



Notes

6

GROWTH AND DEVELOPMENT

You must have noticed that a newborn cannot sit without support. But an infant four months old can sit with support for a minute. By nine months, most infants can sit without support for 10 minutes or longer. Similarly, in toddlers or children between one to three years, there is a marked transition in terms of a child's growth and developmental milestones. This makes us wonder how such rapid growth takes place in young children. Another question that arises is, how do children of a similar age group go through similar changes? Can we identify any predictable patterns in the growth and development of children? What are the factors that affect the growth and development of children? In this lesson, you will find answers to these questions. You will study what is meant by growth and development and what the principles guiding them are. You will also study the factors that affect growth and development.



LEARNING OUTCOMES

After studying this lesson, you will be able to:

- differentiate between growth and development;
- explain the principles of development;
- discuss the role of heredity and environment on children's development; and
- describe the factors affecting growth and development of children.

6.1 WHAT IS GROWTH?

We tend to talk about growth and development together. Indeed the processes of growth and development go hand in hand in each individual. That is why sometimes we may think that they are one and the same. But this is not so! We can differentiate between the two terms which are distinctly different.



Notes

To understand growth, write down the features which indicate that a child is growing well, in the space given below.

What you have just listed are indicators of growth.

Growth refers to quantitative changes in the body. The main indicators of growth are increase in height, weight and changes in the body structure and body proportions. Changes continue to occur in all domains of development but changes that take place in the physical development of children become most visible and apparent. One of the important features of growth is that these changes are measurable. The sequence, pattern and direction of changes in growth are common to all children although the rate of growth may vary from one child to another. In some cases, like in the case of children with special needs, you may find deviations in different domains of development.

Growth is rapid during the first two years of life. You will be surprised to know that between birth and first year of life, well-nourished children can undergo a 50 percent increase in height. However, not all parts of the body grow at the same rate. After the first two years of life, growth curve begins to level off and the rate of growth slows down until puberty. Puberty is marked by a growth spurt i.e. relatively fast increase in height and weight in adolescents. The table below shows the pattern of growth in terms of height and weight increments from birth till eight years in healthy children.

Average height and weight of girls/boys at different ages

Age	Weight (kg)	Height (cm)
Birth	3.3	50.5
3 months	6.0	61.1
6 months	7.8	67.8
9 months	9.2	72.3
1 year	10.2	76.1
2 years	12.3	85.6
3 years	14.6	94.9

Growth and Development

4 years	16.7	102.9
5 years	18.7	109.9
6 years	20.7	116.1
7 years	22.9	121.7
8 years	25.3	127.0

Source: ICMR (1990) Nutrient Requirements and Recommended Dietary Allowances for Indians.

Physical growth is measured by increase in height and weight at regular intervals. The height of a newborn child ranges from 47 cms to 52 cms. The weight can range from 2.4 kg to 3.2 kg. On an average, increment in weight is 2.0–2.5 kg per year. Boys tend to be heavier and taller than girls during infancy and even as toddlers. A steady increase in both height and weight is a good indicator of satisfactory physical growth. A height and weight chart is a good way of assessing health and physical development of children. Growth charts that monitor growth should be maintained regularly for all children.

Along with an increase in height and weight, body proportions of children also undergo changes. You must have noticed that the head of a newborn looks bigger compared to the rest of the body. The top of the head appears to be large and the face remains small. Later body proportions change and the head does not look that big. However, throughout infancy and toddler hood, the lower portion continues to remain small and underdeveloped. The growth of the head is proportionately much less after birth as compared to the growth of the other parts of the body. The head increases in size and accounts for one-fourth of a child's length at two years of age. Its width-wise growth is almost ninety percent complete by the age of three years. However, functional development of the brain continues into adolescence.

Compared to the first year, the trunk and limbs begin to grow at a faster pace during toddlerhood. When children are born, their arms appear to be longer in proportion to their legs. At birth, the legs are short and face each other. As they grow in length, they straighten out. During the first and second years, the height of infants increases approximately by 40 percent and 60-75 percent respectively, greater than at birth. As a result of this change, the body of a child looks more proportionate than it did in the first year. This also helps children attain better balance. This pattern of growth remains the same for both boys and girls, but on an average, baby girls are slightly smaller than baby boys in size.

Let us now understand what development is.

6.2 WHAT IS DEVELOPMENT?

Development refers to qualitative changes in the body as well as changes in



Notes



Notes

behaviour and attitude. It is difficult to measure or quantify development as these changes are not quantitative. It is important to note that physical growth is measurable quantitatively; however, certain changes such as cognitive and socio-emotional maturity may not be measured in quantitative terms. These need to be measured in qualitative terms.

Development is governed by certain principles. These are discussed below.

6.2.1 Principles of Development

Development is continuous and involves change

Do young children start walking suddenly or are there intermediary steps leading to walking? You may have noticed that during infancy, while learning to walk, infants first learn to crawl, then to stand with support, then to stand without support and finally to walk. This points to the fact that development involves changes at each step and continues to take place all the time. We may or may not notice these changes on a day-to-day basis. But these changes in body and behavioural pattern, which are indicators of development take place continuously. At times, development is rapid and at other times, it slows down. But it is continuous. It does not stop at any time. It is worth mentioning that changes appear not only in physical features and body structure but also in the socio-emotional and cognitive development of children.

Development is sequential

As already mentioned, children learn to stand before walking. Similarly, they scribble before writing. These illustrate that there is a pattern in development. This development is sequential. All children follow more or less similar developmental patterns with one stage leading to the other.

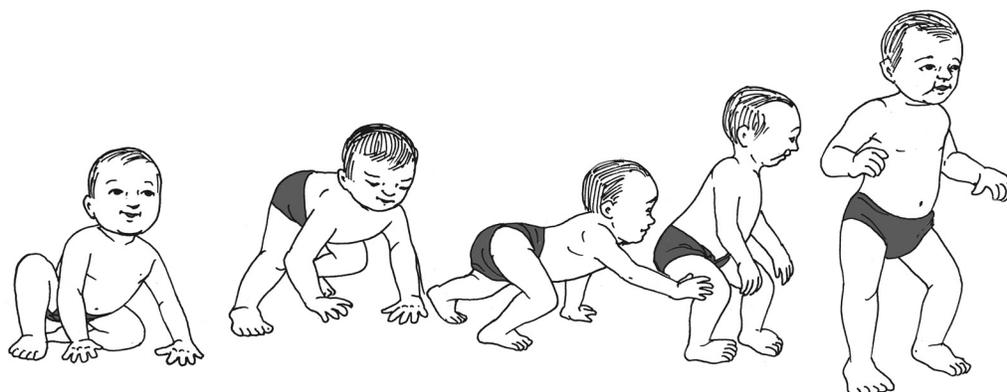


Fig. 6.1 The Developmental Sequence

The sequential pattern of development proceeds in two directions. First, development proceeds from upper part of the body to the lower part of the body,



i.e. from head to toe. This head-to-toe sequence is called **Cephalocaudal** (Latin “head to tail”) principle of development. This shows that development in children’s head region comes first, followed by trunk region, and finally, in the leg region. This pattern helps to understand why children learn to see an object before they can control their trunk and they learn to sit before they can stand.

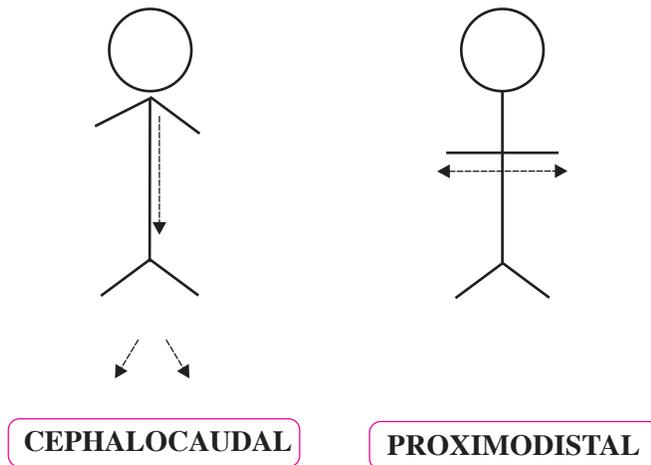


Fig. 6.2 Pattern of Development

Development also proceeds from central parts of the body to peripheral parts referred to as near to far sequence. This is called **Proximodistal** (Latin, “near to far”) principle of development. In a foetus, the head and trunk region gets well developed before the rudimentary limb buds appear. Gradually, the arm buds develop into hands and fingers. That is the reason why children master using their arms before their hands. They develop control over their fingers much later.

Apart from physical and motor development, are there predictable patterns and sequences in other developments also? The answer is, yes. There is a predictable pattern of development for different cognitive functions. Initially, children’s thinking is built on concrete objects in their environment and later they can think in terms of abstract ideas as well. Therefore, young children need concrete objects and pictures to manipulate. They learn by doing and engaging in a variety of activities. Later, children develop concepts in abstract terms also. Likewise, other domains of development also follow a sequential pattern.

Here it is important to bring attention to the fact that although ordinarily the sequence is common to all children, certain aspects of development may remain affected in some children due to a variety of reasons.

Development is a product of maturation and learning

You must have observed that normally most children learn to sit around at the age of six months, stand while holding in eight to nine months take their first steps between 9 and 12 months and start walking by 13 to 15 months. Under normal circumstances, all children have the potential to sit, stand and walk. But



Notes

they can perform the particular tasks only when they get physically and mentally mature.

Maturation is the unfolding of characteristics potentially present in the individual. This comes from genetic endowment. Genetically, we are born with capacities to walk, speak, think and so forth. There is an internal timetable within us that propels us to start walking and speaking at the time when our body and mind becomes mature enough. Have you observed how young children learn? They learn through imitation and trial and error. *Learning* brings change in behaviour due to environmental learning which includes effort and exercise. Maturation and learning are closely related, one influences the other. Children develop as per their internal genetic time table as well as external environmental inputs. Thus, development is the product of maturation and learning.

There are individual differences in development

At each stage of development, one can expect certain competencies to appear in every domain of development. These are called developmental milestones. Milestones of development present the age ranges during which the majority of children accomplish age specific skills.

It is important to note that there are individual differences in development. No two children are alike. Each child is unique. One child may start speaking early and the other might take more time to speak. The range of variability depends on many factors like heredity and environment. Each child has different experiences that interact with the unique hereditary pattern. Although the sequence of development is fairly uniform, predetermined and common to all children, the rate and pace of development may vary from child to child. Developmental differences are routine among children unless a child deviates drastically from the normal developmental pattern.

The child develops as a unified whole

Different domains of development are interrelated and therefore the child develops as a unified whole. Each domain of development affects the other and is, in turn, affected by the others. Any problem in one aspect of development is likely to affect others. For example, a child who may be either chronically ill or may have delayed physical-motor development, may not be able to participate subsequently in physical activities with other children. As a result, the child may not get a chance to mingle with other children and this may affect all other aspects of development including social-emotional, cognitive and language. The impact may be minor and temporary, or serious and permanent.



INTEXT QUESTIONS 6.1

1. What is meant by development?



Notes

2. State whether the following statements are true or false:
- (a) It is not necessary to understand that each child is unique.
 - (b) Development is the product of maturation and growth.
 - (c) The child develops as a unified whole.
 - (d) Any problem in one aspect of development is likely to affect the others.
 - (e) Development is a sequential process.

6.3 FACTORS AFFECTING GROWTH AND DEVELOPMENT

You have already studied about growth and development and the principles that govern development. To understand what factors affect growth and development, let us go through the following case studies:

Case Study 1:

Sudhir was a small-built baby. Although he was born after completing the full period of gestation in his mother’s womb. At the time of birth, his birth weight and height were less than those of an average newborn. Both his parents are shorter in height than the average population. As Sudhir reaches eight years of age, his parents observe that he is shorter in height among the rest of his classmate.

Case Study 2:

Sonu has grown up in a slum and his parents are daily wagers in a factory. His family lives in poverty and sometimes does not have enough to eat. Sonu shows poor intellectual and academic performance.

Case Study 3:

Reema is a three year old girl growing up in an urban locality. She is not able to speak properly. Both her parents are busy in their respective jobs. The child is looked after by a domestic help who takes care of her well but does not talk much to her. Most of the time Reema is made to sleep.

Write down in the space below the probable reasons for Sudhir’s below-average physical growth, Sonu’s poor performance and Reema’s impaired language development.

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Some of you may have attributed the present condition of these three children as being due to genetic factors, and the health of the mother and the child during the prenatal and postnatal periods. Some of you may have attributed these largely to environmental reasons such as less opportunities of stimulation and poor nutrition of the child. This is what the nature-versus-nurture controversy is all about. Some psychologists believe that our heredity affects us more than environmental factors. Some believe the opposite is true. There is no clear answer as to what impacts us more, our genetic make-up or the inputs that we get from our environment. But generally, there is a consensus that both impact us. Let us explore these in greater depth in the following sections.

6.3.1 Heredity

You may like to know whether intelligent parents will always have intelligent children. Do parents of short stature only have short children? Will a child get asthma, if the mother is suffering from asthma? A child may or may not inherit the characteristics mentioned above. It depends on the genetic material a child receives at the time of conception from both the parents through genes, which are structural units of chromosomes.

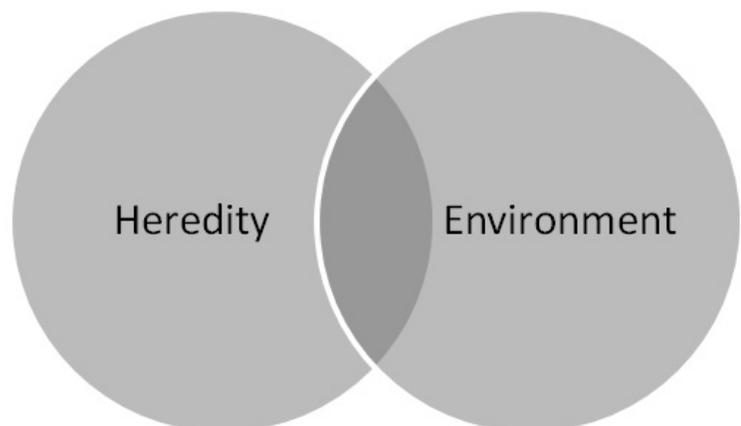


Fig. 6.3 Interrelationship of hereditary and environment factors

Heredity or genetics is found to influence the development of a children's intellectual potential, height, weight and general physical appearance. The genetic makeup inherited from parents seems to be tied to maturation of the body and the brain which influences growth and developmental milestones. After conception, nothing can be done to add to or subtract from the child's hereditary endowment. These characteristics of the child are also determined at the time of fertilisation. At the time of conception, every child receives 46 chromosomes, of which 23 are contributed by the mother and 23, by the father. The X chromosomes passed on by the father will determine the sex of the child.



To an extent, susceptibility to certain diseases (such as colour blindness, Down's Syndrome, asthma, diabetes) also depends on heredity. In addition to that, certain personality characteristics such as temperament may also be affected by genetic factors. However, genetic pre-dispositions can be over ridden by environmental influences. One can create or provide an environment that can help reduce the impact of heredity. In Case Study 1, Sudhir can be provided with healthy food and height-promoting exercises to help reduce the effect of heredity. Similarly, in Case Study 3, Reema can be provided a stimulating environment to help her interact and communicate better.

6.3.2 Environmental Factors

Many environmental factors such as mother's state of health, age, disease and emotional states and exposure of the unborn baby to environmental pollution, to X-rays and drugs affect the child. Certain contextual factors such as family, gender, culture and society at large also influence children's development. Let us read about these environmental factors in detail.

We are familiar that children experience their immediate environment after they are born. However, even before children are born, they experience the environment within their mother's womb. A child and the mother are connected in more than one way. The mother's state of health, diseases, age and emotional states also affect the child. If a mother keeps good health and takes proper nutrition, during and after pregnancy and also during lactation, then the child will also be healthy. However, if a mother has diseases or is nutritionally weak, then the child born to her may also be affected by this. Creating a conducive environment may not totally help the child overcome the constraints set by heredity, but it can help reduce their effect.

► Nutrition, health and hygiene needs of a child and the mother

The foundations for growth and healthy development are laid from the mother's womb. Maternal health is an important factor which affects the growth and development of a child. A foetus gets nourishment from the mother's diet. Therefore, it is very important that during pregnancy, the mother takes a balanced diet which is rich in all necessary nutrients. Moreover, antibodies produced by the mother to combat infectious diseases are transmitted to the foetus, usually producing immunity at birth and for some months thereafter. The placenta also acts as a barrier against some harmful agents, including viruses, microorganisms and various chemicals. Thus, it is important to give both the mother and the child proper and timely immunisation and other health check-ups to prevent various diseases.

Along with mother's and child's nutrition and health, keeping them clean by giving them a regular bath, cleaning of teeth, hair, nails, nose and eyes are other important factors that must be given attention.



Notes

➤ **Age of the mother**

Besides the mother's health, her age also affects foetal development. Reproductive organs of mothers who are less than seventeen years of age are not fully mature and the hormones required for reproduction are not at the optimum level. Among young teenagers, pregnancy tends to inhibit the mother's as well as the child's growth. Young mothers are at high risk of complications during pregnancy. Likewise, after the age of 35, hormonal activity gradually decreases and may lead to complications. Women over the age of 40 run a risk of having children with chromosomal abnormality.

➤ **Emotional state of mother**

Children are not just affected by the mother's physical state but also by the mother's emotional state. Emotions like rage, fear and anxiety bring the mother's nervous system into action and thereby, certain chemicals are released into the bloodstream of the mother. These substances are transmitted to the foetus. Prolonged emotional stress during pregnancy may have lasting consequences on the child. Infants born to upset, unhappy mothers are more likely to be premature or have low birth weights, be hyper active and irritable; and may manifest difficulties such as irregular eating, excessive bowel movements, gas, sleep disturbances and excessive crying.

➤ **Exposure to X-rays**

During pregnancy, one needs to avoid unnecessary exposure to X-rays unless the doctor advises it. Repeated exposures to radiation during early conception period may have harmful effects on the physical and mental development of the foetus.

Drugs

Many drugs are suspected of producing birth defects if they are taken during pregnancy. These include some antibiotics, hormones and steroids. Many a time one finds pregnant women taking medicine without realising its impact on the foetus. It can be harmful or even prove fatal to the unborn child.

➤ **Drinking and Smoking**

Drinking by pregnant women can produce foetal alcohol syndrome. The symptoms of this condition include retarded prenatal and postnatal growth, premature birth, mental retardation, physical malformations, sleep disturbances and congenital heart disease.

Smoking by a pregnant woman retards the growth of the foetus and lowers the newborn's birth weight and resistance to illness. It also increases the chances of spontaneous abortion and premature birth, and may affect long-term physical and cognitive development. This is a consequence of the reduced capacity of the

mother's blood to transport oxygen to the foetus. Caffeine is also likely to cause abortion, still birth and premature birth of the child.

➤ Environmental Pollution

You will be surprised to know that environmental pollution is another factor that affects prenatal development. Exposure of pregnant women to environmental pollution can seriously affect the developing foetus. For instance, pregnant women can absorb lead from car exhaust, paint flaking off the walls in old houses and other materials used in industrial establishments. The high levels of lead exposures are consistently linked to prematurity, low birth weight, brain damage and slightly poor mental development during the first two years. It may also lead to a variety of physical defects.

Other Contextual Factors

Certain contextual factors such as socio-economic status of a child's family, their living conditions, family structure, child rearing practices and the society at large also impact growth and development of children. Let us read more about them.

➤ Socio-economic background

Children from different socio-economic backgrounds may vary in terms of their growth and development. This is on account of factors like nutrition, number of illnesses and overall standards of health. Lack of opportunities and exposure, especially in early years, lead to a lag in certain aspects of development.

➤ Living conditions, illness and accidents

If living conditions are poor, children may suffer from a variety of diseases leaving them with stunted growth and development. Some homes lack proper sunlight and ventilation. Unhygienic living conditions within homes and outside make children susceptible to water-borne diseases like diarrhoea, typhoid and many other ailments of the stomach. Respiratory and gastrointestinal diseases are frequent among many children brought up in an unhygienic environment which may even prove fatal. Children who grow up in unhygienic conditions are also likely to catch common illnesses like measles, chicken pox, whooping cough, diarrhoea and diphtheria. These illnesses may be mild or prolonged in a particular child, but they are most likely to affect growth and delay development.

Other than these, accidents due to lack of safety measures and negligence may lead to physical and intellectual impairments.

➤ Family structure

The changing structure of the family from joint to nuclear has decreased the number of persons including children and grandparents that children interact with. This has an impact on their development including their socio- emotional development.



Notes



Notes

Shrinking family size clubbed with the busy schedules of the parents due to their work commitments often leave the children being socialized by different forms of media and technology. Children's engagement with modern day gadgets such as phones, laptops, tablets and televisions may impact their overall growth and development.

➤ **Child-rearing practices**

Some parents are authoritarian and make strict rules and regulations that the children must follow. This creates fear and insecurity in the children. On the other hand, some parents take children's choices and opinions into consideration while deciding anything for children. Thus, child rearing practices may have positive or negative impact on the children's development. A balanced attitude of parents towards children creates pleasant experiences and favourable environment that helps children to become confident, have high self-esteem and find people around them trustworthy.

➤ **Enabling and stimulating environment**

An enabling and stimulating environment both at home and at school is essential for children's healthy growth and development. The development of children will be positive in a home where they are encouraged to play and interact freely with parents and caregivers. This promotes all the domains of development. Similarly, it is also necessary that children are allowed to ask questions and given an opportunity to explore and experiment at school. If their enthusiasm is curbed and they are discouraged for participating, then their cognitive and socio-emotional development is likely to get affected.

➤ **Influence of Siblings**

Apart from parents, children are strongly influenced by their siblings. They can be a source of emotional security and can help each other acquire skills. If the parents involve an older child in supporting them in looking after the younger sibling, the child learns responsibility and develops a willingness to share. On the other hand, siblings may develop jealousy and rivalry with each other. Parents should avoid comparing the siblings, as this can create resentment and jealousy. They should also ensure that their behaviour towards them is impartial and fair.

• **Peer group**

Beyond the confines of home and one's immediate family, how well children are accepted within the peer group deeply influences their self-concept. The peer group helps children to learn and behave in a socially acceptable manner. Acceptance by one's peer group is a strong source of emotional support. Though parents teach social behaviour, it is in the company of friends that children learn sharing, cooperation, autonomy, skills of leadership and a sense of competition. Hence, the importance of peer group in healthy growth and development cannot be undermined.



• Gender and Culture

Learning to behave according to the gender roles prescribed by society is an important task that children have to master to be accepted by the peer group. Differences in behaviour shown by boys and girls emerge because of parental and societal expectations. Often, it is seen that boys are encouraged to fight back and not to cry "like a girl" while crying is accepted in girls when they are attacked. This is harmful as it creates gender stereotypes, and parents and teachers should ensure that no such behaviour is encouraged through action and words. In addition to this, cultural practices also directly and indirectly influence children's growth and development.



INTEXT QUESTIONS 6.2

1. Fill in the blanks:
 - a. Children learn _____, _____
_____ and _____ in the company of friends.
 - b. _____ and _____
diseases are frequent among many children living in an unhygienic environment.
2. Name any two diseases one can be susceptible to due to hereditary reasons.



ACTIVITY 6.1

Collect information from your community on cultural practices specifically related to health and nutrition that affects the growth and development of children.



WHAT YOU HAVE LEARNT

In this lesson, you have learnt:

- The term growth refers to changes in height, weight and body structure. It refers to quantitative changes in the body that are measurable. Growth is rapid during the first two years of life.
- Development refers to qualitative changes in the body as well as changes in behaviour and attitude. It is difficult to measure development.
- Development is continuous and sequential, involves change and is a product of maturation and learning.
- There are individual differences in development.
- Development is influenced by heredity and a number of environmental factors such as nutrition, health, age and emotional state of the mother. It is also affected by exposure to X-rays, intake of drugs, socio-economic background, living conditions, family structure and child-rearing practices.



Notes

**TERMINAL EXERCISE**

1. What do you understand by the term growth? What are the main indicators of growth?
2. State the differences between growth and development with examples.
3. Explain the principles of development with relevant examples.
4. “A child develops as a unified whole.” Justify the statement.
5. Why do we say that development is the product of maturation and learning?
6. Name some of the contextual factors that can affect the child. Explain any two of these in detail.
7. What effects can exposure to environmental factors such as pollution, X-rays and drugs have on the foetus?

**ANSWERS TO INTEXT QUESTIONS****6.1**

1. Development refers to qualitative changes in the body as well as changes in behavior and attitude.
2. (a) False
(b) False
(c) True
(d) True
(e) True

6.2

1. (a) cooperation, autonomy, skills of leadership
(b) Typhoid and diarrhoea
2. colour blindness, diabetes

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