# Chapter 3: Infants and Toddlers

This chapter explores physical development in infants and toddlers, from birth to around two years old. It discusses rapid physical changes, including growth hormone and thyroid stimulating hormone, as well as body proportions and brain development. Gross motor skills, such as crawling and walking, are introduced, along with fine motor skills like grasping and manipulating objects. Nutrition is also examined, highlighting the importance of breast milk for newborns and the benefits of breastfeeding for both mothers and babies. The chapter concludes by discussing challenges to breastfeeding and its cost-effectiveness.

#### Week 3 Glossary Terms:

* Gross motor skills
* Fine motor skills
* Colostrum
* Wasting
* Failure to thrive
* Immunization
* Object Permanence
* Attachment

## First Two Years

### Physical Development

(Learning & Overstreet, 2017)

Welcome to the story of development from infancy through toddlerhood; from birth until about two years of age. Researchers have given this part of the life span more attention than any other period, perhaps because changes during this time are so dramatic and so noticeable and perhaps because we have assumed that what happens during these years provides a foundation for one’s life to come. However, it has been argued that the significance of development during these years has been overstated (Bruer, 1999). Nevertheless, this is the period of life that contemporary educators, healthcare providers, and parents have focused on most heavily. We will examine growth and nutrition during infancy, as well as other prominent physical changes that take place during this time.

### Rapid Physical Changes

As mentioned in the previous chapter, the average newborn in the United States weighs about 7.5 pounds and is about 20 inches in length. After about a 5 percent weight loss in the first few days, there is a period of rapid growth. By the time an infant is four months old, it usually doubles in weight and by one year has tripled its birth weight. By age two, the weight has quadrupled. The average length at one year is about 26–32 inches.

Two hormones are very important to this growth process. The first is human growth hormone (HGH) which influences all growth except that in the central nervous system (CNS). The hormone influencing growth in the CNS is called thyroid stimulating hormone. Together these hormones influence the growth in early childhood. Sleep is very important to the growth process as these hormones are released as children sleep each night. As a result, children need 11–14 hours of sleep from 2 to 6 years old. Parents may establish rituals, such as reading a story, taking a bath, brushing teeth, and so on, to help children wind down and get the sleep they so desperately need (Leon & West Hills Community College Lemoore, 2021).

### Proportions of the Body

Another dramatic physical change that takes place in the first several years of life is the change in body proportions. The head initially makes up about 50 percent of our entire length when we are developing in the womb. At birth, the head makes up about 25 percent of the infant’s length. By age 25 it comprises about 20 percent of the infant’s length. Imagine how difficult it must be to raise one’s head during the first year of life! If you have ever seen a 2–4 month-old infant lying on the stomach trying to raise the head, you know how much of a challenge this is.

Some of the most dramatic physical change that occurs during this period is in the brain. At birth, the brain is about 25 percent its adult weight. This is not true for any other part of the body. By age 2, it is at 75 percent its adult weight, at 95 percent by age 6 and at 100 percent by age 7 years. While most of the brain’s 100 to 200 billion neurons are present at birth, they are not fully mature and during the next several years dendrites or connections between neurons will undergo a period of transient exuberance or temporary dramatic growth.

### Gross Motor Skills

(Leon & West Hills Community College Lemoore, 2021)

Voluntary movements involve the use of large muscle groups and are typically large movements of the arms, legs, head, and torso. They are referred to as gross motor skills (or large motor skills). These skills begin to develop first. Examples include moving to bring the chin up when lying on the stomach, moving the chest up, rocking back and forth on hands and knees, and then crawling. It also includes exploring an object with one’s feet as many babies do as early as eight weeks of age. This may be easier than reaching for an object with the hands, which requires much more practice (Berk, 2007). And sometimes an infant will try to move toward an object while crawling and surprisingly move backward because of the greater amount of strength in the arms than in the legs! This also tends to lead infants to pulling up on furniture, usually with the goal of reaching a desired object. Usually this will also lead to taking steps and eventually walking.

#### Physical Gross Motor Milestones

As stated above, children grow very quickly and meet physical milestones rapidly in the first few years of life. The following is a table of the major milestones (behaviors or physical skills seen in infants and children as they grow and develop that typically occur within normal range) that occur in children during those first formative years (Developmental Milestones Record, 2023).

|  |  |
| --- | --- |
| Typical Age | What Most Children Do By This Age |
| **2 months** | * Can hold head up and begins to push up when lying on tummy
* Makes smoother movements with arms and legs
 |
| **4 months** | * Holds head steady, unsupported
* Pushes down on legs when feet are on a hard surface
* May be able to roll over from tummy to back
* Brings hands to mouth
* When lying on stomach, pushes up to elbows
 |
| **6 months** | * Rolls over in both directions (front to back, back to front)
* Begins to sit without support
* When standing, supports weight on legs and might bounce
* Rocks back and forth, sometimes crawling backward before moving forward
 |
| **9 months** | * Stands, holding on
* Can get into sitting position
* Sits without support
* Pulls to stand
* Crawls
 |
| **1 year** | * Gets to a sitting position without help
* Pulls up to stand, walks holding on to furniture ("cruising")
* May take a few steps without holding on
* May stand alone
 |
| **18 months** | * Walks alone
* May walk up steps and run
* Pulls toys while walking
* Can help undress self
 |
| **2 years** | * Stands on tiptoe
* Kicks a ball
* Begins to run
* Climbs onto and down from furniture without help
* Walks up and down stairs holding on
* Throws ball overhand
 |

### Fine Motor Skills

(Leon & West Hills Community College Lemoore, 2021)

More exact movements of the feet, toes, hands, and fingers are referred to as fine motor skills (or small motor skills). These include the ability to reach and grasp an object in coordination with vision. Newborns cannot grasp objects voluntarily but do wave their arms toward objects of interest. At about 4 months of age, the infant is able to reach for an object, first with both arms and within a few weeks, with only one arm. Grasping an object involves the use of the fingers and palm, but no thumbs.

Use of the thumb comes at about 9 months of age when the infant is able to grasp an object using the forefinger and thumb. This is known as the pincer grip. This ability greatly enhances the ability to control and manipulate an object and infants take great delight in this newfound ability. They may spend hours picking up small objects from the floor and placing them in containers. And as those objects will often next go into the mouth, caregivers must be vigilant about keeping items small enough to be choking hazards out of reach of little fingers. By 9 months, an infant can also watch a moving object, reach for it as it approaches and grab it. This is quite a complicated set of actions if we remember how difficult this would have been just a few months earlier.

#### Physical Fine Motor Milestones

While fine motor skills are slower to develop (in accordance with proximodistal development), pretty remarkable progress is made in fine motor development during the first two years. As stated above, in the first few years of life children go from having no intentional fine motor control to being able to manipulate objects to play and learn, as well as beginning to care of themselves. The following is a table of the major milestones in fine motor development.

|  |  |
| --- | --- |
| Typical Age | What Most Children Do By This Age |
| **2 months** | * Grasps reflexively
* Does not reach for objects
* Holds hands in fist
 |
| **4 months** | * Brings hand to mouth
* Uses hands and eyes together, such as seeing a toy and reaching for it
* Follows moving things with eyes from side to side
* Can hold a toy with whole hand (palmar grasp) and shake it and swing at dangling toys
 |
| **6 months** | * Reaches with both arms
* Brings things to mouth
* Begins to pass things from one hand to the other
 |
| **9 months** | * Puts things in mouth
* Moves things smoothly from one hand to the other
* Picks up things between thumb and index finger (pincer grip)
 |
| **1 year** | * Reaches with one hand
* Bangs two things together
* Puts things in a container, takes things out of a container
* Lets things go without help
* Pokes with index (pointer) finger
 |
| **18 months** | * Scribbles on own
* Can help undress themselves
* Drinks from a cup
* Eats with a spoon with some accuracy
* Stacks 2-4 objects
 |
| **2 years** | * Builds towers of 4 or more blocks
* Might use one hand more than the other
* Makes copies of straight lines and circles
* Enjoys pouring and filling
* Unbuttons large buttons
* Unzips large zippers
* Drinks and feeds self with more accuracy
 |

## Nutrition

Nutritional needs change with age. Let’s examine how caregivers should nourish children during the first years of life and some risks to nutrition that they should be aware of.

### Breastfeeding

Breast milk is considered the ideal diet for newborns. Colostrum, the first breast milk produced during pregnancy and just after birth has been described as liquid gold (Office on Women’s Health, 2024). It is very rich in nutrients and antibodies. Breast milk changes by the third to fifth day after birth, becoming much thinner, but containing just the right amount of fat, sugar, water and proteins to support overall physical and neurological development. For most babies, breast milk is also easier to digest than formula. Formula fed infants experience more diarrhea and upset stomachs. The absence of antibodies in formula often results in a higher rate of ear infections and respiratory infections.

Children who are breastfed have lower rates of childhood leukemia, asthma, obesity, type 1 and 2 diabetes, and a lower risk of SIDS. The USDHHS (United States Department of Health and Human Services) recommends that mothers breastfeed their infants until at least 6 months of age and that breast milk be used in the diet throughout the first year or two.

#### Maternal Benefits of Breastfeeding

Several recent studies have reported that it is not just babies that benefit from breastfeeding. Breastfeeding stimulates contractions in the mother’s uterus to help it regain its normal size, and women who breastfeed are more likely to space their pregnancies further apart. Mothers who breastfeed are at lower risk of developing breast cancer (Islami et al., 2015), especially among higher risk racial and ethnic groups (Islami et al., 2015); (Redondo et al., 2012). Women who breastfeed have lower rates of ovarian cancer (Titus-Ernstoff et al., 2010), reduced risk for developing Type 2 diabetes (Schwarz et al., 2010); (Gunderson et al., 2015), and rheumatoid arthritis (Karlson et al., 2004). In most studies these benefits have been seen in women who breastfeed longer than 6 months.

#### Challenges to Breastfeeding

However, most mothers who breastfeed in the United States stop breastfeeding at about 6–8 weeks, often in order to return to work outside the home (Office on Women’s Health, 2024). Mothers can certainly continue to provide breast milk to their babies by expressing and freezing the milk to be bottle-fed at a later time or by being available to their infants at feeding time. However, some mothers find that after the initial encouragement they receive in the hospital to breastfeed, the outside world is less supportive of such efforts. Some workplaces support breastfeeding mothers by providing flexible schedules and welcoming infants, but many do not. In addition, not all women may be able to breastfeed. Women with HIV are routinely discouraged from breastfeeding as the infection may pass to the infant. Similarly, women who are taking certain medications or undergoing radiation treatment may be told not to breastfeed (Office on Women’s Health, 2024).

#### Cost of Breastfeeding

In addition to the nutritional benefits of breastfeeding, breast milk does not have to be purchased. Anyone who has priced formulas recently can appreciate this added incentive to breastfeeding. Prices for a year’s worth of formula and feeding supplies can cost well over $1,500 (Office on Women’s Health, 2024).

But there are also those who challenge the belief that breast milk is free. For breastmilk to be completely beneficial for infants the mother's life choices will ultimately affect the quality of the nutrition an infant will receive. Let's consider the nutritional intake of the mother. Breastfeeding will both limit some food and drink choices as well as necessitate an increased intake of healthier options. A simple trip down the supermarket aisles will show you that nutritious and healthier options can be more expensive than some of the cheaper more processed options. A large variety of vegetables and fruits must be consumed, accompanied by the right proportions and amounts of whole grains, dairy products, and fat food groups. Additionally, it is also encouraged for breastfeeding mothers to take vitamins regularly. That raises the question of how free breastfeeding truly is.

#### Alternatives to Breastfeeding

There are many reasons that mothers struggle to breastfeed or should not breastfeed, including: low milk supply, previous breast surgeries, illicit drug use, medications, infectious disease, and inverted nipples. Some mothers choose not to breastfeed. Reasons for this include: lack of personal comfort with nursing, the time commitment of nursing, inadequate or unhealthy diet, and more convenience and flexibility with who and when an infant can be fed. For these mothers and infants, formula is available. Besides breast milk, infant formula is the only other milk product that the medical community considers nutritionally acceptable for infants under the age of one year (as opposed to cow's milk, goat's milk, or follow-on formula). It can be used in addition to breastfeeding (supplementing) or as an alternative to breastmilk.

The most commonly used infant formulas contain purified cow's milk whey and casein as a protein source, a blend of vegetable oils as a fat source, lactose as a carbohydrate source, a vitamin-mineral mix, and other ingredients depending on the manufacturer. In addition, there are infant formulas which use soybeans as a protein source in place of cow's milk (mostly in the United States and Great Britain) and formulas which use protein hydrolysed into its component amino acids for infants who are allergic to other proteins (Wikipedia, The Free Encyclopedia., 2024).

One early argument given to promote the practice of breastfeeding was that it promoted bonding and healthy emotional development for infants. However, this does not seem to be the case. Breastfed and bottle-fed infants adjust equally well emotionally (Fergusson & Woodward, 1999). This is good news for mothers who may be unable to breastfeed for a variety of reasons and for fathers who might feel left out.

### When, What, and How to Introduce Solid Foods

The American Academy of Pediatrics recommends children be introduced to foods other than breast milk or infant formula when they are about six months old. It’s important to remember that every child is different.

Here are some signs that show that an infant is ready for foods other than breast milk or infant formula:

* Children can sit with little or no support.
* Child has good head control.
* Child opens their mouth and leans forward when food is offered.

#### How Should Foods Be Introduced?

(Centers for Disease Control and Prevention, 2023c)

The American Academy of Pediatrics says that for most children, foods do not need to be given in a certain order. Children can begin eating solid foods at about six months old. By the time they are seven or eight months old, children can eat a variety of foods from different food groups. These foods include infant cereals, meat or other proteins, fruits, vegetables, grains, yogurts and cheeses, and more.

When feeding infant cereals, it is important to offer a variety of fortified infant cereals such as oat, barley, and multigrain instead of only rice cereal. The Food and Drug Administration does not recommend only providing infant rice cereal because there is a risk for children to be exposed to arsenic.

Children should be allowed to try one food at a time at first and there should be 3–5 days before another food is introduced. This helps caregivers see if the child has any problems with that food, such as food allergies. When introducing new foods, it may take numerous attempts before a child gains a taste for it. Caregivers should not give up if a food is refused on first offering.

The eight most common allergenic foods are milk, eggs, fish, shellfish, tree nuts, peanuts, wheat, and soybeans. It is no longer recommended that caregivers delay introducing these foods to all children, but if there is a family history of food allergies, the child’s doctor or nurse should be consulted.

It may take numerous attempts before a child gains a taste for it. So caregivers should not give up if a food is refused on first offering.

#### USDA Infant Meal Patterns

The United States Department of Agriculture Food and Nutrition Service provides the following guidance for the day time feeding of infants and toddlers.

##### Infant Meal Patterns

(Centers for Disease Control and Prevention, 2023c)

|  |  |  |
| --- | --- | --- |
| Meal | 0-5 months | 6-11 months |
| **Breakfast, lunch, and supper** | 4-6 fluid ounces breastmilk or formula | 6-8 fluid ounces breastmilk or formula0-4 tablespoons infant cereal, meat, fish, poultry, whole eggs, cooked dry beans or peas; or0-2 ounces cheese; or0-4 ounces (volume) cottage cheese; or0-4 ounces yogurt; or a combination\*0-2 tablespoons vegetable, fruit, or both\* |
| **Snack** | 4-6 fluid ounces breastmilk or formula | 2-4 fluid ounces breastmilk or formula0-1/2 bread slice; or0-2 crackers; or0-4 tablespoons infant cereal or ready-to-eat cereal\*0-2 tablespoons vegetable, fruit, or both\* |

\*Required when infant is developmentally ready. All serving sizes are minimum quantities of the food components that are required to be served.

##### Meal Patterns for Children (1–2 years)

(U.S. Department of Agriculture, Food and Nutrition Service, 2023)

|  |  |
| --- | --- |
| Meal | Ages 1-2 |
| **Breakfast** | 1/2 cup milk1/4 cup vegetables, fruit, or both1/2 ounce equivalent grains |
| **Lunch or supper** | 1/2 cup milk1 ounce meat or meat alternative1/8 cup vegetables1/8 cup fruits1/2 ounce equivalent of grains |
| **Snack** | Select two of the following:1/2 cup milk1/2 ounce meat or meat alternative1/2 cup vegetables1/2 cup fruit1/2 ounce equivalent of grains |

Note: All serving sizes are minimum quantities of the food components that are required to be served.

### Child Malnutrition

(Lally & Valentine-French, 2023)

There can be serious effects for children when there are deficiencies in their nutrition. Let’s explore a few types of nutritional concerns.

#### Wasting

Children in developing countries and places experiencing the harsh conditions of war are at risk for two major types of malnutrition, also referred to as wasting. Infantile marasmus refers to starvation due to a lack of calories and protein. Children who do not receive adequate nutrition lose fat and muscle until their bodies can no longer function. Babies who are breastfed are much less at risk of malnutrition than those who are bottle-fed. After weaning, children who have diets deficient in protein may experience kwashiorkor or the “disease of the displaced child,” often occurring after another child has been born and taken over breastfeeding. This results in a loss of appetite and swelling of the abdomen as the body begins to break down the vital organs as a source of protein. Around the world the rates of wasting have been dropping. However, according to the World Health Organization and UNICEF, in 2014 there were 50 million children under the age of 5 that experienced these forms of wasting, and 16 million were severely wasted (UN Inter-agency Group for Child Mortality Estimation et al., 2015). Worldwide, these figures indicate that nearly 1 child in every 13 suffers from some form of wasting. The majority of these children live in Asia (34.3 million) and Africa (13.9 million). Wasting can occur as a result of severe food shortages, regional diets that lack certain proteins and vitamins, or infectious diseases that inhibit appetite (Latham, 1997).

The consequences of wasting depend on how late in the progression of the disease parents and guardians seek medical treatment for their children. Unfortunately, in some cultures, families do not seek treatment early, and as a result by the time a child is hospitalized the child often dies within the first three days after admission (Latham, 1997). Several studies have reported long-term cognitive effects of early malnutrition (Galler & Ramsey, 1989); (Galler et al., 1987); (Richardson, 1980), even when home environments were controlled (Galler et al.1990). Lower IQ scores (Galler et al., 1987), poor attention (Galler & Ramsey, 1989), and behavioral issues in the classroom (Galler et al., 1990) have been reported in children with a history of serious malnutrition in the first few years of life.

#### Milk Anemia

(Leon & West Hills Community College Lemoore, 2021)

About 9 million children in the United States are malnourished (Coleman-Jensen et al., 2022). More still suffer from milk anemia, a condition in which milk consumption leads to a lack of iron in the diet. This can be due to the practice of giving toddlers milk as a pacifier when resting, riding in a vehicle, waking up, and so on. Appetite declines somewhat during toddlerhood and a small amount of milk (especially with added chocolate syrup) can easily satisfy a child’s appetite for many hours. The calcium in milk interferes with the absorption of iron in the diet as well.

#### Failure to Thrive

(Wikipedia, The Free Encyclopedia., 2023)

Failure to thrive (FTT) occurs in children whose nutritional intake is insufficient for supporting normal growth and weight gain. FTT typically presents before two years of age, when growth rates are highest. Parents may express concern about picky eating habits, poor weight gain, or smaller size compared relative to peers of similar age. Physicians often identify FTT during routine office visits, when a child's growth parameters are not tracking appropriately on growth curves. FTT can be caused by physical or mental issues within the child (such as errors of metabolism, acid reflux, anemia, diarrhea, cystic fibrosis, Crohn’s disease, celiac disease, cleft palate, tongue tie, milk allergies, hyperthyroidism, congenital heart disease, and so on). It can also be caused by caregiver’s actions (environmental), including inability to produce enough breast milk, inadequate food supply, providing an insufficient number of feedings, and neglect. These causes may also coexist. For instance, a child who is not getting sufficient nutrition may act content so that caregivers do not offer feedings of sufficient frequency or volume, and a child with severe acid reflux who appears to be in pain while eating may make a caregiver hesitant to offer sufficient feedings.

### Protecting Health through Immunization

One way to protect a child’s health (and those around them) is through immunization. The vaccines (given through injection) may hurt a little but the diseases they can prevent can hurt a lot more! Immunization shots, or vaccinations, are essential. They protect against things like measles, mumps, rubella, hepatitis B, polio, diphtheria, tetanus and pertussis (whooping cough). Immunizations are important for adults as well as for children.

The immune system helps the human body fight germs by producing substances to combat them. Once it does, the immune system remembers the germ and can fight it again. Vaccines contain germs that have been killed or weakened. When given to a healthy person, the vaccine triggers the immune system to respond and thus build immunity. Before vaccines, people only became immune by actually getting a disease and surviving it. Immunizations are an easier and less risky way to become immune. Vaccines are the best defense we have against serious, preventable, and sometimes deadly contagious diseases. Vaccines are some of the safest medical products available, but like any other medical product, there may be risks. Accurate information about the value of vaccines as well as their possible side effects helps people to make informed decisions about vaccination.

#### Potential Side Effects

Any vaccine can cause side effects. For the most part these are minor (for example, a sore arm or low-grade fever) and go away within a few days (Baker & Foothill College, 2023). Serious side effects after vaccination, such as severe allergic reaction, are very rare (Centers for Disease Control and Prevention, 2023b).

Remember, vaccines are continually monitored for safety, and like any medication, vaccines can cause side effects. However, a decision not to immunize a child also involves risk and could put the child and others who come into contact with them at risk of contracting a potentially deadly disease.

#### How Well Do Vaccines Work?

Vaccines work really well. No medicine is perfect, of course, but most childhood vaccines produce immunity about 90–100% of the time. What about the argument made by some people that vaccines don’t work that well; that diseases would be going away on their own because of better hygiene or sanitation, even if there were no vaccines?

That simply isn’t true. Certainly better hygiene and sanitation can help prevent the spread of disease, but the germs that cause disease will still be around, and as long as they are they will continue to make people sick. All vaccines must be licensed (approved) by the Food and Drug Administration (FDA) before being used in the United States, and a vaccine must go through extensive testing to show that it works and that it is safe before the FDA will approve it. Among these tests are clinical trials, which compare groups of people who get a vaccine with groups of people who get a control. A vaccine is approved only if the FDA determines it is safe and effective for its intended use.

If you look at the history of any vaccine-preventable disease, you will virtually always see that the number of cases of disease starts to drop when a vaccine is licensed. Vaccines are the most effective tool we have to prevent infectious diseases.

#### Opposition to Vaccines

In 2010, a pertussis (whooping cough) outbreak in California sickened 9,143 people and resulted in 10 infant deaths: the worst outbreak in 63 years (Centers for Disease Control and Prevention, 2014). Researchers, suspecting that the primary cause of the outbreak was the waning strength of pertussis vaccines in older children, recommended a booster vaccination for 11–12 year-olds and also for pregnant women (Zacharyczuk et al., 2011). Pertussis is most serious for babies; one in five needs to be hospitalized, and since they are too young for the vaccine themselves, it is crucial that people around them be immunized (Centers for Disease Control and Prevention, 2014). Several states, including California, have been requiring the pertussis booster for older children in recent years with the hope of staving off another outbreak.

But what about people who do not want their children to have this vaccine, or any other? That question is at the heart of a debate that has been simmering for years. Vaccines are biological preparations that improve immunity against a certain disease. Vaccines have contributed to the eradication and weakening of numerous infectious diseases, including smallpox, polio, mumps, chicken pox, and meningitis.

However, many people express concern about potential negative side effects from vaccines. These concerns range from fears about overloading the child’s immune system to controversial reports about devastating side effects of the vaccines (Baker & Foothill College, 2023). Although children continue to get several vaccines up to their second birthday, these vaccines do not overload the immune system. Every day, an infant’s healthy immune system successfully fights off thousands of antigens (the parts of germs that cause their immune system to respond). Even if your child receives several vaccines in one day, vaccines contain only a tiny amount of antigens compared to the antigens your baby encounters every day.

This is the case even if your child receives combination vaccines. Combination vaccines take two or more vaccines that could be given individually and put them into one shot. Children get the same protection as they do from individual vaccines given separately but with fewer shots (Centers for Disease Control and Prevention, 2023b). One misapprehension is that the vaccine itself might cause the disease it is supposed to be immunizing against (Baker & Foothill College, 2023). Vaccines help develop immunity by imitating an infection, but this imitation infection does not cause illness. Instead it causes the immune system to develop the same response as it does to a real infection so the body can recognize and fight the vaccine preventable disease in the future. Sometimes, after getting a vaccine, the imitation infection can cause minor symptoms, such as fever. Such minor symptoms are normal and should be expected as the body builds immunity (Centers for Disease Control and Prevention, 2023b).

Another commonly circulated concern is that vaccinations, specifically the MMR vaccine (MMR stands for measles, mumps, and rubella), are linked to autism. The autism connection has been particularly controversial. In 1998, a British physician named Andrew Wakefield published a study in Great Britain’s Lancet magazine that linked the MMR vaccine to autism. The report received a lot of media attention, resulting in British immunization rates decreasing from 91 percent in 1997 to almost 80 percent by 2003, accompanied by a subsequent rise in measles cases (Delvin, 2008). A prolonged investigation by the British Medical Journal proved that not only was the link in the study nonexistent, but that Dr. Wakefield had falsified data in order to support his claims (the CNN Wire Staff, 2011). Dr. Wakefield was discredited and stripped of his license, but the doubt still lingers in many parents’ minds.

Other parents choose not to vaccinate for various reasons like religious or health beliefs. In one instance, a boy whose parents opted not to vaccinate returned home to the U.S. after a trip abroad; no one yet knew he was infected with measles. The boy exposed 839 people to the disease and caused 11 additional cases of measles, all in other unvaccinated children, including one infant who had to be hospitalized.

According to a study published in Pediatrics, the outbreak cost the public sector $10,376 per diagnosed case. The study further showed that the intentional non-vaccination of those infected occurred in students from private schools, public charter schools, and public schools in upper-socioeconomic areas (Sugerman et al., 2010).

#### The Immunization Schedule

On-time vaccination throughout childhood is essential because it helps provide immunity before children are exposed to potentially life-threatening diseases. Vaccines are tested to ensure that they are safe and effective for children to receive at the recommended ages (Centers for Disease Control and Prevention, 2019). Fully vaccinated children in the U.S. are protected against 16 potentially harmful diseases. Vaccine preventable diseases can be very serious, may require hospitalization, or even be deadly, especially in infants and young children (Centers for Disease Control and Prevention, 2019).

Here is the schedule from the CDC to ensure a child is fully vaccinated:



Source: (American Academy of Pediatrics, 2022)

## Cognitive Development

(Leon & West Hills Community College Lemoore, 2021)

In an effort to better understand the large spectrum of cognition that infants and toddlers go through, it is important to analyze and comprehend various theories that relate to their growth and development. This chapter will take a look at the following theorists: Piaget, Vygotsky, Chomsky, Skinner, Pavlov, Watson, Bandura, and Bronfenbrenner.

### Piaget

Jean Piaget is the most noted theorist when it comes to children's cognitive development. He believed that children's cognition develops in stages. He explained this growth in the following stages:

1. Sensorimotor Stage (Birth through 2 years old)
2. Preoperational Stage (2–7 years old)
3. Concrete Operational Stage (7–11 years old)
4. Formal Operational Stage (12–adulthood)

In this cognitive section, we will focus on his first stage which occurs in infancy.

#### Piaget and Sensorimotor Intelligence

Piaget describes intelligence in infancy as sensorimotor or based on direct, physical contact. Infants taste, feel, pound, push, hear, and move in order to experience the world. Let’s explore the transition infants make from responding to the external world reflexively as newborns to solving problems using mental strategies as two-year-olds.

##### Substages of Piaget’s Sensorimotor Stage

(Leon & West Hills Community College Lemoore, 2021)

|  |  |  |
| --- | --- | --- |
| Substage | Age | Description |
| **Substage One: Simple Reflexes** | **Birth to 1 month** | This active learning begins with automatic movements or reflexes. A ball comes into contact with an infant's cheek and is automatically sucked on and licked. |
| **Substage Two: Primary Circular Reactions** | **1-4 months** | The infant begins to discriminate between objects and adjust responses accordingly as reflexes are replaced with voluntary movements. An infant may accidentally engage in a behavior and find it interesting, such as making a vocalization. This interest motivates trying to do it again and helps the infant learn a new behavior that originally occurred by chance. At first, most actions have to do with the body, but in months to come, will be directed more toward objects. |
| **Substage Three: Secondary Circular Reactions** | **4-8 months** | The infant becomes more and more actively engaged in the outside world and takes delight in being able to make things happen. Repeated motion brings particular interest as the infant is able to bang two lids together from the cupboard when seated on the kitchen floor. |
| **Substage Four: Coordination of Circular Reactions** | **8-12 months** | The infant can engage in behaviors that others perform and anticipate upcoming events. Perhaps because of continued maturation of the prefrontal cortex, the infant becomes capable of having a thought and carrying out a planned, goal-directed activity such as seeking a toy that has rolled under the couch. The object continues to exist in the infant's mind when out of sight and the infant now is capable of making attempts to retrieve it. |
| **Substage Five: Tertiary Circular Reactions** | **12-18 months** | The infant more actively engages in experimentation to learn about the physical world. Gravity is learned by pouring water from a cup or pushing bowls from high chairs. The caregiver tries to help the child by picking it up again and placing it on the tray. What happens? Another experiment! The child pushes it off the tray again causing it to fall and the caregiver to pick it up again! |
| **Substage Six: Internalization of Schemes and Early Representation al Thought** | **18 months-2 years** | The child is now able to solve problems using mental strategies, to remember something heard days before and repeat it, engage in pretend play, and find objects that have been moved even when out of sight. Take for instance, the child who is upstairs in a room with the door closed, supposedly taking a nap. The doorknob has a safety device on it that makes it impossible for the child to turn the knob. After trying several times in vain to push the door or turn the doorknob, the child carries out a mental strategy learned from prior experience to get the door opened: he knocks on the door! The child is now better equipped with mental strategies for problem-solving. |

##### Evaluating Piaget’s Sensorimotor Stage

Piaget opened up a new way of looking at infants with his view that their main task is to coordinate their sensory impressions with their motor activity. However, the infant’s cognitive world is not as neatly packaged as Piaget portrayed it, and some of Piaget’s explanations for the cause of change are debated. In the past several decades, sophisticated experimental techniques have been devised to study infants, and there have been a large number of research studies on infant development. Much of the new research suggests that Piaget’s view of sensorimotor development needs to be modified (Scott & Baillargeon, 2014); (Brooks & Meltzoff, 2014); (Johnson & Hannon, 2015).

##### Object Permanence

One necessary modification would be when children develop object permanence. Infants seem to be able to recognize that objects have permanence at much younger ages than Piaget proposed (even as young as 3.5 months of age).

##### The A-not-B Error

The data does not always support Piaget’s claim that certain processes are crucial in transitions from one stage to the next. For example, in Piaget’s theory, an important feature in the progression into substage four, coordination of secondary circular reactions, is an infant’s inclination to search for a hidden object in a familiar location rather than to look for the object in a new location. Thus, if a toy is hidden twice, initially at location A and subsequently at location B, 8–12 month-old infants search correctly at location A initially. But when the toy is subsequently hidden at location B, they make the mistake of continuing to search for it at location A. A-not-B error is the term used to describe this common mistake. Older infants are less likely to make the A-not-B error because their concept of object permanence is more complete.

Researchers have found, however, that the A-not-B error does not show up consistently (Sophian, 1985). Perseveration and infants' search: A comparison of two and three-location tasks. The evidence indicates that A-not-B errors are sensitive to the delay between hiding the object at B and the infant’s attempt to find it (Diamond, 1985). Thus, the A-not-B error might be due to a failure in memory. Another explanation is that infants tend to repeat a previous motor behavior (Clearfield et al., 2006); (Smith et al., 1999).

### Vygotsky

#### Development Is Determined By Environmental Factors

Piaget set the tone for much of current-day research but his theory has also received a great deal of criticism. Many believe that Piaget ignored the huge influence that society and culture have in shaping a child’s development. At a similar time, another researcher named Lev Vygotsky (1896–1934) had come to similar conclusions as Piaget about children’s development, thinking that children learned about the world through physical interaction with it. However, where Piaget felt that children moved naturally through different stages of development, based on biological predispositions and their own individual interactions with the world, Vygotsky claimed that adult or peer intervention was a much more important part of the developmental process.

Vygotsky concentrated more on the child’s immediate social and cultural environment and their interactions with adults and peers. He argued that development occurred first through children’s immediate social interactions, and then moved to the individual level as they began to internalize their learning. While Piaget saw the child as actively discovering the world through individual interactions with it, Vygotsky saw the child as more of an apprentice, learning through a social environment of others who had more experience and were sensitive to the child’s needs and abilities.

### Language Development

(Leon & West Hills Community College Lemoore, 2021)

Do newborns communicate? Absolutely! However, they do not communicate with the use of language. Instead, they communicate their thoughts and needs with body posture (being relaxed or still), gestures, cries, and facial expressions. A person who spends adequate time with an infant can learn which cries indicate pain and which ones indicate hunger, discomfort, or frustration as well as translate their vocalizations, movements, gestures and facial expressions.

#### Stages of Language Development

**1. Intentional vocalizations:** Cooing and taking turns: Infants begin to vocalize and repeat vocalizations within the first couple of months of life. That gurgling, musical vocalization called cooing can serve as a source of entertainment to an infant who has been laid down for a nap or seated in a carrier on a car ride. Cooing serves as practice for vocalization as well as the infant hears the sound of their voice and tries to repeat sounds that are entertaining. Infants also begin to learn the pace and pause of conversation as they alternate their vocalization with that of someone else and then take their turn again when the other person’s vocalization has stopped. Cooing initially involves making vowel sounds like “oooo”. Later, consonants are added to vocalizations such as “nananananana”.

**2. Babbling and gesturing:** At about 4–6 months of age, infants begin making even more elaborate vocalizations that include the sounds required for any language. Guttural sounds, clicks, consonants, and vowel sounds stand ready to equip the child with the ability to repeat whatever sounds are characteristic of the language heard. Eventually, these sounds will no longer be used as the infant grows more accustomed to a particular language. Deaf babies also use gestures to communicate wants, reactions, and feelings. Because gesturing seems to be easier than vocalization for some toddlers, sign language is sometimes taught to enhance one’s ability to communicate by making use of the ease of gesturing. The rhythm and pattern of language is used when deaf babies sign just as it is when hearing babies babble.

**3. Understanding:** At around ten months of age, the infant can understand more than they can say. You may have experienced this phenomenon if you have ever tried to learn a second language. You may have been able to follow a conversation more easily than contribute to it.

**4. Holophrastic speech:** Children begin using their first words at about 12–13 months of age and may use partial words to convey thoughts at even younger ages. These one word expressions are referred to as holophrastic speech. For example, the child may say “ju” for the word juice and use this sound when referring to a bottle. The listener must interpret the meaning of the holophrase and when this is someone who has spent time with the child, interpretation is not too difficult. They know that “ju” means juice which means the baby wants some milk! Someone who has not been around the child will have trouble knowing what is meant. Imagine the parent who to a friend exclaims, “Ezra’s talking all the time now!” The friend hears only “ju da ga” which the parent explains means, “I want some milk when I go with Daddy.”

**5. Underextension:** A child who learns that a word stands for an object may initially think that the word can be used for only that particular object. Only the family’s Irish Setter is a doggie. This is referred to as underextension. More often, however, a child may think that a label applies to all objects that are similar to the original object. In overextension, for example, all animals become doggies.

**6. First words and cultural influences:** First words if the child is using English tend to be nouns. The child labels objects such as cup or ball. In a verb friendly language such as Chinese, however, children may learn more verbs. This may be due to the different emphasis given to objects based on culture. Chinese children may be taught to notice action and relationship between objects while children from the United States may be taught to name an object and its qualities (color, texture, size, and so on). These differences can be seen when comparing interpretations of art by older students from China and the United States.

**7. Vocabulary growth spurt:** One-year-olds typically have a vocabulary of about 50 words. By the time they become toddlers, they have a vocabulary of about 200 words and begin putting those words together in telegraphic speech.

**8. Two word sentences and telegraphic speech:** Words are soon combined and eighteen-month-old toddlers can express themselves further by using expressions such as “baby bye-bye” or “doggie pretty”. Words are needed to convey the messages used, but the articles and other parts of speech necessary for grammatical correctness are not yet used. These expressions sound like a telegraph (or perhaps a better analogy today would be that they read like a text message) where unnecessary words are not used. “Give baby ball” is used rather than “Give the baby the ball.” Or a text message of “Send money now!” rather than “Dear Mother. I really need some money to take care of my expenses.”

#### Language Milestones

(Centers for Disease Control and Prevention, 2023a)

In the first two years of life, children go from communicating by crying to being able to express themselves with words. Here is a table of common language milestones for infants and toddlers.

|  |  |
| --- | --- |
| Typical Age | What Most Children Do By This Age |
| **2 months** | * Coos, makes gurgling sounds
* Turns head toward sounds
 |
| **4 months** | * Begins to babble
* Babbles with expression and copies sounds he hears
* Cries in different ways to show hunger, pain or being tired
 |
| **6 months** | * Responds to sounds by making sounds
* Strings vowels together when babbling ("ah," "eh," "oh") and likes taking turns with parent while making sounds
* Responds to own name
* Makes sounds to show joy and displeasure
* Begins to say consonant sounds (jabbering with "m," "b")
 |
| **9 months** | * Understands no
* Makes a lot of different sounds like "mamamama" and "bababababa"
* Copies sounds and gestures of others
* Uses fingers to point at things
 |
| **1 year** | * Responds to simple spoken requests
* Uses simple gestures, like shaking head no or waving goodbye
* Makes sounds with changes in tone (sounds more like speech)
* Says "mama" and "dada" and exclamations like "uh-oh!"
* Tries to copy words others say
 |
| **18 months** | * Says several single words
* Says and shakes head no
* Points to show others what is wanted
 |
| **2 years** | * Points to things or pictures when they are named
* Knows names of familiar people and body parts
* Says sentences with 2-4 words
* Follows simple instructions
* Repeats words overhead in conversation
* Points to things in a book
 |

#### Child-Directed Speech

Why is a horse a horsie? Have you ever wondered why adults tend to use baby talk or that sing-song type of intonation and exaggeration used when talking to children? This represents a universal tendency and is known as child-directed speech or parentheses (historically referred to as motherese). It involves exaggerating the vowel and consonant sounds, using a high-pitched voice, and delivering the phrase with great facial expression. Why is this done? It may be in order to clearly articulate the sounds of a word so that the child can hear the sounds involved, or it may be because when this type of speech is used, the infant pays more attention to the speaker and sets up a pattern of interaction in which the speaker and listener are tuned with one another.

### Memory and Attention

#### Memory

(Leon & West Hills Community College Lemoore, 2021)

If we want to remember something tomorrow, we have to consolidate it into long-term memory today. Long-term memory is the final, semi-permanent stage of memory. Unlike sensory and short-term memory, long-term memory has a theoretically infinite capacity, and information can remain there indefinitely. Long-term memory has also been called reference memory, because an individual must refer to the information in long-term memory when performing almost any task. Long-term memory can be broken down into two categories: explicit and implicit memory.

##### Explicit Memory

Explicit memory, also known as conscious or declarative memory, involves memory of facts, concepts, and events that require conscious recall of the information. In other words, the individual must actively think about retrieving the information from memory. This type of information is explicitly stored and retrieved, hence its name. Explicit memory can be further subdivided into semantic memory, which concerns facts, and episodic memory, which concerns primarily personal or autobiographical information.

##### Episodic Memory

Episodic memory is used for more contextualized memories. They are generally memories of specific moments or episodes in one's life. They include sensations and emotions associated with the event, in addition to the who, what, where, and when of what happened. An example of an episodic memory would be recalling your family's trip to the beach. Autobiographical memory (memory for particular events in one's own life) is generally viewed as either equivalent to, or a subset of, episodic memory. One specific type of autobiographical memory is a flashbulb memory, which is a highly detailed, exceptionally vivid snapshot of the moment and circumstances in which a piece of surprising and consequential (or emotionally arousing) news was heard. For example, many people remember exactly where they were and what they were doing when they heard of the terrorist attacks on September 11, 2001. This is because it is a flashbulb memory.

Semantic and episodic memory are closely related; memory for facts can be enhanced with episodic memories associated with the fact, and vice versa. For example, the answer to the factual question "Are all apples red?" might be recalled by remembering the time you saw someone eating a green apple. Likewise, semantic memories about certain topics, such as football, can contribute to more detailed episodic memories of a particular personal event, like watching a football game. A person that barely knows the rules of football will remember the various plays and outcomes of the game in much less detail than a football expert.

##### Implicit Memory

In contrast to explicit (conscious) memory, implicit (also called unconscious or procedural) memory involves procedures for completing actions. These actions develop with practice over time. Athletic skills are one example of implicit memory. You learn the fundamentals of a sport, practice them over and over, and then they flow naturally during a game. Rehearsing for a dance or musical performance is another example of implicit memory. Everyday examples include remembering how to tie your shoes, drive a car, or ride a bicycle. These memories are accessed without conscious awareness. They are automatically translated into actions without us even realizing it. As such, they can often be difficult to teach or explain to other people. Implicit memories differ from the semantic scripts described above in that they are usually actions that involve movement and motor coordination, whereas scripts tend to emphasize social norms or behaviors.

##### Short-Term Memory Storage

Short-term memory is the ability to hold information for a short duration of time (on the order of seconds). In the process of encoding, information enters the brain and can be quickly forgotten if it is not stored further in the short-term memory. George A. Miller suggested that the capacity of short-term memory storage is approximately seven items plus or minus two, but modern researchers are showing that this can vary depending on variables like the stored items' phonological properties. When several elements (such as digits, words, or pictures) are held in short-term memory simultaneously, their representations compete with each other for recall, or degrade each other. New content gradually pushes out older content, unless the older content is actively protected against interference by rehearsal or by directing attention to it. Information in the short-term memory is readily accessible, but for only a short time. It continuously decays, so in the absence of rehearsal (keeping information in short-term memory by mentally repeating it) it can be forgotten.

##### Long-Term Memory Storage

In contrast to short-term memory, long-term memory is the ability to hold semantic information for a prolonged period of time. Items stored in short-term memory move to long-term memory through rehearsal, processing, and use. The capacity of long-term memory storage is much greater than that of short-term memory, and perhaps unlimited. However, the duration of long-term memories is not permanent. Unless a memory is occasionally recalled, it may fail to be recalled on later occasions. This is known as forgetting. Long-term memory storage can be affected by traumatic brain injury or lesions. Amnesia, a deficit in memory, can be caused by brain damage. Anterograde amnesia is the inability to store new memories; retrograde amnesia is the inability to retrieve old memories. These types of amnesia indicate that memory does have a storage process.

## Psychosocial Development

### Forming Attachments

Attachment is the close bond with a caregiver from which the infant derives a sense of security. The formation of attachments in infancy has been the subject of considerable research as attachments have been viewed as foundations for future relationships. Additionally, attachments form the basis for confidence and curiosity as toddlers, and as important influences on self-concept.

#### Freud’s Psychoanalytic Theory

According to Freud, infants are oral creatures who obtain pleasure from sucking and mouthing objects (Freud, 1938). Freud believed the infant will become attached to a person or object that provides this pleasure. Consequently, infants were believed to become attached to their mother because she was the one who satisfied their oral needs and provided pleasure. Freud further believed that the infants will become attached to their mothers “if the mother is relaxed and generous in her feeding practices, thereby allowing the child a lot of oral pleasure,” (Shaffer, 1985).

#### Harlow’s Research

In one classic study, Wisconsin University psychologists Harry and Margaret Harlow investigated the responses of young rhesus monkeys to explore if breastfeeding was the most important factor to attachment. The infant monkeys were separated from their biological mothers, and two surrogate mothers were introduced to their cages. The first mother (the wire mother) consisted of a round wooden head, a mesh of cold metal wires, and a bottle of milk from which the baby monkey could drink. The second mother was a foam-rubber form wrapped in a heated terry-cloth blanket. The infant monkeys went to the wire mother for food, but they overwhelmingly preferred the warm terry-cloth mother. The warm terry-cloth mother provided no food but did provide comfort (Harlow, 1958). The infant's need for physical closeness and touching is referred to as contact comfort. Contact comfort is believed to be the foundation for attachment. The Harlows’ studies confirmed that babies have social as well as physical needs. Both monkeys and human babies need a secure base that allows them to feel safe. From this base, they can gain the confidence they need to venture out and explore their worlds.

#### Bowlby’s Theory

Building on the work of Harlow and others, John Bowlby developed the concept of attachment theory. He defined attachment as the affectional bond or tie that an infant forms with the mother (Bowlby, 2003). An infant must form this bond with a primary caregiver in order to have normal social and emotional development. In addition, Bowlby proposed that this attachment bond is very powerful and continues throughout life. He used the concept of secure base to define a healthy attachment between parent and child (Bowlby, 2003). A secure base is a parental presence that gives the child a sense of safety as the child explores the surroundings.

Bowlby said that two things are needed for a healthy attachment: The caregiver must be responsive to the child’s physical, social, and emotional needs. The caregiver and child must engage in mutually enjoyable interactions (Bowlby, 2003). Additionally, Bowlby observed that infants would go to extraordinary lengths to prevent separation from their parents, such as crying, refusing to be comforted, and waiting for the caregiver to return.

Bowlby also observed that these same expressions were common to many other mammals, and consequently argued that these negative responses to separation serve an evolutionary function. Because mammalian infants cannot feed or protect themselves, they are dependent upon the care and protection of adults for survival. Thus, those infants who were able to maintain proximity to an attachment figure were more likely to survive and reproduce.

#### Erikson: Trust vs. Mistrust

As previously discussed, Erikson formulated an eight stage theory of psychosocial development. Erikson was in agreement on the importance of a secure base, arguing that the most important goal of infancy was the development of a basic sense of trust in one’s caregivers. Consequently, the first stage, trust vs. mistrust, highlights the importance of attachment. Erikson maintained that the first year to year and a half of life involves the establishment of a sense of trust (Erikson, 1998).

Infants are dependent and must rely on others to meet their basic physical needs as well as their needs for stimulation and comfort. A caregiver who consistently meets these needs instills a sense of trust or belief that the world is a trustworthy place. The caregiver should not worry about over indulging a child’s need for comfort, contact, or stimulation.

Erikson (1982) believed that mistrust could contaminate all aspects of one’s life and deprive the individual of love and fellowship with others. Consider the implications for establishing trust if a caregiver is unavailable or is upset and ill-prepared to care for a child. If a child is born prematurely, is unwanted, or has physical problems that make them more challenging to parent, we cannot assume that the parent is going to provide the child with a feeling of trust.

#### Mary Ainsworth and the Strange Situation

Developmental psychologist Mary Ainsworth, a student of John Bowlby, continued studying the development of attachment in infants. Ainsworth and her colleagues created a laboratory test that measured an infant’s attachment to their parent. The test is called The Strange Situation because it is conducted in a context that is unfamiliar to the child and therefore likely to heighten the child’s need for their parent (Ainsworth, 1979).

During the procedure, which lasts about 20 minutes, the parent and the infant are left alone, while the infant explores the room full of toys. Then a strange adult enters the room and talks for a minute to the parent, after which the parent leaves the room. The stranger stays with the infant for a few minutes, and then the parent again enters and the stranger leaves the room. During the session, a video camera records the child’s behaviors, which are later coded by the research team. The investigators were especially interested in how the child responded to the caregiver leaving and returning to the room, referred to as the reunion. On the basis of their behaviors, the children are categorized into one of four groups, where each group reflects a different kind of attachment relationship with the caregiver. One style is secure and the other three styles are referred to as insecure. The four styles include:

1. Secure
2. Ambivalent
3. Avoidant
4. Disorganized

A child with a secure attachment style usually explores freely while the caregiver is present and may engage with the stranger. The child will typically play with the toys and bring one to the caregiver to show and describe from time to time. The child may be upset when the caregiver departs, but is happy to see the caregiver return.

A child with an ambivalent (sometimes called resistant) attachment style is wary about the situation in general, particularly the stranger, and stays close or even clings to the caregiver rather than exploring the toys. When the caregiver leaves, the child is extremely distressed and is ambivalent when the caregiver returns. The child may rush to the caregiver, but then fails to be comforted when picked up. The child may still be angry and resist attempts to be soothed.

A child with an avoidant attachment style will avoid or ignore the mother, showing little emotion when the mother departs or returns. The child may run away from the mother when she approaches. The child will not explore very much, regardless of who is there, and the stranger will not be treated much differently from the mother.

A child with a disorganized or disoriented attachment style seems to have an inconsistent way of coping with the stress of the strange situation. The child may cry during the separation, but avoid the mother when she returns, or the child may approach the mother but then freeze or fall to the floor.

How common are the attachment styles among children in the United States? It is estimated that about 65 percent of children in the United States are securely attached. 20 percent exhibit avoidant styles and 10–15 percent are ambivalent. Another 5–10 percent may be characterized as disorganized.

Some cultural differences in attachment styles have been found (Rothbaum et al., 2010). For example, German parents value independence and Japanese mothers are typically by their children’s sides. As a result, the rate of insecure avoidant attachments is higher in Germany and insecure resistant attachments are higher in Japan. These differences reflect cultural variation rather than true insecurity, however (Van Ijzendoorn & Sagi, 1999).

Keep in mind that methods for measuring attachment styles have been based on a model that reflects middle-class, US values and interpretation. Newer methods for assessment attachment styles involve using a Q-sort technique in which a large number of behaviors are recorded on cards and the observer sorts the cards in a way that reflects the type of behavior that occurs in the situation (Waters, 1987). There are 90 items in the third version of the Q-sort technique, and examples of the behaviors assessed:

* When child returns to the mother after playing, the child is sometimes fussy for no clear reason.
* When the child is upset or injured, the child will accept comforting from adults other than mother.
* Child often hugs or cuddles against the mother, without her asking or inviting the child to do so.
* When the child is upset by the mother's leaving, the child continues to cry or gets angry after she is gone.

At least two researchers observe the child and parent in the home for 1.5–2 hours per visit. Usually two visits are sufficient to gather adequate information. The parent is asked if the behaviors observed are typical for the child. This information is used to test the validity of the Strange Situation classifications across age, cultures, and clinical populations.

#### Caregiver Consistency

Having a consistent caregiver may be jeopardized if the infant is cared for in a child care setting with a high turnover of staff or if institutionalized and given little more than basic physical care. Infants who, perhaps because of being in orphanages with inadequate care, have not had the opportunity to attach in infancy may still form initial secure attachments several years later. However, they may have more emotional problems of depression, anger, or be overly friendly as they interact with others (O’Connor et al., 2003).

#### Social Deprivation

Severe deprivation of parental attachment can lead to serious problems. According to studies of children who have not been given warm, nurturing care, they may show developmental delays, failure to thrive, and attachment disorders (Bowlby, 2003). Non-organic failure to thrive is the diagnosis for an infant who does not grow, develop, or gain weight on schedule. In addition, postpartum depression can cause even a well-intentioned mother to neglect her infant.

### Infant Emotions

(Lally & Valentine-French, 2023)

At birth, infants exhibit two emotional responses: attraction and withdrawal. They show attraction to pleasant situations that bring comfort, stimulation, and pleasure. They withdraw from unpleasant stimulation such as bitter flavors or physical discomfort. At around two months, infants exhibit social engagement in the form of social smiling as they respond with smiles to those who engage their positive attention (Lavelli & Fogel, 2005). Social smiling becomes more stable and organized as infants learn to use their smiles to engage their parents in interactions. Pleasure is expressed as laughter at 3–5 months of age, and displeasure becomes more specific as fear, sadness, or anger between 6 to 8 months.

Anger is often the reaction to being prevented from obtaining a goal, such as a toy being removed (Braungart-Rieker et al., 2010). In contrast, sadness is typically the response when infants are deprived of a caregiver (Papoušek, 2007). Fear is often associated with the presence of a stranger, known as stranger wariness, or the departure of significant others (known as separation anxiety). Both appear sometime between 6 to 15 months after object permanence has been acquired. Further, there is some indication that infants may experience jealousy as young as 6 months of age (Hart & Carrington, 2002).

Emotions are often divided into two general categories: Basic emotions, such as interest, happiness, anger, fear, surprise, sadness and disgust, which appear first, and self-conscious emotions, such as envy, pride, shame, guilt, doubt, and embarrassment. Unlike basic emotions, self-conscious emotions appear as children start to develop a self-concept, and require social instruction on when to feel such emotions. The situations in which children learn self-conscious emotions varies from culture to culture. Individualistic cultures teach us to feel pride in personal accomplishments, while in more collective cultures children are taught to not call attention to themselves, unless you wish to feel embarrassed for doing so (Akimoto & Sanbonmatsu, 1999).

Facial expressions of emotion are important regulators of social interaction. In the developmental literature, this concept has been investigated under the concept of social referencing; that is, the process whereby infants seek out information from others to clarify a situation and then use that information to act (Klinnert et al., 1983). To date, the strongest demonstration of social referencing comes from work on the visual cliff concept. In the first study to investigate this concept, Campos and colleagues (Sorce et al., 1985) placed mothers on the far end of the cliff from the infant. Mothers first smiled to the infants and placed a toy on top of the safety glass to attract them; infants invariably began crawling to their mothers. When the infants were in the center of the table, however, the mother then posed an expression of fear, sadness, anger, interest, or joy. The results were clearly different for the different faces; no infant crossed the table when the mother showed fear; only 6 percent did when the mother posed anger; 33 percent crossed when the mother posed sadness; and approximately 75 percent of the infants crossed when the mother posed joy or interest. Other studies provide similar support for facial expressions as regulators of social interaction. Researchers posed facial expressions of neutral, anger, or disgust toward babies as they moved toward an object and measured the amount of inhibition the babies showed in touching the object (Bradshaw, 1986). The results for 10–15 month-olds were the same. Anger produced the greatest inhibition, followed by disgust, then neutral. This study was later replicated using joy and disgust expressions, altering the method so that the infants were not allowed to touch the toy (compared with a distractor object) until one hour after exposure to the expression (Hertenstein & Campos, 2004). At 14 months of age, significantly more infants touched the toy when they saw joyful expressions, but fewer touched the toy when the infants saw disgust.

A final emotional change is in self-regulation. Emotional self-regulation refers to strategies we use to control our emotional states so that we can attain goals (Thompson & Goodvin, 2007). This requires effortful control of emotions and initially requires assistance from caregivers (Rothbart et al., 2006). Young infants have very limited capacity to adjust their emotional states and depend on their caregivers to help soothe themselves. Caregivers can offer distractions to redirect the infant’s attention and comfort to reduce the emotional distress. As areas of the infant’s prefrontal cortex continue to develop, infants can tolerate more stimulation. By 4–6 months, babies can begin to shift their attention away from upsetting stimuli (Rothbart et al., 2006). Older infants and toddlers can more effectively communicate their need for help and can crawl or walk toward or away from various situations (Cole et al., 2010). The role of language in the development of emotion regulation. This aids in their ability to self-regulate. Temperament also plays a role in children’s ability to control their emotional states, and individual differences have been noted in the emotional self-regulation of infants and toddlers (Rothbart & Bates, 2006).

Development of sense of self: During the second year of life, children begin to recognize themselves as they gain a sense of self separate from their primary caregiver. In a classic experiment by Lewis and Brooks (1978) children 9–24 months of age were placed in front of a mirror after a spot of rouge was placed on their nose as their mothers pretended to wipe something off the child’s face. If the child reacted by touching their own nose rather than that of the baby in the mirror, it was taken to suggest that the child recognized the reflection as themself. Lewis and Brooks found that somewhere between 15 to 24 months infants developed a sense of self-awareness. Self-awareness is the realization that you are separate from others (Kopp, 2011). Once a child has achieved self-awareness, the child is moving toward understanding social emotions such as guilt, shame or embarrassment, as well as sympathy or empathy.

#### Social Emotional Milestones

(Centers for Disease Control and Prevention, 2023a)

As infants and toddlers interact with other people, their social and emotional skills develop. Here is a table of social and emotional milestones that they typically experience during the first two years.

|  |  |
| --- | --- |
| Typical Age | What Most Children Do By This Age |
| **2 months** | * Begins to smile at people
* Can briefly calm self (may bring hands to mouth and suck on hand)
* Tries to look at parent
 |
| **4 months** | * Smiles spontaneously, especially at people
* Likes to play with people and might cry when playing stops
* Copies some movements and facial expressions, like smiling or frowning
 |
| **6 months** | * Knows familiar faces and begins to know if someone is a stranger
* Likes to play with others, especially parents
* Responds to other people's emotions and often seems happy
* Likes to look at self in a mirror
 |
| **9 months** | * May be afraid of strangers
* May be clingy to familiar adults
* Has favorite toys
 |
| **1 year** | * Is shy or nervous with strangers
* Cries when mom or dad leaves
* Has favorite things and people
* Shows fear in some situations
* Hands you a book when wants to hear a story
* Repeats sounds or actions to get attention
* Puts out arm or leg to help with dressing
* Plays games such as peek-a-boo and pat-a-cake
 |
| **18 months** | * Likes to hand things to others as play
* May have temper tantrums
* May be afraid of strangers
* Shows affection to familiar people
* Plays simple pretend, such as feeding a doll
* May cling to caregivers in new situations
* Points to show others something interesting
* Explores alone but with parent close by
 |
| **2 years** | * Copies others, especially adults and older children
* Gets excited when with other children
* Shows more and more independence
* Shows defiant behavior (doing what he has been told not to)
* Plays mainly beside other children, but is beginning to include other children, such as in chase games
 |

### The Importance of Play

The following section is drawn from Lifespan Development by Maricopa Open Digital Press (2024)

The development of play is an important milestone in early childhood. Play holds a crucial role in providing a safe, caring, protective, confidential, and containing space where children can recreate themselves and their experiences through an exploratory process (Winnicott, 1942); (Erikson, 1963). During this stage, pretend play is a great way for children to express their thoughts, emotions, fears, and anxieties. Early childhood play can be understood by observing the elements of fantasy, organization, and comfort. Fantasy, the process of make-believe, is an essential behavior the child engages in during pretend play; organization helps the child to structure pretend play into a story and to utilize cause-and-effect thinking, and comfort is used to assess the ease and pleasure in the engagement in play.

As children move through the stage of early childhood, they also progress through several stages of non-social and social play. Stages of play is a theory and classification of participation in play developed by Mildred Parten Newhall in 1929 (Parten, 1929). Parten observed American children at free play. She recognized six different types of play:

* Unoccupied play: when the child is not playing, just observing. A child may be standing in one spot or performing random movements.
* Solitary (independent) play: when the child is alone and maintains focus on their activity. Such a child is uninterested in or is unaware of what others are doing. More common in young children (age 2–3) as opposed to older ones.
* Onlooker play: when the child watches others at play but does not engage in it. The child may engage in forms of social interaction, such as a conversation about the play, without actually joining in the activity. This type of activity is also more common in younger children.
* Parallel play (adjacent play): when the child plays separately from others but close to them and mimicking their actions. This type of play is seen as a transitory stage from a socially immature solitary and onlooker type of play, to a more socially mature associative and cooperative type of play.
* Associative play: when the child is interested in the people playing but not in coordinating their activities with those people, or when there is no organized activity at all. A substantial amount of interaction is involved, but the activities are not in sync.
* Cooperative play: when a child is interested both in the people playing and in the activity they are doing. In cooperative play, the activity is organized, and participants have assigned roles. There is also increased self-identification with a group, and a group identity may emerge. This is more common toward the end of the early childhood stage. Examples would be dramatic play activities with roles, like playing school, or a game with rules, such as freeze tag.

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