Introduction

During the first three years of life, children’s brains develop at an unbelievable rate. Brain development is critical because it is the key to a child’s capacity to acquire and use knowledge and skills in all areas. The experiences children have during this time, including interactions with adults, have a major impact on how this development takes place. This means that children’s earliest experiences not only influence their development in the short-term, but also their lives into adulthood. For licensing staff, helping those who care for children implement methods to promote healthy brain development is crucial. In this course we will talk about how brain development takes place in infancy and toddlerhood, and what you can expect to see caregivers doing to give children’s brains the best start possible.

Learning Objectives

When you have completed this course you will be able to:

- Describe how brain development occurs during the first three years of life,
- Explain how early experiences affect the course of early brain development,
- Identify strategies caregivers can use to promote healthy brain development, and
- Make practical suggestions to caregivers related to environments and experiences that encourage optimal brain development.

Brain Development Vocabulary

Let’s begin by taking a closer look at the structure of the brain at its most basic level and defining some key terms. The typical brain cell is called a neuron. For our purposes, each neuron consists of three basic parts: cell body, axon, and dendrites. The axon is a long, rope-like structure that is used to send information to other neurons. The dendrites, on the other hand, receive information from other neurons. The places where the axon from one neuron connects with the dendrite from another are called synapses. We’ll discuss synapses in greater depth in just a moment.

The Brain at Birth
Did you know that when children are born, their brains are still in an unfinished state? In fact, the brain is the most underdeveloped organ in the entire body at birth. Though the brain already contains about 100 billion cells when a baby is born, there is still a lot of work to be done. Basic connections between major areas of the brain are formed before birth, and are based on genetic information passed to the baby from her biological parents. What happens next is a process of fine-tuning to make the brain work more effectively and efficiently.

**Connections and Pathways**

Fine-tuning of the complex network of neurons within the brain takes place in the earliest years of life. In large part, this process occurs during infancy and toddlerhood. In fact, by the time a child reaches 3 years of age, about 85 percent of his brain’s core structure is wired. During this period, many new synapses are formed, connecting neurons and creating pathways of communication throughout the brain. The process becomes even more complicated when we consider that each neuron is capable of connecting with many other neurons simultaneously. These connections form when electrical signals travel from one neuron to another across a synapse. To some extent, neurons are unable to connect to other neurons without outside input. This input is called a stimulus.

**Stimuli**

A *stimulus* is a piece of information a child’s brain receives from one of her five senses: sight, hearing, touch, taste, and smell. When we are referring to more than one stimulus, we use the word *stimuli*. Stimuli cause electrical impulses to travel through the nervous system to the brain. This new information causes neurons in specific regions of the brain to “fire,” or send out electrical impulses to other neurons. The signals are passed from neuron to neuron, creating or strengthening the synapses they travel across.

**Critical Periods**

Different areas of the brain develop at different times. For certain areas of the brain, there are specific time frames during which development takes place very quickly. If a child’s brain does not receive proper stimulation during these periods, she might experience skill deficits for the rest of her life in the affected areas. These windows of rapid growth are often referred to as “critical” or “sensitive” periods.

The timing of critical periods varies from child to child, and for different skills. For example, the critical period for vocabulary development is approximately 6 months to 6 years of age. The critical period for motor development is from birth until about age 8. (Sousa, 2006)

Critical periods for some abilities, such as emotional function or mathematical ability, are harder to identify. This is because these are not actually skills, but skill sets, or groups of related individual skills. For example, researchers might someday find that the ability to understand
algebraic functions develops in an altogether different critical period than the ability to grasp parts-of-a-whole, such as decimals and fractions.

Some skills and abilities do not appear to be subject to critical periods at all, at least as far as we can tell. Later research might discover that these skills actually do develop during critical periods.

It is important to note that children can still benefit from stimuli in an area of development, even if the child’s age does not match up with the average critical period for that skill. Children are capable of learning and growth in areas affected by critical periods even after the critical period has ended. Since it is difficult to determine when a child is experiencing a critical period, infants and toddlers need stimulation in a variety of areas on an ongoing basis.

**Pruning**

You might be surprised to learn that the brain of an adult has fewer connections than the brain of a 3-year-old child. Early in life, a child’s brain forms a lot of connections in a short period. In fact, it forms too many, and brain functions may not be carried out with maximum efficiency. Over time, certain connections are used more frequently than others. Connections that are used regularly are strengthened, and those that are not being used are cut-off or “pruned.”

The process of pruning may sound harsh, but it is actually the brain’s way of becoming more efficient. Without pruning, basic brain functions would be more difficult to perform, affecting a child’s ability to perform basic actions like seeing or walking. Because connections between neurons that are not used will likely be destroyed, infants and toddlers need appropriate stimulation for all their senses as a regular part of their daily routines.

Now that you have an understanding of how the brain develops, the rest of this course is intended to help you identify best practices and be prepared to give suggestions to providers related to promoting healthy brain development. Use the handout called “Summary of Key Brain Development Terms” if you need a reminder of any of the concepts we have discussed so far. Let’s take a look at some of the ways providers can offer infants and toddlers the stimulation they need.

**Talking with Children**

Talking with children is an important way for caregivers to provide stimulation to infants and toddlers. It can lead to stronger language and social skills and greater emotional regulation. It also helps fine-tune the connections in the brain related to hearing and to understanding and using language. This is why minimum standards for infant and toddler care instruct providers to talk to children regularly throughout the day. Some caregivers might need suggestions for how to make talking to children a part of daily care. This section is intended to give you some ideas to help them get started.
Even before infants are able to speak, they begin to understand language by hearing spoken words from others. Therefore, caregivers should spend time talking to every infant, even those who cannot talk yet. Providers might feel silly talking to non-verbal infants. You can remind them that through hearing language, infants can start to learn the rules of conversation and begin to acquire a vocabulary of words they understand. Suggest that caregivers listen to the sounds infants make, cooing and babbling, and pretend the child is actually talking. Then they can respond in words, mirroring the tone and emotion expressed by the baby. Alternatively, they can respond by mimicking the infant’s sounds and waiting for the child’s response. Let caregivers know that it is okay to speak to children in a sing-song style, but that they should always use simple, correct grammar.

Another suggestion you can offer caregivers is that talking with very young children can and should be integrated into the normal routines of the day. Ordinary tasks like feeding, diapering, and hand washing are excellent opportunities for caregivers to talk with children. Another way to include talking throughout the day is for providers to narrate children’s experiences. This can include talking about what children are doing, what caregivers and other children are doing, and the emotions the child appears to be expressing. Reading is another way providers can incorporate talking with children into the day.

While it is important for children to receive face-to-face time with their caregivers each day, providers need to be aware of children’s cues, and respect when children need some quiet time to relax. When a baby starts to look away or become fussy, it might be time for the caregiver to offer the child a break.

The following video shows an interaction in which a caregiver talks with an infant. As you watch, try to identify instances where the adult uses some of the strategies we’ve just discussed.

[VIDEO: Talking with Infant]

Creating Meaningful Play Experiences

You probably already know that caregivers are supposed to be providing a variety of activities for children daily. Children should have opportunities for indoor and outdoor play, and active and quiet play. Did you also know that these experiences are crucial for the development of children’s brains? The things children do during play provide stimulation for many areas of the brain, and help build important connections in these areas.

Many caregivers may be unaware of how to provide appropriate play experiences specifically designed for infants and toddlers. In this section, we will discuss some ways providers can offer opportunities for infants and toddlers to learn through play.

Often, those who care for infants fail to recognize how infants engage in play. In reality, many of the things infants do when they are not eating or sleeping are the earliest forms of play. Providing appropriately stimulating play for infants and toddlers is based on a few key
principles, some of which may be very different from the principles of creating play experiences for older children.

Perhaps the most important principle of infant and toddler play is that it should allow children to explore as independently as possible. To make this a reality, providers will need to thoughtfully assess the environments in which they care for children. Help caregivers understand why it is important for toys, floors, and surfaces to be kept safe and sanitary, for materials to be age-appropriate, in good repair, and for objects in the environment not to pose a choking risk. Remind caregivers of this rule of thumb: If an object can fit easily inside a paper towel tube, it is too small for an infant or toddler environment.

The environment should also be set up so that caregivers can easily supervise children at all times. Talk with providers about the rationale behind constant supervision, reminding them that supervision allows them to provide the maximum amount of independence for infants, while maintaining their ability to intervene if a child is in danger or becomes distressed.

In addition to health and safety considerations, giving infants and toddlers the independence to explore requires caregivers to have the right mindset. You can help caregivers achieve the best possible attitudes for infant and toddler care. For instance, let providers know that they can and should allow children to follow their own interests during play, unless following those interests will put the child or others in danger. Talk to providers about the importance of allowing infants and toddlers to use materials in creative ways, which leads to strong creative thinking and problem-solving skills, instead of expecting children to always use a toy the “right” way.

Help providers see the value in constantly monitoring children’s frustration levels. In order to promote optimal learning, toys and activities should be challenging for infants and toddlers, but not overly frustrating. Tell caregivers that if they see an infant or toddler becoming frustrated, they should first intervene by offering the least amount of assistance possible, and only provide more assistance if the child remains frustrated. For example, if a toddler is struggling to put in a puzzle piece, the provider might start by saying, “Try a different space.” That might be all the encouragement the child needs to alleviate his frustration. If it is not, and the child still seems frustrated, the provider can move to a greater level of assistance by pointing to the appropriate space. It is important to let providers know that doing the task for the child should be an absolute last resort.

The next principle of infant and toddler play is that very young children need a mix of familiar and new stimulations. Familiar toys, songs, games, and books can be comforting because they help children know what to expect, and new ones can be exciting and encourage children to explore new concepts. Help caregivers see the importance of making thoughtful choices when rotating materials, selecting some new materials and keeping or reintroducing ones that children are already familiar with. Encourage providers to give children plenty of time to get to know a new material before exchanging it for something new.

Another principle of play for infants and toddlers is that it should be driven by children’s interests. Children are most motivated to learn when they engage in an activity of their own choosing. To capitalize on this phenomenon, let providers know that they can learn about where
children’s interests lie by observing their play. Then it will be easier to create meaningful experiences that support the children’s natural learning process.

The last principle of infant and toddler play we will discuss is the importance of opportunities for outdoor play. Caregivers are supposed to take children outside every day, weather permitting. This is true of infants and toddlers as well as older children. Outdoor play gives children the chance to engage in experiences that are not available indoors. The outside world is full of new stimulations, including sights, sounds, smells, and textures.

Outdoor play also gives children a chance to move their bodies in ways that are not necessarily appropriate for indoor play. Outside, children can run, jump, climb, throw, and explore different types of movement. In addition to creating healthy habits of physical activity, all of these experiences contribute to the formation and maintenance of important connections in a child’s brain.

Safe, well supervised outdoor experiences can do a great deal to enhance children’s early brain development. When you examine outdoor play areas, bear in mind that the needs of an infant or toddler in outdoor play are quite different from the needs of a preschool or school-age child. For example, play areas covered in pea gravel, bark, or sand, or those which provide no shade can put infants, in particular, at risk. Infants are likely to mouth objects in an attempt to learn about their texture, shape, and taste, and may not be particularly mobile or able to understand the cause-and-effect relationship between sun exposure and overheating or sunburn. If these circumstances exist in a given program’s outdoor care environment, you may need to coach providers about the importance of differentiating outdoor play for infants and toddlers from that of preschool and school-age children. Infants’ outdoor play may need to be shorter in duration or confined to an area free from choking hazards to ensure that children remain safe and healthy while getting the important outdoor stimulation they need.

**Giving Warm, Responsive Care**

Have you ever wondered why it is recommended that the same person care for infants and toddlers on a daily basis whenever possible? Or why caregivers are supposed to respond to infants’ and toddlers’ physical needs and signals of distress right away? These requirements, as well as others, are intended to help infants and toddlers feel a sense of security while in care.

Very young children thrive when they receive warm, responsive care. This means being cared for by adults who promptly meet their needs, respond to their signals of distress, such as crying, and provide lots of love and affection. In addition to making children feel safer, this type of care is actually important for children’s developing brains. Children who receive warm, responsive care feel freer to explore and learn from their environments.

You should see caregivers being carefully attentive to children’s emotional signals, and responding in a timely fashion to each child’s needs. This can be challenging to achieve in a group care setting. It is important that you have realistic expectations of caregivers who might be caring for four or five infants at one time. This is especially true because infants are cared for on
their own biological schedules, unlike older children who may be fed and toileted on regular group schedules. Sometimes providers might have to prioritize needs, choosing to diaper one infant before moving on to feed another, or choosing to acknowledge an emotionally upset child using words and eye contact while rocking another infant to sleep. Help providers find ways to multitask or to meet each child’s need more efficiently so that each child in care can receive the attention he needs.

You should also see providers spending time showing love and affection to each child on a regular basis. For example, a caregiver might show affection by holding, cuddling, and smiling at children. You can model these behaviors during your time in the child care setting.

Warm, responsive care can mitigate the effects of stressful situations, such as adapting to a new child care setting or caregiver for the first time. It can also build children’s growing social skills by strengthening the areas of the brain that will allow children to engage in positive relationships throughout life.

In the following video clip, you will see a provider offering warm, responsive care to an infant. Notice what the adult does in response to the child’s signals of distress, and how the child responds.

[VIDEO: Warm, responsive care]

[Activity 1]

Thinking in Terms of Domains of Development

While every child is different and develops in a unique pattern and pace, there are some common principles of development that apply to all children. One of those principles is the understanding that children develop in three primary areas, which experts call domains of development. They are: the physical domain, the cognitive domain, and the social emotional domain. The physical domain includes a child’s growing capacity for movement and coordination, as well as her physical health. The cognitive domain includes a child’s acquisition of language, and her ability to think and reason. The social emotional domain includes a child’s capacity to form relationships with others and to regulate and express her emotions.

One way caregivers can ensure they are providing an appropriate variety of stimulation for infants and toddlers is to think in terms of the domains of development. The brain, as the body’s primary information headquarters, is critical to development in all domains. Specific areas of the brain influence a child’s ability to learn to walk, to speak and read, to remember information, and to exercise self-control. As children get older, the connections formed in their brains early on will affect how they process and utilize information. In every area of learning and growth, the brain plays a chief role with long-lasting effects. Those who care for infants and toddlers should intentionally create activities that promote development in each of these areas.
Physical Development

There are two main subcategories of physical development: large motor development and small motor development. Large motor development includes a child’s ability to control and use large muscle groups, such as the legs and the trunk, to become increasingly more mobile. Small motor development includes a child’s capacity to use smaller muscles, particularly those in the hands and fingers, to perform more delicate tasks. Often, active play by children in care involves large motor activity, while quiet play involves small motor activity. Both are important, and encouraging each one in infant and toddler care requires a tailored approach consistent with the requirement that caregivers provide a wide variety of daily activities for children.

Large Motor Development

There are many ways providers can promote infants’ and toddlers’ large motor development. Even before children begin to move on their own, their brains are developing in ways that will be the foundation for later movements. For example, when a caregiver holds an infant in her arms while she walks, sways, and bounces, the child’s brain is developing connections in the areas that control coordination and balance. This is why providers are supposed to use infant swings and seats sparingly, because they keep infants away from this and other important sources of stimulation. You can explore how often swings and seats are used in infant care by observing and by talking with providers. Coach caregivers to limit swing and seat time to no more than 20-30 minutes at a time.

The parts of the brain related to voluntary movement and large-motor coordination are forming very rapidly during infancy and toddlerhood. As they do, children will begin to push up, crawl, cruise, and, eventually, walk. To help these areas develop optimally, adults who care for infants and toddlers should provide lots of opportunities for different types of movement. When the right kinds of opportunities are available, infants and toddlers will likely engage in movement with very little provocation. Tummy time for non-mobile infants, well-anchored furniture for cruisers to hold onto, and push and pull toys with strings for toddlers are ways providers can encourage children’s natural movements. You may need to remind caregivers that due to potential strangulation hazard, strings on pull toys should always be less than 10 inches long.

It is important to note the difference between providing experiences that encourage children to practice movement and trying to make children learn to crawl or walk. Providers need to be aware that each child is an individual, and should be allowed to develop at his own pace. Holding infants in a standing position for long periods does not help them learn to walk sooner. Neither does the use of baby walkers. In fact, baby walkers can be dangerous for infants. They are not allowed to be used in childcare because they can lead to accidents and injuries, such as falls down the stairs or contact with hot kitchen appliances.

Small Motor Development
Providers can do many things to promote small motor development in infants and toddlers. For older infants and toddlers, the areas of the brain that control fine motor skills are undergoing dramatic development. If a caregiver is struggling to find ways to give children the chance to practice these skills, you might offer some of the following suggestions.

Art activities are useful in getting children to use their small motor muscles. Drawing, painting, and coloring, either at a table or an easel, helps children build the skills they will later need for writing. Dolls with doll clothes, zippers and buttons to fasten and unfasten, stringing beads, soft modeling dough, blocks that snap together, small toy vehicles, and many other materials allow children to practice grasping, pinching, and other fine motor abilities. For young toddlers and infants, toys that encourage grasping, such as rattles, stacking rings, and books, and even toys with buttons to push or levers help build small motor muscles. Sensory table experiences, such as water, shaving cream, or play-dough play are also good ways to get children involved in using their hands and fingers. During sensory play, fine motor abilities can be honed even more when providers incorporate materials for scooping, filling, dumping, and squeezing. Remind providers that after sensory experiences, including water play, materials and containers should be cleaned and sanitized. By mid- to late-toddlerhood, children can also begin to use child-sized utensils at mealtimes.

Each of these activities creates connections in the parts of the brain related to physical development, especially movement and fine motor skills. Now we’ll discuss what caregivers can do to help children’s brains develop in ways that lead to healthy social emotional development.

**Social Emotional Development**

Providing care that leads to optimal social emotional development means doing several things we have already discussed. An inspection is a good time to model talking with children, recognizing and articulating children’s emotions, and showing warmth and affection.

When providers talk to children, especially about the emotions they perceive children expressing, when they are attuned to children’s needs, when they respond quickly to children’s signals of distress, and when they spend time showing love and affection to each individual child, they are helping the areas of the brain that control social and emotional development to build strong connections. Encourage these behaviors among the caregivers you work with. For example, during infants’ tummy time, encourage providers to lie on the floor face to face infants. Making eye contact and talking with, singing to, or smiling at infants during tummy time conveys warmth and affection, and may help prolong tummy time for infants who do not like being on their stomachs.

Another aspect of infants’ and toddlers’ social emotional development is their growing capacity to interact with their peers. Caregivers can help this process run smoothly by having realistic expectations of the children in their care. For instance, expecting toddlers to consistently share is an unrealistic expectation. While the parts of the brain that allow children to control socially unacceptable impulses, such as the desire to grab a toy from another child, are growing throughout toddlerhood, providers should expect this to be a gradual learning process. This is
true of other inappropriate behaviors as well. Very young children, especially older toddlers, may understand that their behavior is undesirable, but until their brains are well-enough developed, they may not be able to stop themselves from acting on those impulses. Instead of expecting infants and toddlers to know better, caregivers should be prepared to redirect the same unacceptable behaviors many times as each child learns.

**Cognitive Development**

Infants’ and toddlers’ cognitive development is related to many different areas of the brain. Very young children learn best through experiences using their senses, rather than formal instruction. This is because sensory experiences are what builds and maintains connections and pathways in the developing brain. Let’s take a look at what is actually happening in the parts of the brain that affect cognition, and discuss how providers can use those processes to create meaningful learning experiences.

Infants and toddlers tend to do the same things over and over again. As they grow older, they may start to make small changes in their behavior as a way of experimenting with cause and effect. For example, when an infant bangs his spoon on his high chair, and then on his plate, he learns that tapping on different surfaces makes different sounds. This strengthens connections in the area of his brain that controls his understanding of cause and effect. To use this phenomenon to create learning experiences, caregivers must first understand that this behavior is not intended to annoy or manipulate adults. It is simply part of a child’s natural process of exploring his environment. Instead of trying to stop this behavior, caregivers might try providing materials that encourage repetition. For instance, infants enjoy filling and dumping containers.

Toddlers, especially older toddlers, are undergoing brain development that allows them to understand that symbols are used to represent other things. This milestone, called symbolic representation, lets them engage in more pretend play than ever before. For instance, a toddler might pretend to eat a toy apple, or use a block to represent a phone and talk while holding it to his ear. Caregivers can promote these skills by providing plenty of dramatic play materials for children starting at around 1 year of age, including dress up clothes, and a variety of toys representing items children see in their everyday lives.

The parts of the brain associated with memory develop quite a bit during toddlerhood. As a result, toddlers may be able to recall events that happened a few hours, or even a whole day prior. This might manifest itself in a pattern of behavior called “deferred imitation.” Deferred imitation is when a toddler sees another person do something, waits awhile, and then imitates the behavior. This affords toddlers a greater ability to learn from other people’s actions. Caregivers should be sure to consciously model appropriate behavior at all times. They can also help children build memory skills by talking with children about things that happened earlier in the day, or even the previous day.

From around 12 months old, the part of a child’s brain that deals with memory is developing. This means that sensory experiences can lead to longer lasting memories of the concepts children encounter during play. Providers can use this to create learning experiences that help children
remember concepts that will come in handy during later learning. For example, having some objects that sink and some that float at a water table, or mixing colors of non-toxic finger paint to see what happens are both sensory activities that also teach concepts children will be expected to learn later in school.

During this video clip, try to think about the activity from the child’s perspective. Which domain or domains of development does this experience support?

[Video: Infant activity]

[Activity 2]

Thinking in Terms of Children’s Senses

Even before birth, babies’ senses – sight, hearing, touch, smell, and taste – are already developing. After they are born, infants use their senses in many ways. Input from their senses allows infants to achieve comfort, gauge familiarity with people and situations, understand the emotional context of the world, and explore and learn from their environments. This is all true because sensory input directly affects what goes on in babies’ brains.

Another way caregivers can frame their thinking in order to provide an appropriate variety of experiences for infants and toddlers is to think in terms of children’s five senses. Providing meaningful experiences that appeal to each sense will maximize the helpful stimulation infants’ brains receive, and give their brains the best possible start. As with all activities, caregivers should strive to respect the interests and preferences of children in care. Now let’s look at each of the five senses, and consider what providers can do to offer stimulation for each one.

Hearing

Infants can hear before they are born. In the womb, they hear sounds such as their mother’s heartbeat, digestive noises, and voice. During the first few months of life, babies are able to turn their heads toward sounds, particularly voices. Babies seem most attuned to the sound, pitch, and rhythm of voices. Early on, infants begin to prefer human voices over the sounds of objects, such as a rattle, because the baby’s mind recognizes that voices are associated with the adults who meet the child’s needs.

As the brain develops in ways that allow for better hearing and a greater understanding of the things they hear, infants and toddlers start to acquire language, learning both the vocabulary and the structure that make up their native language. Hearing problems during this developmental process can lead to delays in language development. In other words, infants have to hear others using language before they can learn to produce language on their own. If caregivers suspect a child may have a hearing problem, they should immediately bring this concern to the attention of the child’s parents, who can seek further guidance from their licensed healthcare professional.
The earlier hearing problems are diagnosed and, if necessary, treated, the more easily the child will be able to acquire language.

In order to strengthen the areas of the brain related to hearing, caregivers can provide materials that make interesting sounds. Beyond toys, providers can offer children chances to use simple musical instruments, such as shakers, drums, or rhythm sticks.

Another activity that utilizes children’s hearing is sound containers. Caregivers can fill small containers with small items such as beans, sugar, paper clips, and buttons, and then seal them tightly. Then, they can encourage toddlers to shake the containers and try to match the pairs of sounds. For younger toddlers and infants, just shaking the container and hearing the different types of sounds will be a valuable sensory experience.

**A Note on Music**

Music is another important way to appeal to children’s sense of hearing. Researchers are still working to figure out whether music directly affects the way connections and pathways in the brain develop, and if so, how. What we do know about music is that it serves many valuable roles in children’s learning.

Music, especially soft, rhythmic tones like a lullaby, can be very soothing for infants and toddlers. In this way, music can be a part of the warm, responsive care that very young children need.

Singing, even if providers are self-conscious about their singing voices, can be a good source of interaction and stimulation for infants and toddlers. This is true in part because of the fact that infants are so attuned to human voices.

Infants and toddlers will probably have their own preferences for different styles of music. Some of these preferences may be due to inborn, biological characteristics called temperament, and some of it may be due to cultural and family influences. When caregivers select music for use in the classroom, they should do so thoughtfully, taking into consideration the rhythm, tempo, and beat of the music and how these things affect each individual child in care. No matter what style of music is used, it should always be kept at a low volume to avoid damaging children’s hearing.

Remind providers that screen time is not recommended for infants or toddlers at all, even if it is used as a way to play children’s music. Screen time includes time children spend in front of a television, computer, or other screen-based technology. Some caregivers may not realize that adult programming on television or radio affects children. Coach providers to select music with child-friendly lyrics, and to understand that even a television placed at the adult’s eye-level still negatively affects children if it is in the care environment. Recorded music may be a good alternative to radio and television programs.

Providers should avoid playing constant background music. While no studies have been conducted to investigate the impact of constant music on brain development, experts believe that
constant background music can negatively affect development in other ways. Background music may be overstimulating for some infants and toddlers, causing them to feel stressed in the care environment. It may also cause children to miss out on other sources of stimulation, such as caregivers’ voices talking. Some infants and toddlers might even begin to “tune out” the background music, which, over time, can make them less attuned to music.

If you find yourself observing a care setting where music is used inappropriately or not at all, use this information to suggest ways the providers can incorporate music in age-appropriate, child-friendly ways. For more information about the benefits of music for development and suggestions for using music with very young children, view the handout called “How Does Music Enhance Children’s Learning?” You might want to share this handout with caregivers in need of technical assistance related to music.

Vision

When infants are born, vision is the least mature of all their senses. They are able to see things better through peripheral vision than looking at them straight on. A newborn can see things best when they are about 9 to 12 inches from her face. As they get a little older, they will start to intentionally move their gaze from one place to another. They will learn to focus on objects of interest, to track an object as it moves from side to side or up and down, and gain depth perception. These developments all take place because of growing and strengthening connections in the areas of the brain that control vision.

Caregivers can encourage infants and toddlers to use their sense of sight by providing a stimulating, but not overstimulating, environment. Signs of overstimulation are unique to each individual infant or toddler, and different children have different tolerances for stimulation, but some of the most obvious signs that a given child is receiving too much stimulation include irritability, fussing, crying, or turning away from the source of the stimulation. As a good rule of thumb, the visual environment should be such that an infant or toddler can focus his attention on one thing at a time.

Infants, especially non-mobile infants, enjoy practicing following objects with their eyes. Providers can make this a game of sorts by holding an object in the child’s visual field and moving it slowly back and forth or up and down. This can be a fun tummy time activity.

Very young children are naturally attuned to human faces. Even when they are very young, babies prefer to look at faces over other objects or images. Because of this, caregivers can make their faces an interesting source of stimulation for children. By frequently smiling at children and making eye contact, they give infants and toddlers incentive to keep looking at adult faces.

For all infants and toddlers, pictures are an excellent way to provide visual stimulation. Providers should avoid using cartoon-like images in the care environment, and should instead opt for realistic portrayals of familiar and new things. One good use of pictures in the infant or toddler care environment is showing photos of children’s families, which has the added benefit of providing comfort and familiarity to children throughout their time in care. Another is to show
pictures related to curriculum themes, such as having pictures of trees with multi-colored leaves if a provider is incorporating autumn as a theme. Showing pictures to go along with each area of the classroom can help children learn which materials are associated with which area, especially useful when teaching toddlers to put away some materials on their own. In addition to providing important stimulation for the visual areas of the brain, these pictures can be a source of conversation between providers and children, and lead to greater acquisition of language.

Older toddlers may enjoy activities that allow them to explore different aspects of vision. Magnifying lenses, binoculars, and child-sized microscopes help them see familiar things, like toys and materials, in a new way. Providers can offer toddlers a variety of items to look at under magnification, perhaps selecting items related to an ongoing curriculum theme. Encourage providers to select magnifying devices with plastic lenses for use with infants and toddlers. Discuss the potential safety hazards associated with glass lenses and ensure that all appropriate safety precautions, including constant supervision, are in place when magnifiers are being used.

Smell

Researchers are not entirely certain whether infants can smell from birth or not. It is believed that newborns can smell, because studies have shown that newborns can taste, and smell and taste are the two most closely linked of all the senses.

Very soon after birth, infants who are breastfed learn to identify the smell of their own mother’s breastmilk, and will show preference for it over the scent of other mothers’ milk. Young infants also begin to prefer the smells of sweet things over bitter or sour smells. For example, a very young infant might take a deep breath in the presence of the smell of a banana, but might turn away or fuss at the smell of vinegar. As the olfactory areas of the brain continue to develop, infants will even start to recognize and respond to the smells of adults’ food.

While they may not seem as obvious as activities designed to stimulate the senses of hearing and sight, there are several ways caregivers can provide stimulation for infants’ and toddlers’ sense of smell. The first is to talk about smells children naturally encounter, using words like sweet, bitter, and sour to describe the odors.

Another way providers can stimulate children’s sense of smell is to place items with strong, distinctive smells in covered containers and let children sniff them. Coffee, rose petals, and citrus peels are some obvious options. For infants and young toddlers, it is probably best to use clear containers where they can see the item while they smell it. For older toddlers, it can be a fun game to smell a hidden item and then look inside to see what it is.

Gardens are yet another way to expose very young children to new and interesting smells. Infants and toddlers can smell different kinds of safe, non-toxic plants, and caregivers can talk to them about the smells. Letting toddlers participate in gardening in developmentally appropriate ways, such as digging holes for and planting seeds or watering plants, provides lots of other kinds of stimulation as well.
**Taste**

As we discussed before, newborns are able to taste right away. Just as with smell, babies tend to prefer sweet tastes over bitter, sour, or salty ones. Before they reach 1 year of age, infants start to form strong preferences for and against different foods. As their taste buds and the areas of the brain related to taste mature, their preferences will likely change as well. Toddlers often prefer bland foods over those with strong flavors.

The most important way caregivers can stimulate infants’ and toddlers’ sense of taste is to make the most of meal and snack times. When caring for infants, providers must follow written feeding instructions from each child’s parents. Once feeding instructions are no longer required, providers should continue to serve a variety of healthy, nutritionally beneficial foods, and talk with children about the tastes they encounter. This is true even though infants and toddlers may appear to prefer one or two specific foods.

While children’s preferences for and against certain foods should be respected, it can be a pleasant surprise when a child chooses to try a food he has previously refused. It may take several times of being introduced to a new food before an infant or toddler will actually try it. As an added bonus, positive experiences with food in infancy and toddlerhood can also lead to healthier eating habits in childhood and into adulthood.

Taste tests are another way to stimulate children’s sense of taste. A provider can prompt children to close their eyes, give each of them a child-sized spoon, and then give each of them small tastes of different foods, one at a time on their spoons. Then, the group can discuss what each food might be and how it tastes. Is it sweet? Salty? Sour?

Simple cooking activities are appropriate for use in toddler care. Caregivers might try making smoothies, allowing each child to select from a variety of ingredients and push the button on the blender with adult assistance. Giving children a chance to taste their own creations can lead to stimulating conversations about the tastes of foods.

Discuss with providers the importance of following appropriate procedures during activities involving food. These include safe food handling practices, informing parents in advance about the activities, and taking any necessary precautions to protect children with food allergies.

**Touch**

Touch is the first sense infants develop before they are born. For newborn babies, the palms, the soles of the feet, and the area around the mouth are the most sensitive places on the whole body. Soon infants learn to use touch to intentionally explore their environments. They learn through touch about the boundaries of their own bodies. They learn that when they touch their own bodies, it feels very different from touching the body of another person. As areas of the brain associated with touch develop throughout infancy and toddlerhood, touch continues to be an important tool for learning about the world.
Since infant and toddler bodies are especially attuned to touch, caregivers can provide stimulation simply by touching, cuddling, and caressing them. These are also parts of warm, responsive care. Touching can even include unconventional areas of the body, such as the knees, elbows, or nose. However, children’s preferences for touch should always be respected, and providers should stop if the child expresses signs of discomfort or unease. As we mentioned earlier, infant seats and swings should only be used on a limited basis, because they keep children away from loving touches and other stimulation.

Textural experiences are the key to stimulating the sense of touch. There are virtually unlimited ways caregivers can offer chances to explore different textures. Books, blocks and toys often have varying textures for children to enjoy. Providers can also incorporate textures by using different types of paper for children’s artwork, including coffee filters, construction paper, tissue paper, wrapping paper, butcher paper, and cardstock.

With proper supervision, a wide variety of textural experiences can be made available to mobile infants and toddlers. Many of these experiences would not be appropriate for infants who are not yet able to crawl. Surfaces with different textures for children to touch or crawl on, such as soft blankets, straw mats, bubble wrap, and rough towels, as well as materials that are sticky, cold, smooth, or bumpy are all terrific ways to stimulate touch. Sensory table materials, like sand, water, shaving cream, modeling clay, or “slime” made from cornstarch and water provide even more options for caregivers looking to give children’s sense of touch a workout.

Licensing staff should be prepared to see, and caregivers should be prepared to provide, messy experiences. Finger painting, playing with food, and squishing and squeezing all sorts of other materials are important for infant and toddler learning. Instead of discouraging children from getting messy, providers can talk to them about the types of textures they feel and help them gain a better understanding of the experience.

A Note on Mouthing

Anyone who cares for infants and toddlers is already aware that very young children like to put things in their mouths. What they may not know, though, is that mouthing helps children’s brains take in crucial information about the taste, texture, and shape of an object. Remember, the area around the mouth is extremely sensitive for infants and toddlers.

Of course, children’s health and safety are always top concerns in care. Coach providers to assess the safety of materials to prevent potential hazards, especially those related to preventing choking and poisoning. Providers should assume that infants and toddlers are going to mouth, and choose materials accordingly. Encourage providers to select plastic and cloth toys, which can be cleaned easily, rather than toys made of wood, which can be porous and more difficult to thoroughly sanitize. When mouthing occurs, unless the child is at risk, she should be allowed to finish exploring the object. After she is finished, providers can remove the object from circulation until it has been properly cleaned and sanitized. Let providers know that best practice is to clean and sanitize materials before they are rotated out of or into the environment, to
minimize the transfer of germs from one group to another or between children in a group. With a little foresight and the right attitude, mouthing can actually be a good thing.

[Activity 3]

Bringing it All Together

During this course, we have discussed how infants’ and toddlers’ brains develop in the first three years of life, as well as some specific ways you can encourage caregivers to work to promote healthy brains. Since the experiences children have early on literally affects the structure of their brains, the activities and materials they encounter should be chosen with the utmost thought and care. Here are the major messages we’d like for you to keep in mind during your next inspection:

- While the basic structure of the brain is formed based on genetic information, sensory experiences, called stimuli, encountered after birth create and maintain connections that “fine tune” the brain’s functioning,
- Connections that are used regularly are maintained, and those that are not used are pruned, or cut off. Therefore, children’s experiences need to be varied and meaningful so they can strengthen important areas of the brain,
- The foundations of any experience that promotes early brain development are: talking with children frequently, providing meaningful play experiences, and giving warm responsive care. When providers do these things on a daily basis, infants’ and toddlers’ brains have the best chance for optimal development,
- Thinking in terms of the domains of development – physical, social emotional, and cognitive – can be a useful tool to help providers offer the right mix of experiences for infants and toddlers, and for assessing activities in the infant or toddler environment. There may be times you need to offer some ideas to help caregivers get started creating these experiences, and
- Thinking in terms of children’s senses – hearing, vision, smell, taste, and touch – is another way to help providers meet all of children’s brain development needs. While an activity may often stimulate more than one sense at a time, thoughtfully targeting each specific sense will likely lead to an appropriate variety of experiences for very young children.

Thank you for your attention, and for your commitment to ensuring that our most vulnerable children receive the best possible care.

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