

LATE CHILDHOOD (Physical Development)

Today, we are discussing Physical development during early school years which range from 6 to 11 years. Many writers prefer the term 'middle childhood' for this period. "Middle childhood is the period from about the age of 5 or 6 to about the age of 11 and 12. This is a time of leisurely growth between the more rapid growth of the preschool period and the onset of adolescence" (Elkind & Weiner 1978: 374). The middle years of childhood between the ages of 6 and 12 are often referred to as the school years. This period is characterised by slow but steady physical growth, the perfection of motor abilities and the rapid development of cognitive and social skills.

However, all children do not follow same pattern of growth. Individual differences are high during this period as each child follows her own unique time table of growth. Some characteristics of this stage can be outlined as follows (Rajamal P. Devdas & N Jaya 1984: 125). This stage extends from the age of 6 years to the time when the child becomes sexually mature. Some writers have even used the term late childhood. This stage begins when the child enters primary school; the child is mostly a first-grade student. It has also been designated as the 'elementary school age'. Life in school is responsible for many changes that take place in the child's attitudes and behaviour.

Parents regard this stage as the 'smart' age, that is the time when the child thinks he knows everything and does not hesitate to inform others of his/her superior knowledge. To the psychologist, it is the 'gang-age'. The major concern of every normal boy or girl is to be accepted as a member of a 'gang'. This period is also characterised by new social expectations which the child faces. In order to achieve a place in the social group, the older child must master the developmental tasks society expects of him / her. The mastery of developmental tasks is the responsibility of teachers and, to some extent, members of the peer group. Developing fundamental skills in reading, writing, calculating and attitudes towards social groups and institutes becomes as much the responsibility of the teachers as the parents. Failure to master the developmental tasks at this stage results in poor personal and social adjustment in subsequent years.

Physical Growth in Early School Years

In early school years the growth and development become relatively slower as compared to the earlier periods of development. Yet the growth has its own characteristic features and these are presented below.

Body Size: Height and Weight

This stage is a period of slow and relatively uniform growth until the pubertal changes begin. Increase in height is at the rate of 5 to 6 cms annually. An average girl of eleven years should have the height of 139.2 cm and the average boy of the same age, 138.3 cm.

Increases in weight are also slow and fairly uniform at this age. At the onset of puberty, the average girl of 12 years should weigh 29.8 kg and the average boy of the same age 28.5 kg.

Between the ages of 6 and 12, the average child will grow 2 to 2.5 inches and gain 3 to 6 pounds (Tanner, 1978). The average 6-year-old child is almost 3.5 feet tall and weighs about 40 pounds (18.14 kg); the average 12-year-old child is almost 5 feet tall and weighs about 80 pounds (Harris, C. 1993). Within this period, it takes children 6 years to double their weight and to increase their height by one-third.

The heights and weights of Indian children reported by ICMR (1968) are given below:

SEX	MEASUREMENTS	AGE IN YEARS						
		6	7	8	9	10	11	12
Girls	Standing height in centimeters	107.4	112.8	118.2	122.9	128.4	133.6	139.1
	Weight in Kg	16	17.6	19.4	21.3	23.6	26.4	29.8
Boys	Standing height in centimeters	108.5	113.9	119.3	123.7	128.4	133.4	138.4
	Weight in kg	16.3	18.0	19.7	21.5	23.5	25.9	28.5

Some factors affect the size of body which is as follows:

Weight and height are influenced by many factors

Hurlock (1978: 111) has discussed following conditions which cause variations in body size:

- **Family influences:** This involves both hereditary and environmental aspects. Genetic factors make some children fatter and thus heavier than others. Environment helps to determine whether hereditary potentials will be reached. At every age, environment has a greater influence on weight than on height.
- **Nutrition:** Well-nourished children are taller and reach puberty sooner than poorly

nourished children. Poor nourishment during puberty can prevent attainment of hereditary growth potentials.

- **Emotional Disturbances:** Persistent emotional disturbances cause an overproduction of adrenal steroids which inhibit production of the pituitary's growth hormone causing delay in the growth spurt. It prevents children from reaching the height they would otherwise attain.
- **Socio-economic Status:** Children from homes of low socioeconomic status are smaller than children from higher and better socio-economic status.
- **Health:** Children whose health is good and who suffer from only infrequent and minor illnesses tend to be taller than other children.
- **Endocrine Functioning:** Normal endocrine functioning results in normal size. By contrast, deficiency in growth hormone leads to dwarfism while an excess of growth hormone leads to gigantism.
- **Sex:** Girls at this stage tend to be slightly heavier than boys, and this difference is increased when girls begin their puberty growth spurt sooner than boys in the closing years of childhood.

The size and growth rates of boys and girls are comparable until age 9, and then girls begin to grow more rapidly than boys. For both boys and girls, the initial indication of the growth spurt is a sudden increase in foot length and shoe size (Tanner, 1978).

Thus, whether genetics will be the prominent deciding factor in determining body size of the child or the environment is the deciding factor, depends on the combination of factors. When children get enough to eat and are reasonably healthy, genetics account for individual differences. When children live in poverty and illness, belong to poor socio-economic class, the differences in growth appear (Harris, C 1993). Height more than weight reflects a child's nutritional history. Undernourished children are shorter in stature than well nourished (Pollitt et. al.1982). Under all circumstances, physically abused children grow less well than non-abused children (Karp et al. 1989).

Growth and Development Year Wise 6-11 Years

Growth is physical change and increase in size. It can be measured quantitatively. Indicators of

growth include height, weight, and dentition. Growth rates vary during different stages of development. This growth rate is rapid during prenatal, neonatal, infancy and adolescent stages and slows during childhood. On the other hand, development is an increase in the complexity of function and skill programme. It is the capacity and skill of a person to adapt to the environment. Development is the behavioural aspect of growth. The new inches or pounds are added in “mini” growth spurts, usually lasting several months and occurring several times a year. It’s normal at this age for adenoids and tonsils to be large – in fact, tonsils may actually meet in the midline.

According to the developed countries data, the average growth and development for males and females 6 years of age through 11 years is given below:

6 years: The average height for females is 45 inches. The average weight for females is 43 pounds. The average height for males is $45\frac{3}{4}$ inches. The average weight for males is 45.5 pounds.

6 years: The brain is now 90% of its adult weight.

6.5 years: Average age at which the first permanent tooth comes in. However, this age varies based on genetic and environmental factors.

6-puberty: The temporal and parietal lobes in the brain, related to language and spatial relations, develop the fastest during this time.

6-11 years: During this period of time, before the growth spurt of puberty, the growth rate is very slow and steady, averaging approximately 2 to 3 inches a year.

6-11 years: The average weight gain each year during this period is approximately 5 to 7 pounds.

6-11 years: Strength capabilities double during this time.

6-11 years: A more proportional-looking body forms when the head and waist circumference, as well as leg length, decrease compared to the body height.

6-11 years: Bones continue to harden, but can handle pressure put on them more than mature bones can.

7 years: The average height for females is $47\frac{1}{2}$ inches. The average weight for females is 48.5 pounds. The average height for males is 48 inches. The average weight for males is 50.25 pounds.

8 years: The average height for females is $49\frac{3}{4}$ inches. The average weight for females is 54.75

pounds. The average height for males is 50 inches. The average weight for males 55.75 pounds.

8-10 years: There is a growth spurt in the development of the right hemisphere of the brain. Right Cerebral Hemisphere Functions include improvement in the sensation, perception and appreciation of the stimuli. It also improves the cognitive functions such as spatial orientation, sequencing of objects etc., time perception, music appreciation, recognition of objects and faces and non-verbal communication. The development of the right hemisphere function also leads to the development of emotions such as empathy, with and humour etc. Children can now more vigilant and attentive than before. The movements of the left side of the body including vision etc., becomes more refined and improved. Planning, organising etc., become possible due to the right hemisphere development.

9-15 years: “Research has found that female pubertal characteristics develop in this order: breasts enlarge and public hair appears, armpit hair, height increase, hips become wider than shoulders, menarche (which can be very irregular at the beginning), and more fully developed breasts” (Santrock, 2004, p. 375).

10 years: The average height for females is 54½ inches. The average weight for females is 71.75 pounds. The average height for males is 54¼ inches. The average weight for males is 69.25 pounds. Development of breasts, pubic hair etc., in girls is seen between 10 – 14 years of age.

11 years: The growth spurt of boys typically begins around this age, averaging about 4 inches per year. The average height for males is 55¾ inches. The average weight for males is 77.75 pounds. The growth spurt peaks for girls at this age, on average.

Motor Skills in Growth and Development (6-11 Years)

The truly attention-getting change in children will probably be associated with the first signs of puberty. For girls, breast development may start as early as 8 years, although 10 is the average. For boys, enlargement of the testicles and thinning and reddening of the scrotum, (the pouch of skin that holds the testicles) marks the beginning of puberty. Male puberty may begin as early as 9, although 11 is the average.

During these years, children of the same age are frequently at different points in their growth and sexual development. School-age children typically have fairly smooth and strong motor skills. However, their coordination (especially eye-hand), endurance, balance, and physical tolerance vary.

Fine motor skills may also vary widely and influence a child’s ability to write neatly, dress appropriately, and perform certain chores, such as making beds or doing dishes.

There will be significant differences in height, weight, and build among children of this age range. It is important to remember that genetic background, as well as nutrition and exercise, may influence a child's growth.

There can also be a big difference in the age at which children begin to develop secondary sexual characteristics. Girls will grow buds of breasts at ten or eleven, her hips will take shape and she may begin to menstruate at eleven or twelve. Eleven is an early start for a first period and even at twelve and thirteen girls are not always emotionally prepared and welcoming of this powerful sign of approaching fertility.

When her periods begin the girl may be proud and excited to be growing up like all her friends or she may, in the back of her mind, be anxious about approaching adolescence and the complications that this introduces into her life. Her biology demands that she be a woman soon - whether she likes it or not. How she feels about it will be strongly affected by her impression of how well adult life has treated her mother and the women close to her. Womanhood may seem rich and pleasurable or scary and hard.

As for boys, the physical changes and emotional challenges are not so dramatic as they tend to mature physically a little later than girls. However around twelve some boys experience masturbation and nocturnal emissions. Boys of this age can be very competitive; and success at sport, or his social position in the playground may be close to his heart and a source of concern for him.

As you already know the head of the newborn is $\frac{1}{4}$ th the size of the body and that of a 6-8 year old is about $\frac{1}{6}$ th of the body and by adulthood it will become $\frac{1}{8}$ th of the body. In other words, the head becomes smaller in proportion to the rest of the body as one grows. In middle childhood along with gross muscles, fine muscles develop rapidly.

Development of Teeth, Bones and Muscles

Teeth: By the time a child is 3 years old, the child has 20 teeth and these are the milk teeth. But by the time the child is in middle childhood, he/she has 28 teeth and these are all permanent teeth. An adult has 32 teeth.

Bones: By middle childhood, all the bones in the body are formed and henceforth, these continue to grow in size and strength. Bones become brittle when there is too much calcium in them and they break easily. During middle childhood, there is sufficient calcium in the bones to

make them strong. This is one reason why the activity level in middle childhood is high. Strong bones provide better anchorage to the muscles.

Muscles and Fat: All bones are covered with fat and muscles. Girls have more fat around their bones than muscles. At seven to eight years, girls start to gain more fat than muscles on their arms, legs and trunk, whereas boys have more of muscles than fat. This is why they have more strength. Boys can generally run longer distances, jump higher, etc.

MOTOR DEVELOPMENT

Have you seen 6-11-year-old coming out of their classes after school is over? What would they be doing? Yes, you are right! Some of them would be running, others would be skipping and still others leaping onto narrow edges and balancing themselves. In all these activities, the children are learning to co-ordinate their muscles for different types of movements.

The body has two types of muscles, namely, the large muscles such as those of the arms, legs, back, etc., and the small or fine muscles such as those in the fingers, toes, etc. You probably know that muscular activity is possible because of their contraction and flexion (relaxation). Different muscles placed in different parts and some in same parts of the body perform and control different movements. Some part of this control is automatic while some part is learnt. Movement due to muscular control which is learnt is called muscular coordination.

Again, muscular coordination is of two types : fine and gross. The movement of the fine (small) muscles is called fine muscular coordination while the movement of large muscles is called gross muscular coordination. Activities such as running, balancing, skipping, climbing, etc., involve mostly the coordination of large muscles.

Gross muscular coordination

Let us make the following observation. There is a pencil lying on a table. Let us imagine how a one-year old child pick it up and how a 3-year-old and a 11 year old pick it up?

Generally, the one year old uses her entire palm to pick the pencil while the three-year-old may use more than one finger and thumb to pick the pencil. At the same time, the eleven year old may use the index finger and thumb and may also be able to manipulate the pencil with very fine movements, i.e., play with it using only the index finger and the thumb or twirl it around or apply just the right pressure for writing.

Fine muscular coordination

As the child grows older greater proficiency over fine movements is gained. This is the period when many activities which involve fine muscular coordination can be taught to the child such as writing, needlework, painting, etc.

It is known from experience that children learn to walk, run, jump, kick, etc., before they learn to feed themselves or write. What does this imply? It means that the gross muscular coordination is learnt before fine muscular coordination. Muscles develop over a period of time and when the muscles are developing, that period is known as the sensitive period.

Think what will happen if we insist on making a child learn an activity before the muscles are ready for it? Yes, the muscles which are not yet completely formed will get damaged. Which muscles stand greater chance of being damaged? Yes, the fine muscles. This is the reason why children should not be forced to write before they are four and a half to five and a half years old. This is one of the important reasons that the formal schooling for children begin after 5 years of age. From 6-11 years, the handwriting gradually improves i.e., it becomes better and faster. Sensitive period is the time when one can learn a specific activity most effectively.

Around the sensitive period, the body is ready to learn a particular activity or skill most efficiently. If the child is given practice and encouragement at this time to learn that activity or skill, the child will learn it best. Children in the age group of 6-11 years learn maximum number of different activities. They play different types of games. What does this information indicate? That many of the muscles are maturing at this age.

The following chart shows the motor development or certain activities and skills from 6 years to 10 years.

Activities and Skills Between 6-11 Years

At this time the children will be able to throw a ball at an estimated distance, catch the ball, and they can run with coordinated movements. They can judge and stop a small ball, and can balance on one foot for a very short while. Children at this age can balance and hop on one foot for longer periods.

They can jump at a good height and can skip with two legs. Can hop and jump in small squares and play games with alternate hopping rhythm. Jump as high as one. At this age, children can run and jump hurdles at the same time.

Disorders in Physical Development During 6-11 Years of Age

Some of the disorders that may arise in children could be due to physical illnesses, fall and injuries, accidents etc. Some of the disorders are genetic while some are acquired. The disorders that are obtained during this period are given below:

Attention Deficit Disorder (ADD). Hyperactive or Hypoactive.

Hyperactive: Children with this disorder are distractible, impulsive, irritable, moody, slow in learning, and inattentive. Physically such children tend to move from one side to another, cannot inhibit action, and are constantly diverted by sounds and objects. They are chaotic in their behaviour, and tend to forget what they are told to do, cannot do sequentially ordered tasks. The child may be annoying and unpopular amongst peers.

Hypoactive: Children with disorder show less than normal activity levels and excessive daydreaming. They may be quiet and undistracting in their behaviour but may not be able to attend to specific tasks. This may go unnoticed for many years as they tend to be good and compliant in their behaviour.

Execution of motor skills: Children at this age show wide range of individual differences in the execution of motor skills and in their ability to master complex motor tasks. They show improvement in gross motor skills reflected in increased speed, power, coordination, agility, and balance. These children appear to be always in a hurry and their motor development is such that they can now ride scooters, wagons, bicycles or move on skates. They register considerable improvement upon gross motor skills previously acquired and now learns many new skills. They can run faster, with greater accuracy and can cover longer distance. They can now hop and jump in a highly coordinated manner and also can throw, catch and kick accurately as required. Team sports. Basketball, football, baseball, dancing, swimming, roller skating, tennis are some of the sports which can help them refine their motor skills still further. They also show intense interest in acquiring and improving these skills.

As for disorders in regard to these aspects, they may have certain congenital or acquired deficits in motor skills and activities. Many may not be able to show coordination of gross and finer motor skills due to deficiency or abnormality in their physique. Sometimes injuries may lead to certain deformity which may prevent these children involving themselves in different required and essential activities. Sometimes high fever and many physical illnesses may keep the children off from many of these activities and when they do recover, they may not be able to equal their peers and

thus feel unhappy. In certain cases, children afflicted with polio may have problems in doing any physical activities and similarly children suffering from brain damage due to fall etc. may show poor motor and physical coordination.

Improvement in Control and Coordination of Fine Motor Skills

Children at this age can perform progressively neater and smaller tasks. They can play musical instruments, a feat which requires dexterity and control over the small muscles of the hands and fingers. Tasks such as sewing and knitting, or drawing pictures in minute detail require fine motor control and at this age these aspects develop to a great extent and children are able to accomplish many of these tasks. However children with any kind of physical illness etc. will not be able to accomplish these tasks.

The extent to which children develop their genetic potential for motor skills.

Motor skills depend upon body size, strength and brain maturation. And, the extent to which children develop their genetic potential for motor skills depends on temperament and personality factors such as energy level, venturesomeness, aggressiveness, and persistence as well as their attitude toward their body build and their eagerness to participate in group functions and competition. Shy children or children with low self-esteem will have difficulty competing with other children, and since motor skills are developed primarily in the context of the peer group, these children will miss out on the opportunity to acquire and develop such skills.

Participation

These children learn to participate in a large number of activities both at school and in the society (neighbourhood). Such participation enables the children to become active members of society. They participate in scouts, little league teams, etc., a context within which they develop friendships and share interests.

Progress in Physical Growth and Motor Development

There is a steady and sustained growth during this period. There is an increased ability to execute motor skills and master more complex and elaborate motor tasks. Variation in growth among children in this age group is apparent. Not only do children of the same age grow at different rates, children today are taller than they were in previous generations, and they also mature at an earlier age. This phenomenon is known as the secular trend. Attitude about self becomes related to conception about body size and shape. They acquire ability to think about what other

people think. Thus, others' reactions to him become important.

BODY PROPORTIONS

These years are a time of steady overall growth, but the growth rate differs for different body parts, such as legs grow faster than other body parts.

Body proportions change during these years. The disproportion of too large a head decreases; and the lower part of the face increases in size, thus eliminating some of the facial disproportions of the early childhood. The gradual eruption of permanent teeth changes the shape of the mouth. As childhood progresses, the trunk elongates and becomes slimmer. The chest broadens and flattens, the neck becomes longer, permitting the shoulders to drop and the pelvis to increase in size. The arms and legs are thin with no developments in their musculature. The hands and feet grow slowly. The hands and feet are generally longer for boys.

Children lose their 'baby fat'; their faces tend to become slimmer and narrower. School age children usually have a tooth either coming or going. They lose their baby-teeth, the first one coming out at about the age of 6. Toothless smiles are common among this age group. With the appearance of permanent teeth and several molars, the shape of the child's face is changed. The transition from temporary to permanent teeth is usually completed by about 11 or 12 years of age. Both boys and girls have all their permanent teeth except the second and third molar.

At 6 years of age, the eyes have not yet reached their final shape and size. Many children between 6 and 8 years of age are slightly farsighted, but this condition corrects itself between the ages of 8 and 10 when their eyes reach adult eye size and shape (Jenkins, Shacter & Bower, 1966)¹. One potential implication of this finding is that their early reading material should be printed in large type. Binocular vision (in which both eyes work together) is usually well established by age 6. Reading is best delayed until approximately 6 years of age.

Marked improvements are observed in posture. The rounded shoulders, slight spinal curvature and prominent abdomen of the early years are replaced by more erect bearing. Consequently, school-age children gain efficiency in using their arms and legs.

Brain growth has essentially been finished by age 10 or 12. Bone growth is concentrated in the face, arms and legs. Children are more flexible than adults because their ligaments are less firmly attached and there is more space between the bones at the joints. But since the Ossification² process is still incomplete, children are less resistant to breaks, fractures and muscle pulls than mature adults.

Muscle and Fat

Both in girls and boys, muscles increase in size and strength, although the number of muscle fibers remains the same. The muscles of 6-12 years old are still functionally immature when compared with adolescent. Sports, dance, skating etc. help develop muscle tissues while improving coordination.

Heart grows more slowly during school years and is proportionally smaller than at any other period of life (Schwartz et al. 1990).

Body fat accounts for 15% of the average school-age child's total body weight. Girls tend to retain more fat than boys at age 6, but unless their eating habits differ, both accumulate body fat at an even rate from age 7 to adolescence. The appetite of the young child increases after six years of age. Thereafter children tend to eat more than they did earlier. Many even over-eat and become obese. The child who is overweight loses out in active play. As a result, he misses out the opportunity to acquire skills extremely necessary for social success.

The gastrointestinal system is quite mature by the time the child is in school. School age children experience fewer stomach upsets, steadier blood sugar levels and a greater stomach capacity than younger ones. Though children at this stage do not need to be fed as carefully or as frequently as preschoolers, caregivers still need to be vigilant in minimizing the child's junk food intake.

The lungs continue to grow until about age 8, though the respiratory airways grow well in adolescence. Lung capacity increases and the respiratory rate or the number of breaths per minute slowly decreases. Bowel and bladder control are usually well established by the school years. The ear and sense of hearing are well developed by school age and auditory sensitivity continues to improve.

MOTOR SKILLS DEVELOPMENT

“Motor skills are fine coordinations in which the smaller muscles play a major role” (Hurlock 1978: 143). Childhood is often called an ideal age for learning motor skills. There are a number of reasons for this (Hurlock):

First, children's bodies are more pliable than those of adolescents and adults; hence all learning is easier.

Second, children have fewer previously learned skills that will conflict with the learning of a new skill.

Third, children are, on the whole, more adventurous than grown up people

Fourth, while adolescents and adults find repetition boring, children enjoy it. As a result, they are willing to repeat an act over and over again fewer times than, until the muscle patterns have been trained to perform effectively.

Fifth, Children have more time to devote to the mastery of because they have fewer duties and responsibilities than they will have as they grow older.

Smooth co-ordination of small and large muscles is refined and used in many activities ranging from reading and writing to playing team games.

Motor skills are refined and expanded. Through play and endless practice, children perfect six basic motor behaviours: running, jumping, sequencing foot movements, balancing, throwing and catching. Improvement in motor skills keeps pace with maturation although practice affects performance of some skills, such as learning to kick a ball (Engelhorn, R. 1988)⁴.

Jumping is a good index of motor co-ordination and strength. At the age of seven boys often exceed girls in the height of vertical jumping. Girls are superior to boys in the task of jumping and hopping into grids (Elkind and Weiner 1978). Rapid improvements in this skill are shown from the age 6 to 9.

Throughout this period, children channel more and more energy into controlled, goal directed activities such as sports and cooperative play. Also, children become more competitive and tend to form larger, more complex groups when they play. The benefits of team sports participation include social contact with peers, the exhilaration of self-improvement, learning the value of team work, the fun of the sport and the importance of physical fitness. Emphasis on competition and winning over learning sports fundamentals devoid all the essence from the sports activities. Sport is a very good medium of boosting motor developments and teaching values. Parents and teachers should encourage striving, improvement and excellence without creating an obsession for perfection.

Handedness is well established by age 6 and small-muscle ability and artistic skill improve steadily from then until 12. Children make great strides in writing and drawing during school years. With practice, school age children can learn to play a musical instrument and to master a variety of handicraft skills such as ceramics, needle work, painting and model building. In this regard, girls continue to have greater hand and finger dexterity than boys.

In addition to dexterity, eye-hand co-ordination improves substantially during the school years. By age 8, the child is better able to plan a movement and by age 10, there is an increase in the child's ability to control the speed and direction of their grasp (Bairstow, P.J. 1989)⁵.

Interestingly, despite the steady progress in fine motor and eye-hand skills, school age children become noticeably more clumsy and less well coordinated during their growth spurt years. Children may be more distractible when they are growing; they are also not used to maneuvering larger feet and a taller frame. Daydreaming and other pre-occupations may also lead to the appearance of clumsiness.

Major Motor Developments

- Children improve in running, jumping, sequencing foot movements, balancing, throwing and catching
- Children add skilled movements associated with sports, games, music, hobbies etc. Reaction time improves
- Eye-hand coordination improves
- Competitive sports participation is common during these years Left-right discrimination improves
- Handedness is well established
- Fine motor skills improve. Girls have greater dexterity than boys.