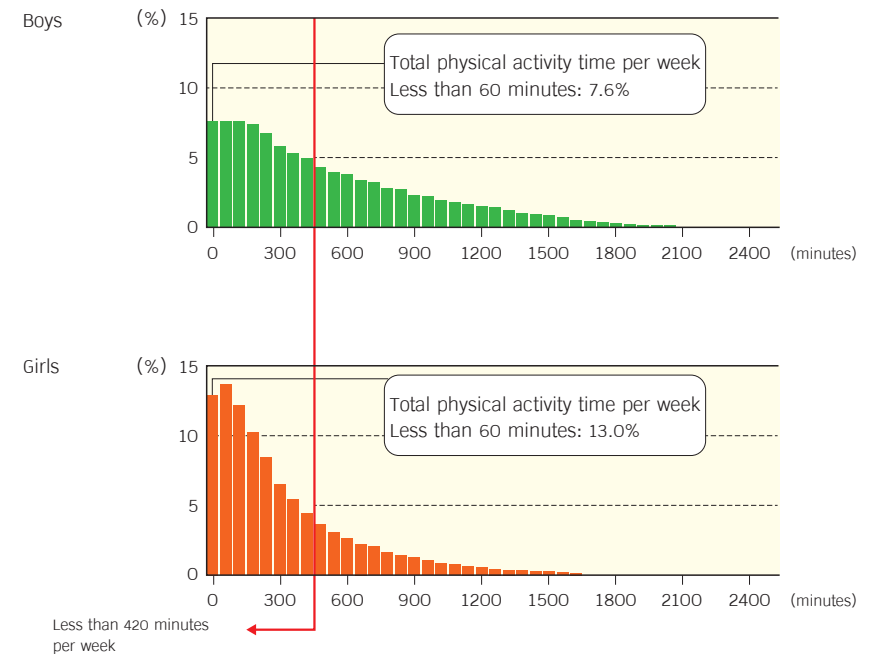
### Throwing: ball



Source: FY 2018 Survey on Physical Fitness and Athletic Performances (2019)

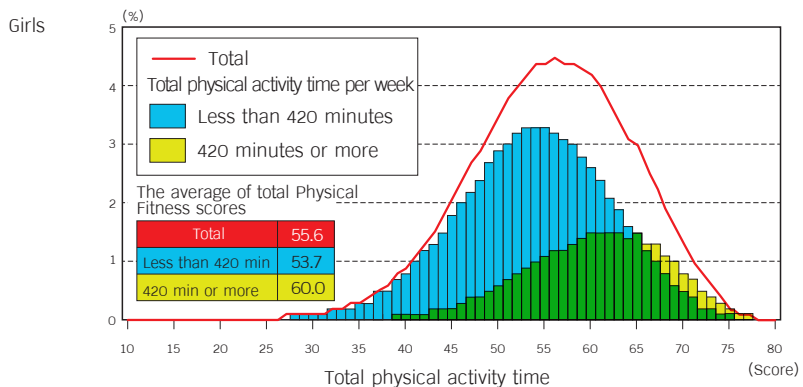
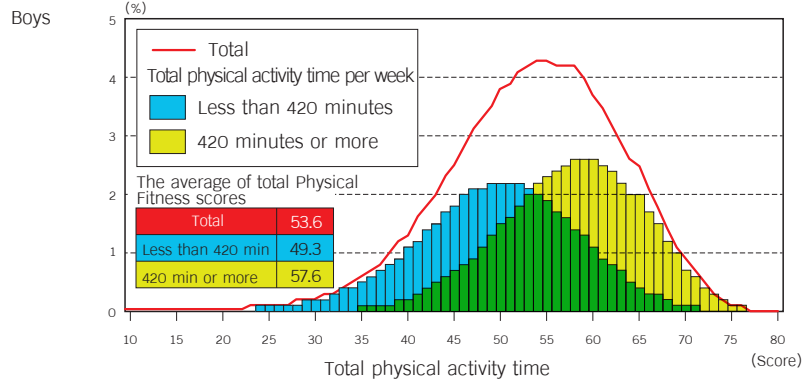
Figure2 Changes in children's physical fitness

This can generally be attributed to, among other things, the widespread disregard for the importance of physical activity as well as the changes in the social and physical environment surrounding children, which have made it difficult for them to find time, space and friends for physical play and sports. However, not all children have become alienated from physical activity and sports; some children are even more engaged in sports. The survey conducted in 2019 by the Japan Sports Agency noted the high proportion of children who rarely engage in physical activity (total time of physical activity is less than 60 minutes a week, Figure 3) and the widening gap in physical fitness between the children who engage in physical activity and those who do not (Figure 4).



Source: FY 2019 National Survey of Physical Fitness, Athletic Performances and Exercise Habits (2019)

Figure 3 Distribution of total physical activity time per week (Fifth-grade students)



Source: FY 2019 National Survey of Physical Fitness, Athletic Performances and Exercise Habits (2019)

Figure 4 Correlation between total physical activity time and total Physical Fitness scores (fifth-grade)

## 2. Significance of Physical Activity in childhood

When children engage in different activities using their entire minds and bodies, especially in early childhood, each experience builds on the other experiences to steadily develop their minds and bodies. Therefore, performing sufficient physical activities focused on play during childhood goes beyond helping them acquire diverse body movements (“nervous system”) to also enhance cardiopulmonary function and bone formation. This, in turn, enables them to lay the foundation (“lifestyle”) for leading enriched lives, which includes building lifelong health and positive attitude to everything (“willingness”). The following outcome from physical activity is expected as follows:

### (1) Improved physical fitness and motor ability

#### ① Improve physical coordination and basic ability to avoid danger

Physical fitness is the source of human activity and largely contributes to maintaining physical health as well as enhancing mental health such as improved self-motivation and mental energy. As such, physical fitness is important in our lives and in childhood as well. However, we should remember that physical fitness varies from person to person. If it is not enhanced appropriately to the development profile of each child, it will be ineffective and may even have adverse effects. The nerve system develops greatly in early childhood to about 80 percent of its adult capacity by the age of around five. During this period, the ability to coordinate motion, such as timing the movement of the body or controlling the power to use, greatly improves during this period. The ability to coordinate motion is important in learning new physical movements; enhancing this ability in one’s childhood is significant in that it helps form the foundation for developing motor ability after childhood.

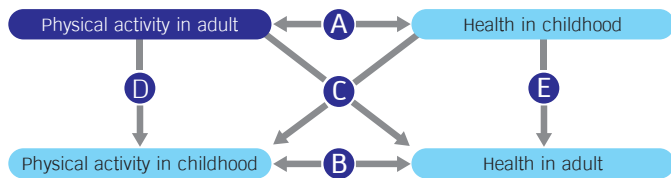
Particularly, the basic physical movement children learn during this period will help build the foundation for more complex play and physical activities (sports) as well as for protecting themselves from danger.

#### ② Enhance strength to maintain posture and increase endurance

In recent years, many adults realize that more children easily complain about fatigue and say that they are tired or cannot move anymore. Pre-school children who are physically active in kindergarten tend to show stronger muscle strength to support their body, which is measured by how long they can support their body weight with their arms while standing between two supports, putting one hand on each support and lifting their legs together off the floor. Also, studies have demonstrated that pre-school children attending kindergartens that have proactively introduced physical play programs show higher maximal oxygen uptake, which is a measure of general endurance. Muscle strength and endurance serve an important function in practicing more active play and exercise; they are also critical elements for physical fitness. This seems to hold true for children both under and at school age. Although muscle strength and endurance do not increase greatly in childhood, being physically active daily helps to gradually enhance endurance and cardiopulmonary function. It is important that children are given appropriate opportunities to develop muscle strength and endurance through active or continuous physical play.

### ③ Childhood exercise habits affect them as an adult

According to a follow-up survey of pre-school children conducted by the Ministry of Education, Culture, Sports, Science and Technology, children who graduated from kindergartens that focused on developing physical fitness tend to exercise more frequently, participate in sports club activities more and generally score better on the Ministry's new physical fitness test. These findings demonstrate that children who engaged in physical play in their childhood remain physically active in their later lives. It is also known that exercise habits in childhood have a positive impact on exercise habits in adults and, in turn, on health in adulthood (Figure 5). Physical fitness and motor ability of children build up gradually through the habit of engaging in physical play and regular lifestyle habits. In terms of building a foundation for lifelong mental and Physical Fitness, it is important for childhood to experience the fun of physical activity while they are young and eventually develop the habit of regular exercise.



Modified in part from Blair et al. (1989)

Figure 5 The relationship between physical activity and health (the carry-over effect of physical activity and health)

## (2) Development of a healthy body

### ① Establish lifestyle habits conducive to good health

The established habit of regular exercise promotes the development of physical functions, likely contributing to building lifelong health and active lifestyle habits. This will help reduce health risk in early childhood and the risk of lifestyle diseases such as high-blood pressure, dyslipidemia, myocardial infarction and diabetes later in life.

The children who complain of drowsiness and fatigue in the morning, being sluggish in everything they do, also complain of mental tiredness. When children engage in physical play, they become hungry, eat well and obtain sufficient fatigue to sleep well (Figure 6). By continuing to do so, children will become healthier in terms of reduced headaches, stomachaches and physical fatigue along with increased vitality and mental energy, acquiring the habit of regular exercise. For children, physical play will help maintain physical and mental health.

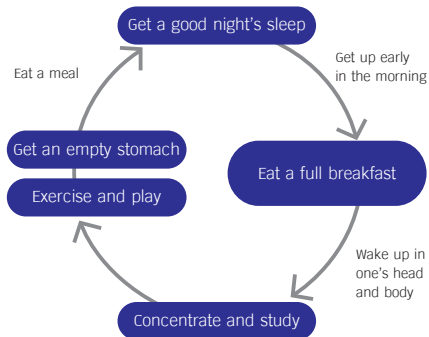


Figure 6 Lifestyle habits are a chain (a good chain)

### ② Develop a strong and balanced body

Obesity and being underweight can mainly be attributed to imbalanced nutritional intake and lack of exercise, which influence the bone formation as well. In addition to sufficient intake of calcium, vitamin D and other nutrients, adequate exercise is crucial for bone formation. Thus appropriate exercise will help develop a strong and balanced body and help prevent obesity and being underweight.

Playing well, eating well and sleeping well are important for the development of a strong and balanced body. An excess or shortage of any of the three is not desirable.

## (3) Development of a positive mind

### ① Develop positive attitude and perceived competence

For children, being vigorously active through, for example, physical play helps develop a positive attitude toward everything, and also nurtures a healthy mind. According to a survey of pre-school children by the Ministry of Education, Culture, Sports, Science and Technology, physically active children tend to show positive characteristics such as being self-motivated, patient, social and outgoing. Children who are observed as self-motivated tend to be more physically active, running around freely and playing together with many friends in kindergarten and nursery school.

This positive attitude is supported by a sense of competence, or a sense of can-do and self-confidence. Children gain the foundation of perceived competence in play and physical activity in childhood by accumulating successful experiences through physical play, and that perceived competence leads to active participation in physical or sports activity in later years. Children with perceived sport competence will grow up to love and participate in physical activity, but those with perceived incompetence will be unwilling to participate in physical activity. Therefore, it is important to create an environment that is designed to give children opportunities to accumulate successful experiences while enjoying physical play, as well as to enable children with different development profiles to participate in physical play together.

## (4) Development of social adaptability

### ① Help children to be able to control emotions and play harmoniously with other children

Children learn, through playing and interacting with many other children, that they need to follow rules, control themselves and communicate with others to cooperate and collaborate. Many children around five-six years old learn how to be leaders or fill certain roles in groups. It is essential that children interact with their family members, instructors and children in the same generation or groups as they grow up. Physical play or activity, especially organized play with rules or sports provide opportunities to stimulate social development. Physical play also helps release stress while giving the sense of refreshment and fulfillment.

## (5) Development of cognitive functions

### ① Support brain development and nurture creative minds

Many areas of the brain are involved when we engage in physical activity, from situational judgment to the actual movement of the body. In recent years, it is suggested that physical activity has potentially

positive impact on cognitive abilities. For example, a number of research studies have demonstrated that full body motion activities that require agile movement (e.g. turning around quickly), situational judgment or strategic thinking are effective in promoting the development of motor control and intellectual functions of the brain. These findings suggest that physical play and exercise (sports) may contribute to promoting the development of cognitive functions, going beyond the simplistic causal argument that physical exercise improves academic performance.

Space recognition ability is important for the brain to control movement. This ability enables us to accurately recognize the conditions of an object in 3-dimensional space (e.g. the position, direction, spacing or velocity). In the context of a sports game, for example, in a volleyball game, players make instant judgments about the speed, angle and trajectory of the ball, time their jumps accordingly and attack. This series of motions are caused by the movement involves the brain processing the information received from sensory functions such as seeing and hearing, which is followed by getting the body to react based on the information., or space recognition ability

Children learn to be creative while engaging in play and changing it by adapting and inventing new rules. Traditional children's play with a long history has local rules and ways of playing, demonstrating the creativity of children in playing.



### 3. Development characteristics of children

#### (1) Development of body and motor activity in early childhood

From birth to about age two, children grow rapidly in height and weight; after that, the growth rate slows and becomes gradual. However, the brain and nervous system continue to develop greatly in early childhood. With these distinctive physical changes, motor ability and movement patterns also change and develop greatly over several years of early childhood.

After acquiring walking skills and learning to walk on their own, and eventually to run around, children start to explore their surroundings and move even further afield. They approach what they find fun and interesting, thus building up new experiences. Therefore, providing an environment that will attract their attention and motivate them to move actively is desirable. Moving their bodies to react to what they come across will stimulate their motor functions and lead to the acquisition of new movement skills. It is important for children to actually feel the fun and enjoyment of physical activity through learning and experiencing new movements such as running, jumping, climbing, rolling over and throwing balls.

In terms of developmental change in movement patterns, children around three years old are generally timid and cautious in their movements. As they grow older, they gradually gain confidence, become active and move around more when they reach four to five years of age. They often behave recklessly but acquire coordinated movement through experiencing a wide variety of activities inspired by their imagination. Children acquire and become proficient at fundamental movement skills over early childhood. When they are around five to six years of age, they are more able to control their body movements, behaving in a more composed manner. As children grow, their movement skills develop so that they can perform more complicated movements, combine different movements and perform them in a smooth and coordinated way.

#### (2) Development of cognitive functions and physical activity and play in early childhood

In early childhood, children gradually develop the ability to communicate their wants and thoughts in words. They also learn to control the expression of their emotions. Children around three years old tend to act out their emotions impulsively and physically, but when they are around six years old, they are able to express their feelings in words and control them with restraint.

Children aged four or five also start to be independent in various aspects, wanting to do more on their own and being capable of doing more. They acquire an awareness of self, becoming more conscious of how well they did in physical activity. When they do well and receive praise or recognition, they will gain confidence and behave more actively. Experiencing success in physical activity, where children can easily see how well they are doing, has significant implications in developing children's self-concepts. For pre-school children, physical activity makes up an important part of their everyday life and how well they perform it means much to them. The confidence children gain in early childhood that they are skilled in physical activity will likely influence their willingness to participate in exercise or sports later in life.

As imagination grows in early childhood, children start to act on their imagination and imitate the movements of others. They find it interesting to arrange their play as they like and to create new rules. The children try hard to imitate the movement of a model that appeals to them or motivates them to do the same. Through such efforts, they naturally learn new movements.

In addition, spatial and temporal cognitive functions develop in early childhood. Children over four years old are able to perceive the pace of time, tempo and other temporal features; when they are around five or six years old, they can time their body movement in a coordinated way. As such, providing children with experiences where they can move their whole body or manipulate equipment to a rhythm is recommended.

### (3) Development of sociality and physical play in early childhood

Pre-school children develop sociality through interaction with others. Children around three to four years of age tend to assert themselves forcefully; they come to control themselves as they grow up though, demonstrate empathy toward others and act cooperatively. Thus, as the children get older, they learn to follow conventions and rules, wait their turns, step aside for others and keep their temper under control when things do not turn as they expected. Children gradually transition from solitary play to parallel play, which means playing alongside other children but not with them, and ultimately to cooperative play and organized play. As play becomes more complex, children need to understand the rules of play, what they are supposed to do and what roles they are expected to play. Around the age of three, only about three out of ten children can understand conventions and rules of play. This proportion increases with age, and six out of ten can follow rules by age four, and more than eight out of ten are able to do so by age six. Understanding, following and sharing rules is essential in children's group play. In group play, children learn to cooperate with friends, share roles to achieve a goal and build on their experience to add new twists to their play. They understand and learn how to act and behave in order to share enjoyment with others. Group play thus provides the best environment to develop sociality in pre-school children.

### (4) Acquisition of fundamental movement skills

In childhood when the nervous system develops rapidly, children acquire a number of movement skills by adapting to various stimulation around them. During this period, the ability to coordinate motion, such as timing body movement and controlling the power to use, increases and children become able to perform fundamental movements such as those necessary in their daily lives and to react instantly to protect themselves, and those relevant for sports that they will engage in during later years.

Fundamental movements are categorized into three types: stability movements such as standing up, sitting down, lying down, getting up, spinning and rolling, crossing and hanging down; locomotor movements such as walking, running, jumping, climbing up and down, crawling, dodging and ducking, and sliding; manipulative movements such as holding, carrying, throwing, catching, kicking, rolling an object on the floor, pushing, pulling, stacking, digging and rowing. Physical play involves a combination of the above fundamental movements to create wide variety of movements. For example, a game of tag involves many movements such as running, dodging, climbing up and ducking under. These movements occur in various actions; for instance, running involves chasing, fleeing, dodging or changing speed or direction. Ideally children experience different physical movements while having much fun with physical play and naturally acquire a wide variety of movement skills.

As children encounter and experience different movements in their daily lives, they will be able to

perform a wider variety of movements (acquisition of various movement skills). Also, as children repeatedly perform the same movement, they will be able to improve as they learn to move more efficiently (refinement of movement skills). As such, acquisition of movement skills in childhood has both quantitative and qualitative aspects in that children learn many new movements and become proficient in performing them. Actively engaging in physical activity helps develop both of those aspects.

Therefore, children becoming physically active through play and other activities in various aspects of their daily lives is important; we need to devise an encouraging environment to enable this to happen. It is desirable that instructors understand the developmental traits of children well and develop programs that will enable them to extensively experience activities based on their interests and, in particular, encourage them to engage in full body movements. For mixed-age groups, instructors also need to pay attention to the roles and contents of play that are appropriate for different ages.

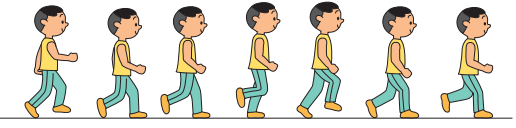
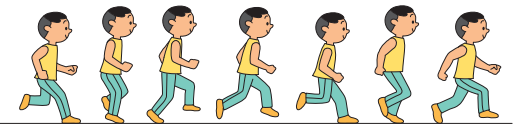


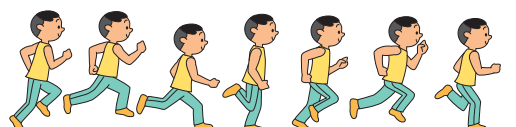
## 4. Qualitative evaluation of fundamental movement skills: evaluation measures

Children need to acquire diverse movement skills in childhood. It is crucial for them to experience a wide array of fundamental movements that will be required throughout their lives, including everyday movements such as standing up and walking, movements to avoid danger such as dodging, ducking and rolling over, and movements that form the foundation of sports, such as running, jumping and throwing. In childhood, clumsy and uncoordinated movements are refined into efficient movements that are fit for the appropriate purpose. Children's sports instructors need to have a good understanding about how children acquire diverse movement skills and refine them to help them develop these skills.

Evaluation measures have significant implications, especially in helping children to refine their movements. Quantitative measurements such as how fast children can run a certain distance and how far are strongly influenced by their body size. Thus, quantitative measures such as time and distance are inappropriate to evaluate their refinement of movements. In order to evaluate how efficient and fit for a purpose children are at using their bodies or how refined their movements are, we need to observe how children are moving; qualitative observation and evaluation of movements are required.

### (1) Qualitative evaluation of movements

What is involved in qualitative evaluation of movement? The Figure 7 illustrates how children between three to six years of age refine their running movement patterns. As children progress from Pattern 1 to 5, distinct characteristics become more apparent in parts of their bodies such as ① arms swinging more widely, ② the foot springing more upward after striking the ground and ③ the knee being more extended when the foot strikes the ground. Whole body movement becomes more dynamic, with the foot striking the ground forcefully to drive forward instead of taking short steps. Qualitative evaluation involves observing specific movements in different parts of the body as well as whole-body movements, identifying the degree of refinement of those movements. Instructors need to observe children engaging in physical play and perform qualitative evaluation of their movements to obtain an understanding of their development, while encouraging and helping children to refine their movement. Examples are discussed below.

	Pattern	Movement Pattern
1	Swinging of both arms is not observed.	
2	Movement of the arms such as in dog-paddle swimming is observed and swinging of the left and right arms is not well-balanced.	
3	The legs are sufficiently kicked back.	
4	Both arms are swung with large movements.	
5	Knees are sufficiently extended for kicking the legs back horizontally.	

Based on A Report on the Nature of Practical Activities in Early Childhood to Foster a Foundation for Physical Fitness (Ministry of Education, Culture, Sports, Science and Technology, 2011)

Figure 7 Characteristics of the developmental stages of the "running" motion

## (2) Guidance depending on the development stage of movement skills

Consider a game of tag, for instance. Children, especially pre-school children, are not good at running a straight course with a defined start and goal and racing with other children, as in a short-distance sprint. They are not yet skilled enough to run straight and hard; furthermore they do not understand that they should run on a defined course or the meaning of racing with other children side by side. However, in a game of tag, children naturally run at their top speed given the clear and concrete purpose to flee from the tagger or chase others to tag them.

If a child demonstrates an immature running pattern, barely swinging their arms, as seen in Pattern 1 of the Figure 7, the child most likely lacks adequate experience of running at their top speed. In this case, as the first step, an adult should be the tagger, adjusting their chasing speed and giving the child

the thrill of being chased around. The playfield should not be too large at this stage. As the child starts to show wider arm swings or stronger foot strikes as in Pattern 3, let them be the tagger or make the playfield increasingly larger. By the time the child's running pattern matures as seen in Pattern 5, the child will have refined their running movements enough and understood the fun of racing with others. The child will then be ready to engage in more sport-like activity such as a footrace or more advanced and tactical games of tag such as chain tag or freeze tag (refer to p. 34 - 35).

## (3) Toward the diversification and refinement of movement skills

As discussed above, an important role for sports instructors guiding children in childhood is to provide a wide variety of physical play which children will find engaging and fun, and to create an environment in which children can naturally refine their movements while playing. To that end, instructors need to understand what movements are involved in each physical play activity and how those movement develop qualitatively as children refine them. Instructors also need to be capable of adjusting the settings and rules of play to help children refine their movements.

