

**Mental Health in the Child Care Setting: Supporting Social and
Emotional Development
Training Module
version 3
(Last revised 2/12/2013)**

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NOTE TO TRAINER

This Training Module presents information on supporting social and emotional development of children in the child care setting. Learning activities previously included in the Module can now be found in the *Mental Health in the Child Care Setting* Trainer's Toolkit that has been developed to accompany this Module. The Toolkit includes a Trainer's Guide to leading training sessions, PowerPoint slides, and materials for participants' packets.

For more information about using the NTI materials, please read "Guidelines for Using the NTI Curriculum Materials," available in the "Curriculum" section of the NTI Resources Website (accessed by entering your NTI username and password at <http://sakai.unc.edu>)

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LEARNING OBJECTIVES

After reading this Module, Trainers will be able to:

- List characteristics of mentally healthy children and families
- Explain how to build a strong caregiver-/teacher-child relationship
- Describe ways the caregiver/teacher can create a child care environment that enhances social and emotional growth
- Recognize risk factors and behavioral characteristics for child social and emotional difficulties
- Advise responses to a child's social and emotional difficulties
- Discuss how to address the problem of expulsion from child care
- Describe types of services for children available from early childhood mental health consultants
- Describe sources of funding for children's mental health services

INTRODUCTION: THE ROLE OF THE CCHC

Providing early childhood mental health consultation may be a challenge for CCHCs who are not specifically trained for that role. While a CCHC should not replace an early childhood mental health consultant, there are ways in which a CCHC can enrich the social and emotional well-being of children in child care, and he/she can help child care staff assess the mental health needs of the children in the facility and can provide referrals to local mental health resources, including an early childhood mental health consultant.

To this end, the CCHC should be knowledgeable about current mental health issues as they relate to children and child care and should keep informed of local and national mental health trends. The CCHC is responsible for transmitting relevant information to caregivers/teachers/, parents/guardians, and other family members. For example, the CCHC should make certain that caregivers/teachers and family members are aware of the characteristics of mentally healthy children and families and how children develop good mental health.

This Module is intended to provide information needed for CCHCs to help child care caregivers/teachers interpret the meaning of a child's behavior, make a decision about the quality of that behavior, and respond to the child's needs. As staff works with CCHCs to identify problems and intervene, they may need to reach out to mental health consultants and other local resources.

CARING FOR OUR CHILDREN NATIONAL STANDARDS (3rd ed., 2011)

Caring for Our Children: National Health and Safety Performance Standards: Guidelines for Early Care and Education Programs (CFOC) is a set of 686 attainable standards that are intended for use by health care professionals, trainers, regulators, caregivers/teachers, academics and researchers, parents/guardians, and others “who work toward the goal of ensuring that all children from day one have the opportunity to grow and develop appropriately, to thrive in healthy and safe environments, and to develop healthy and safe behaviors that will last a lifetime” (*CFOC* 3rd ed., 2011, p. xxi). These standards, supported by the Maternal and Child Health Bureau, were developed by the American Academy of Pediatrics, the American Public Health Association, and the National Resource Center for Health and Safety in Child Care and Early Education.

The following is a list of the standards relating to social and emotional health in the child care environment, along with a short description and the page number in *CFOC* on which the standard can be found. All listed standards are referenced throughout this module.

[1.6.0.3](#) - Early Childhood Mental Health Consultants, p. 36

States that a child care facility should engage a qualified early childhood mental health consultant who will assist the program with a range of early childhood social-emotional and behavioral issues and who will visit the program at minimum quarterly and more often as needed.

[2.1.1.4](#) - Monitoring Children’s Development/Obtaining Consent for Screening, p. 51

Explains that child care settings should provide daily indoor and outdoor opportunities for promoting and monitoring children’s development, and that caregivers/teachers should continually collaborate with parents/guardians and the child’s primary care provider and health, education, mental health and early intervention consultants.

[2.2.0.8](#) - Preventing Expulsions, Suspensions, and Other Limitations in Services, p. 73

States that child care programs should not expel, suspend, or otherwise limit the amount of services (including denying outdoor time, withholding food, or using food as a reward/punishment) provided to a child or family on the basis of challenging behaviors or a health/safety condition or situation unless the condition or situation meets one of the two exceptions listed in the standard.

[9.4.1.19](#) - Community Resource Information, p. 386

States the facility should obtain or have access to a community resource file that is updated at least annually. This resource file should be made available to parents/guardians as needed. For families who do not speak English, community resource information should be provided in the parents’/guardians’ native language or through the use of interpreters.

[10.3.4.3](#) - Support for Consultants to Provide Technical Assistance to Facilities, p. 403

Explains that state agencies should encourage the arrangement and coordination of and fiscal support for consultants from the local community to provide technical assistance for program development and maintenance.

WHAT THE CCHC SHOULD KNOW: CHARACTERISTICS OF MENTAL HEALTH IN CHILDREN

A child's mental health is the state of his or her emotional and social development. According to Zero to Three (2002, p. 2), infant mental health is:

the developing capacity of the children from birth to 3 to: experience, regulate, and express emotions; form close and secure interpersonal relationships; and explore the environment and learn—all in the context of family, community, and cultural expectations for young children.

Characteristics of Mentally Healthy Children and Families

Definitions of mentally healthy feelings and behavior vary with children's individual development and familial/cultural characteristics. For example, biting another child might be a normal behavior for an 18-month-old but a sign of emotional distress for a 4-year-old. Spending an extended period of time alone in quiet activities may be mentally healthy for a child with a shy temperament and an introspective nature but a sign of emotional distress for a child who is usually gregarious and physically active. Avoiding eye contact with adults may be appropriate in a child from one culture but a sign of abuse in a child from another culture.

Although young children exhibit a wide range of normal feelings and behaviors, Greenspan and Greenspan (1985) list some general characteristics that all mentally healthy young children share:

- Positive self-esteem: feeling optimistic and confident that they can make things happen
- A capacity for warm and trusting relationships with other children and adults
- Developmentally appropriate expression of their feelings and needs: an increasing ability to use words to express their feelings, ideas, and needs
- Developmentally appropriate control of impulses and behavior: an increasing ability to express curiosity, assertiveness, and anger according to the norms of their particular homes or child care settings
- Initial signs of the development of empathy and compassion for others
- Initial development of skills to focus attention and make plans as a basis for learning

Mentally-healthy families, like the individuals within them, also share certain characteristics. Doub and Scott (1987) identify the characteristics of mentally-healthy families as:

- Adults are in charge: they are the leaders and role models. They are respected, and they make and enforce the plans and rules.
- Children feel they belong and are valued: they are encouraged to participate in and contribute to family activities.

- Communication is clear and fair: family members are encouraged to express how they feel and what they need. There is mutual respect among family members.
- Changes are expected, and the family is able to respond to those changes.
- Outside help is sought and utilized when needed.

Child care programs can also be viewed as a "family" where adults care for children. As such, well-functioning child care programs should exhibit the characteristics of mentally healthy families.

Mental Health Development in Young Children

The development of children's mental health is as important as that of their physical health. Infants are born with feelings and needs. They also are born with a capacity to have their needs met by communicating with and responding to their parents/guardians or caregivers/teachers. From the start, a child's *emotional development* (feelings and expectations of self) and *social development* (feelings about and expectations of others) occur in the context of relationships with those caring for them. Shore (1997) reports that a child's relationship with his/her primary parent/guardian or caregiver/teacher in the first few years of life lays the foundations for lifelong mental health.

There are several benefits associated with positive social and emotional development. First, quality relationships in the first years of life are critical in developing trust, empathy, compassion, generosity, and the ability to discern between right and wrong (Zero to Three, 2002). For example, when an infant cries in hunger and the caregiver/teacher promptly picks him up, talks to the child sweetly, and feeds him, the trust that the caregiver/teacher will meet his needs is developed. As a toddler grows comfortable with daily child care routines (e.g., the caregiver's/teacher's cheery conversation during feeding, special game for diapering, or songs for naptime), she learns that the caregiver will respond to her needs and that she is worthy of love. Through a warm and responsive relationship with an adult, the child's feelings of security, trust, confidence, and well-being grow. These types of relationships serve as support for the child during stressful situations.

Second, social and emotional wellness has an impact on the child's brain development (Squires and Nickel, 2003). These experiences "affect gene function, neural connections, and the organization of the mind," having positive effects that will last a lifetime (Squires and Nickel, 2003, p. 1). Please see "Appendix A: Early Brain Development" for more information.

Third, established healthy relationships that older children have with their caregivers/teachers have an impact on their cognitive development, thus acting as a factor for determining school readiness (Zero to Three, 2002). Siegel (1999, p. 16) proposes that "experiences can shape not only what information enters the mind, but the way in which the mind develops the ability to process that information."

A child who experiences significant maltreatment during the first few years of life is at risk for developing depression, anxiety disorders, cognitive impairment, and difficulty in relationships.

Once established, problems of this nature can be difficult to change. Further, research indicates that there is a strong association between childhood mental health problems and future criminal behaviors (Squires and Nickel, 2003).

As adapted by Zero to Three (2002), Stanley Greenspan, MD, suggests that an infant's intelligence and social and emotional competence evolve over time "in the context of [his or her] relationships with parents" and other influential adults, such as regular caregivers/ /teachers (p. 5). This model is presented in Table 1, on the following page.

Table 1: Greenspan’s Six Essential Developmental Stages

Developmental Goal	Age Range	What’s Happening?
Stage 1 Being calm and interested in all the sensations of the world.	Birth to 3 months	The baby is: - Learning how to be calm, regulated, secure, and interested in the world around him/her - Trying to organize the information she/he is receiving from his/her senses
Stage 2 Falling in love	Begins at 2-4 months, roughly spanning the period from “first smiles to crawling”	- Becoming more focused on parents and other people and things outside of him/herself - Expressing emotional reactions of his/her own (e.g., smiles and frowns) - Expressing pleasure in other’s company
Stage 3 Becoming an intentional two-way communicator	3-10 months	- Purposefully using gestures (facial expressions, actions, sounds) to communicate - Responding to others’ gestures with gestures of his/her own - Realizing that his/her expressions elicit a response from parents and caregivers and that what he/she expresses can and does have an effect
Stage 4 Learning to interact to solve problems and discover a sense of self	9-18 months	- Learning to solve problems - Learning to see and decipher patterns - Communicating in increasingly complex ways - Learning what to expect from others, based on interactions and experiences with parents and caregivers
Stage 5 Creating ideas	16-36 months	The child is: - Becoming skilled in symbolic thought (e.g., labeling images with words) - Using verbal means to communicate needs and desires - Engaging in pretend play - Learning to recognize and communicate his/her feelings - Learning to understand others’ feelings
Stage 6 Building bridges between ideas	36-48 months	- Sharing his/her own ideas; exchanging ideas with parents and caregivers - Learning to be logical, connecting one ideas to another in a meaningful way - Developing a sense of time - Developing a sense of space, or “near” and “far” - Making connections between ideas that convey feelings (e.g., asking, “Why are you sad?”)

Action Items for the CCHC

The CCHC should:

- Educate child caregivers/teachers, parents/guardians, and other family members about the characteristics of mentally healthy children and families and the development of children's mental health

- Ensure that the caregiver/teacher reflects the characteristics of mentally healthy families

- Read newspapers, magazine articles, journals, and studies on child mental health issues (See the "Where to Find More Information" section at the end of this Module for a list of resources.)

- Network with community and state organizations and agencies to keep informed of local and national mental health trends

- Network with community groups (e.g., child advocacy groups, church groups, civic groups) to reinforce a positive attitude towards child mental health needs and resources

WHAT THE CCHC SHOULD KNOW: HOW CHILD CARE PROGRAMS CAN PROMOTE CHILDREN'S MENTAL HEALTH

The Importance of a Caregiver/Teacher-Child Relationship

Lally (1990) reports that the most effective way to promote children's mental health is to support a warm and responsive relationship between the child and an adult. Most children's primary relationship is with a parent/guardian or close family member. Child care staff can play an important role in supporting children's relationships with their families by developing a family-centered program.

Children and families learn that their relationships are valued when caregivers/teachers:

- Inquire about the child's and family's history during enrollment
- Ask families to post photos on their child's cubby
- Invite parents/guardians to teach the children about their traditional foods and songs
- Tell parents/guardians each day about the special things their child did
- Offer families developmental guidance and support

For young children in child care, a close relationship with a caregiver/teacher or other caregiver/teacher is crucial. Child care programs can promote such attachments by ensuring the following:

- Adequate adult to child ratios
- Small group sizes
- One primary caregiver/teacher for each child
- Continuity with that caregiver/teacher over the time the child attends the program

Studies show that young children, especially infants and toddlers, who have a close relationship with a caregiver/teacher in their child care program demonstrate better social and emotional skills. A close relationship with a child caregiver/teacher can also be a lifeline for children who lack a strong relationship within the family, e.g., through abuse or neglect (Lally, 1990).

How to Build a Strong Caregiver/Teacher-Child Relationship

Warm, responsive relationships are built on understanding. To develop a close relationship, caregivers/teachers must get to know each child (his/her development, temperament, likes and dislikes, and past experiences) and work to meet the child's particular needs. When the partners in a relationship feel understood and successful with each other, the relationship grows strong.

Caregivers/teachers should use parents/guardians as a bridge and a guide to understand and build a relationship with the child. For example, the more a caregiver/teacher knows in advance about what the child likes to eat and how the child goes down for a nap, the more effective she/he can be from the very beginning in making the child feel safe and loved. On an ongoing basis, the more frequently the caregiver/teacher discusses with parents/guardians their child's health issues, the better she/he can prevent or respond promptly to the child's illnesses and help the child feel healthy and safe in child care.

The caregiver/teacher also gets to know the child through close observation every day. Children's behavior reflects how they feel and think, what their skills are, and what they need. While children's development generally proceeds through predictable patterns, each child charts a unique path through the stages of development of behaviors and skills. In addition, each child has a unique, inborn temperament or style of responding to the world that is maintained throughout development. For example, some babies love being free to kick and feel the air on their skin while others get agitated if they are not tightly swaddled; some preschoolers can sit and draw with crayons for a long time while others can sit quietly for only 5 minutes before jumping up and running around.

Understanding a child's development and temperament can help a caregiver/teacher structure the child care program (the relationships, environment, and activities) to best meet each child's needs. Early childhood mental health experts have defined three basic temperament types: "fearful," "feisty," and "flexible." There is no good or bad temperament. In fact, studies show that the temperament traits that caregivers/teachers consider to be easy vary among cultures. When caregivers/teachers routinely document their observations and share them with parents/guardians, it can help both the caregiver/teachers and parents/guardians understand the child better.

When the caregiver/teacher understands what a child's behavior is communicating, she/he can respond effectively to the child's needs. For example, an infant caregiver/teacher quickly learns to recognize a baby's particular cry when she/he is hungry and learns to respond with food rather than with a clean diaper or a change of scenery. The caregiver's/teacher's effective response to the baby's needs reinforces the child's growing physical, emotional, and social well-being.

How Caregivers/Teachers Can Support Children's Resiliency

All children experience stressful life events at some time (e.g., the birth of a sibling, death of a family member, divorce, a parent's/guardian's loss of a job, family violence) that challenge their mental health. Werner (1990) reports that certain protective factors contribute to a child's "resiliency," i.e., the ability to recover readily or bounce back from stressful life experiences.

To support children's resiliency, caregivers/teachers should ensure that:

- Each child has a caring relationship with at least one adult
- Each child has opportunities for meaningful participation and responsibility at the child care facility
- The caregiver/teacher has high expectations for each child and believes that each child can make a contribution
- The caregiver/teacher recognizes each child's abilities and is hopeful for each child's future

Effective Child Care Environments

Interpersonal relationships that come out of a strong caregiver/teacher-child partnership are critical to promoting social and emotional development, but the environment of the child care facility can also play a role. To promote an environment in which children's social and emotional needs are being met, the child care environment should have the following characteristics:

- A classroom design that allows for children to be easily visually monitored
 - Limiting the number of children in activity areas
 - Arranging materials to encourage children to move easily and independently from one activity to the next (e.g., put items on low shelves for easy access, provide age-appropriate activities)
 - Maintain noise and light levels that reduce stimulation
- (Alter and Conroy, 2006)

In considering the daily routines of the child care facility, staff should aim to have a predictable daily schedule with these elements:

- Pictures or other visual cues about what comes next
 - Alternating small and large group activities, as well as quiet and high-energy activities, to meet the needs of children with different preferences
 - Allowing clear choices between activities
 - Creating rules and rituals that are easy to follow
- (Alter and Conroy, 2006)

Action Items for the CCHC

The CCHC should:

- Assist child care caregivers/teachers in building relationships with families to promote an environment in which emotional and social concerns may be openly addressed.
- Educate staff about methods for promoting mental health in child care. The CCHC should ensure that the child care caregiver/teacher not only *knows* the importance of a family-centered program, how to build a strong caregiver/teacher-child relationship, and how to support children's resiliency, but also has *specific policies and procedures* in place for achieving these goals.
- Help providers create an environment that promotes social and emotional development.
- Remain flexible, because the strategies appropriate for one caregiver/teacher may not work well for another.

WHAT THE CCHC SHOULD KNOW: HOW CHILD CARE PROGRAMS CAN SUPPORT CHILDREN WITH SOCIAL AND EMOTIONAL DIFFICULTIES

It is appropriate to seek early childhood mental health consultation and support anytime a child's behavior is causing prolonged distress for the child, parents/guardians, and/or the caregiver/teacher. Early childhood mental health consultation and/or intervention offers support not only with severe mental health problems (e.g., post-traumatic stress disorder, depression, severe emotional disturbance) but also with common developmental experiences that can be stressful for children, parents/guardians, and caregivers/teachers (e.g., infants not sleeping well, biting, toddlers having difficulties with toilet learning, and preschoolers being very active). The following section details how to assess children's behavior and some common responses to difficult behavior that might assist the child care staff in taking steps to promote mental health before having to contact a specially-trained early childhood mental health consultant.

How to Identify Children with Social and Emotional Difficulties

Important Risk Factors

Staff should obtain as much information as possible from the parents/guardians and primary care provider in order to be alert about any special needs. For example, the caregiver/teacher should have relevant information about the child's prenatal and birth history, medical conditions, development, temperament, likes and dislikes, family relationships, and previous child care experiences. Studies have shown that children with particular risk factors are significantly more likely to experience mental health problems (Shore, 1997). Although many children who experience these risk factors remain mentally healthy, caregivers/teachers should observe these children more closely for signs of distress and provide them with extra support.

According to Shore (1997), important risk factors include:

- Family stress
 - Maternal depression or other mental illness
 - Poverty
 - Substance abuse
 - Homelessness
 - Family violence
 - Military deployment of a parent/guardian
 - Death or loss of a family member
- Neglect or abuse
- Special medical/developmental needs
 - Physical or mental disability
 - Special health care needs
 - Chronic medical conditions

Behavioral "Red Flags"

Children communicate their feelings and needs through words and behavior. While the caregiver's/teacher's main focus should be observing and supporting children's pro-social,

successful behaviors, she/he should also be attentive to behavioral red flags that may indicate social and emotional difficulties. Experienced caregivers/teachers report that they have a sixth sense for identifying children with social and emotional difficulties because these children provoke uncomfortable feelings in others. Their behavior is often characterized as:

- Emotionally extreme (extreme anger, sadness, or giddiness)
- Inappropriate for their age/developmental stage
- Hurtful to themselves or others
- Difficult in that others have trouble forming positive relationships with them
- Driven, excessive, persistent, and/or out-of-control
- Displaying little or no interest or ability to play with peers
- Suddenly changing emotions (e.g., from outgoing to withdrawn)
- Excessively fearful of certain, people or objects
- Regressive in behaviors where child had previously shown mastery

Caregivers/teachers should also consider the following as red flags for mental health problems:

- Disclosure of harm by an adult
- Play themes that demonstrate inappropriate material for age and ability of the child

Based on his/her initial assessment the caregiver/teacher must determine whether a child's behavior is part of normal development or a red flag for social and emotional difficulties. Caregivers/teachers should monitor the children's development, share observations with parents/guardians, and provide resource information as needed for screenings, evaluations and early intervention and treatment. [2.1.1.4](#) Consideration should be given to utilizing parent/guardian-completed screening tools, such as the Ages and Stages Questionnaire. [2.1.1.4](#) These may help with an assessment of whether a behavior is developmentally-appropriate for a given child.

Confirming Behavioral Concerns

While all children experience difficult emotional and social episodes, these become mental health problems when the difficulties persist over a period of time and in different settings, often despite negative consequences. A child who displays a troubling behavior only once or twice, such as a 4-year-old who punches a classmate in the absence of other risk factors or "red flags", is probably not a concern. If the child punches classmates frequently despite assistance with using words to express his/her feelings or attempts to teach acceptable behavior, the caregiver/teacher should take further steps. To get objective information about problem behavior, the caregiver/teacher should:

- Observe and document the child's behavior over time and in a range of different relationships, environments, and activities
- Have a colleague or supervisor observe the child to provide a different perspective and/or independent confirmation of the problem behavior
- Express his/her concerns to the child's parents/guardians and work together with them to understand the behavior and develop strategies to better meet the child's needs

- With the parents'/guardians' consent, request that an early childhood mental health consultant observe and assess the child and provide consultation on strategies to support positive behavior and/or referral for intervention

Meeting the needs of children with social and emotional difficulties can be challenging. It is critical for caregivers/teachers to know when and how to seek additional information and help from the family, colleagues, supervisors, and early childhood mental health specialists. Caregivers/teachers can keep journals of their observations of children and their own responses to help identify the support they might need to help children with social and emotional difficulties.

How to Respond to Children's Behavior

Interpret the Meaning of the Behavior

Caregivers/teachers and parents/guardians must use their understanding of the individual child, his/her particular development, temperament, and life experiences, to interpret the meaning of the child's behavior and to respond to the child's needs. Remember, a child's behavior is often prompted by a combination of causes. The art of responding appropriately is in taking many factors into consideration. In trying to interpret the causes of a troubling behavior, caregivers/teachers should consider the following explanations and should keep in mind that there may be multiple causes of behavior. The table on the following page lists how to tell if a child's behavior is caused by any of these explanations and, if so, how to respond.

Developmental Skills: Young children are learning everything for the very first time and need many opportunities to have things explained and to practice new skills. Each developmental stage has predictable behavior that accompanies it. The behavior is the child's way of practicing the important tasks of that stage. Some of these behaviors can be frustrating for caregivers/teachers, but they are a normal part of child development.

Individual Traits: Each child is born with unique physical characteristics and temperament. These characteristics influence how the child experiences and responds to his/her environment.

Home Environment: Each child carries experiences and expectations from home into the child care environment. The home environment, including the language, culture, food preferences, and rules for behavior, influences the child's behavior and response to child care.

Child Care Environment: The child's entire experience in the child care program—relationships with children and adults, the caregiver's/teacher's style of interacting with children, the physical environment, and activities—shape the child's behavior. When children act out in response to features of the child care environment, their behavior will improve when the caregiver/teacher changes his/her own behavior, activities, or the environment.

Unmet Emotional Needs: All children have fundamental emotional needs for safety, consistency, trusting relationships, and feeling competent in the world. When these needs are not adequately met, the child lacks something critical for his/her emotional development. Until the emotional need is satisfied, the child is driven by a hunger for it. Troubling behaviors can be a child's attempt to get what she/he needs. Even though it might not be successful, the behavior won't go away until the underlying emotional need is understood and satisfied.

Table 2: Explanations of Child Behavior

Explanation of Behavior	How to tell if behavior is caused by this explanation	How to respond if behavior is caused by this explanation
Developmental Skills	<ul style="list-style-type: none"> - The behavior is described in child development books. - Other children at the same stage are observed to behave this way. - The child is in a new situation or facing a new task or problem. 	<ul style="list-style-type: none"> - Remember that this is normal for children. Tolerate the behavior—it will end as the developmental stage passes. - Channel the behavior, allowing it in certain places at certain times. - Model appropriate behavior. - Explain why not to do the behavior and teach the child a “replacement behavior.” - Give encouragement for small successes and be patient with failures. - Stop the behavior when it is disruptive or dangerous. Be firm and patient. Use words and actions that don't make the child feel bad about him/herself.
Individual Traits	<ul style="list-style-type: none"> - The behavior is not explained by developmental stage alone. - Upon observation, this child's temperament style is a consistent quality in his/her behavior. - The child's family confirms this quality has been consistent since infancy. - Research indicates that this type of behavior is characteristic of certain temperament types. 	<ul style="list-style-type: none"> - Accept the child's unique qualities. Try to see the child's positive traits. - Adapt expectations and interactions to fit the child's abilities and style. - When possible, offer acceptable options for activities that are consistent with the child's way of expressing him/herself and responding to the world. - Change the way the adult interacts with the child to obtain a different outcome.
Home Environment	<ul style="list-style-type: none"> - There are significant differences between the routines and cultures of home and child care. - The child's behavior has changed suddenly, corresponding with changes or difficulties that the child is experiencing at home. 	<ul style="list-style-type: none"> - Get more information about the home environment/culture from parents/guardians. - When possible, adapt expectations in child care to accommodate the child's family and culture. - Provide support for the child. Make child care a safe oasis for children who may be experiencing difficulties at home. - If there is reasonable suspicion of child

		neglect or abuse at home, child care caregivers/teachers may be legally obligated to report this suspicion to Child Protective Services.
Explanation of Behavior	How to tell if behavior is caused by this explanation	How to respond if behavior is caused by this explanation
Child Care Environment	<ul style="list-style-type: none"> - The behavior is not simply explained by a developmental stage or individual traits. - Many children in the group have the same behavior. - The group is responding to a specific condition or activity. - When the condition in the environment changes, the behavior changes. - The behavior is not present when a different caregiver is in charge. 	Change the environment. Make sure the child care program is developmentally appropriate and that children experience sufficient protection, attention, stimulation, order, and calm.
Unmet Emotional Needs	<p>When <u>ALL</u> of the following are present:</p> <ul style="list-style-type: none"> - The behavior is inappropriate—the child is not acting his/her age. - The child has a limited way of responding and uses the same behavior repeatedly. - The behavior has a driven, intense quality—the child <i>has</i> to do it, despite repeated, negative consequences. - The behavior is persistent, even when channeled or stopped it keeps recurring. - The usual ways of helping children with this behavior do not seem to help this child. 	<ul style="list-style-type: none"> - Try to figure out what need the child may be trying to communicate. Remember that the behavior doesn't usually look like a need. Ask for help from colleagues, supervisors, and mental health consultants in analyzing the function of the behavior. - Respond actively to the child through deeds, not only words; through giving, not withholding; through support, not punishment. - Stop the behavior when the child is hurting him/herself or others. Use quiet firmness and patience. - Get additional support for yourself, the child, and the family. Refer the child to his primary care provider for assessment. Work with your co-workers, supervisors, and mental health consultants.

Intervene to Enhance Social and Emotional Learning

CCHCs can assist staff in emphasizing social and emotional learning instead of relying on threats, punishment, or social isolation. Social and emotional learning focuses on the development of emotional competence, impulse control, self-expression and self-regulation. Rather than behavior management, caregivers/teachers can instead practice persistent persuasion, patience, empathy, logical consequences, and the combined expectation that children want to do the right thing and that they will also make mistakes. The focus of this approach is on building an intimate relationship with children that promotes attachment, discussion of emotions, conflict resolution and problem solving skills (Denham and Burton, 2003).

According to Fay and Fay (2005), the key to working with behavior problems in children is for caregivers/teachers to practice the following:

- Keep their own emotions in check
- Respond to misbehavior from a place of empathy for what the child just did as well as the consequences of that behavior
- Send a message that they believe the child can do the right thing
- Gently hold children accountable for their poor decisions
- Provide repetition and practice
- Pay attention to the triggers for behavior and make environmental and interactive changes
- Reserve removal of children to more restrictive settings (time-out) as a last resort

Some additional techniques for caregivers/teachers include:

- Frequently give limited choices in an age appropriate manner: *“Would you rather clean up the puzzles or the dolls?”*
 - Always respond with empathy prior to imposing a consequence: *“How sad, I see you grabbing toys from your friends so it is time to make a different choice. This center is now closed for you.”*
 - Catch the child behaving well as often as possible and notice her strengths: *“Terrific. At this table I see Eric sharing the crayons with Julie.”*
 - To develop a bond with children, notice them without judging or labeling their behavior as good or bad: *“Bonnie, I notice you have been drawing with yellow a lot this week.”*
 - Use enforceable statements that tell the child what you are going to do rather than telling him what to do: *“I will speak with you as soon your voice is as calm as mine.”*
- (Denham and Burton, 2003, and Fay and Fay, 2000, Fay and Billings 2005, Fay and Fay, 2005.)

For example, when a child angrily throws toys, an intervention could look like this:

Caregiver/Teacher: “Hi Johnny, I see you want to come into the block center, but it is full right now. You may ask someone if they are ready to change centers so you can have a turn.”

Child: “No! I want to come in right now!”
(Child runs in and knocks down the structure of a classmate and starts to throw blocks at the caregiver/teacher.)

Caregiver/Teacher: “Oh, no, this is really sad.”
(Using her most empathetic voice possible), “You look really frustrated. I allow children to play in blocks who wait their turn and play safely with their friends.”
(Using this enforceable statement in a calm but firm voice while physically assisting the child out of the center), “Now that you have lost the privilege to play in blocks for today, your choices are art or sand play.”
(The caregiver/teacher deliberately gives only two choices where there are openings. It is even better if they might help the child to calm down and self-regulate.)

Child: “But I want to play in blocks. I hate art! I want blocks!”
(Caregiver/teacher knows this is just part of the power struggle the child is trying to engage her in so she does not enter into it.)

Caregiver/Teacher: “I know, and that is not a choice right now. Do you want to play in art or sand tray?”
(Said with calm, gentle and firm persuasion so the consequence does the teaching.)

Child: “When can I play in blocks?”

Caregiver/Teacher: “When I don’t have to worry about you throwing blocks or destroying other children’s creations. Maybe tomorrow, if I feel that everyone will be safe.”

Child: “I won’t do it, I promise.”

Caregiver/Teacher: “Good, will it be art or sand tray for now?”

Child: “Sand tray. I like to feel the cold sand run through my fingers.”

In this scenario, the caregiver/teacher used empathy and persistent persuasion by giving two acceptable choices, using enforceable statements, and letting the consequence do the teaching while holding the child accountable for his behavior without shaming or isolating him. She shared the control by giving him limited choices and allowing him to express himself in ways that did not disrespect others. If a child injures someone, then caregivers/teachers could involve him/her in coming to the aid of the other child. Caregivers/teachers may want to avoid simply having an angry child apologize because, if she/he does not mean it, she/he is just learning to lie and does not develop a sense of remorse.

Develop a Positive Perspective

Usually there is a natural affinity between the caregiver/teacher and children which allows a warm relationship to grow steadily over time. Sometimes, however, a child's temperament or behavior can elicit negative reactions, making it difficult to form a relationship, or the

caregiver/teacher reacts negatively to a family or blames a family for difficulties their child experiences. In such situations, caregivers/teachers need to work harder to develop a positive relationship with the child and family. The caregiver/teacher may be able to pick one characteristic that he/she can view positively to focus on.

The caregiver/teacher should make an effort to observe the child's entire range of behaviors. It is important to "catch the child being good" or note what is happening when the child is doing well in addition to what is happening when there are problems. These are the positive behaviors, activities, and relationships that should be encouraged to support the child's success. Every challenging behavior or temperament style can be viewed from a negative or positive perspective. Caregivers/teachers should make the effort to maintain a positive perspective on the children in their care. For example:

- A child who "hits a room like a hurricane" and "bounces off the walls" can also be viewed as "enthusiastic, spunky, spirited, active, daring, and athletic".
- A child who is "loud and bossy" can also be viewed as "assertive and a leader".
- A child who is "shy, withdrawn, and fearful" can also be viewed as "sensitive, introspective, and cautious".

The following tips may help caregivers/teachers respond more positively to children who are evoking a negative feeling:

- Examine their own feelings and understand why they may react negatively to a child or family
- Readjust their perspectives to see the child's and family's strengths
- See the child as capable of developing emotionally and socially
- See themselves as capable of developing a relationship with the child and family and helping to meet the child's needs

If a caregiver/teacher is unable to do this, it is extremely important for him/her to identify another caregiver/teacher who can develop a positive relationship with the child and family.

Adapt the Child Care Environment

Caregiver/teachers must aim to adapt their child care programs (e.g., their interactions with the child, the physical environment, and the activities) to meet the child's needs. The caregiver/teacher achieves a good fit with the child when she adapts her expectations to the child's abilities and helps to guide the child's behavior within appropriate bounds. When the fit between the child care program and the child is right, the child can experience success in his relationships and activities, building his mental health.

For example, a preschooler who fidgets, interrupts, and pokes other children during 20-minute circle time may be showing signs of an active temperament. Talking with the parent/guardian about the child's activity level as an infant and toddler might help confirm this explanation for the child's behavior. Forcing the child to sit still won't change her temperament and may make the child feel unhappy and frustrated. A better response, based on an understanding of the child's behavior and temperament, would be to provide her options for other acceptable activities at circle time. For example, the caregiver/teacher might say, "You have so much energy! I know it's hard for you to sit still during circle time. If you get restless you can squish and pound this modeling clay." The caregiver/teacher could also include more movement-based activities or schedule a shorter circle time. By modifying the child care activities and interactions with the child to meet his/her developmental and temperamental needs, the caregiver/teacher promotes the child's daily sense of success. See the tips on page 12 for more ideas about how to adapt the environment.

Action Items for the CCHC

The CCHC should:

- Work with the child caregivers/teachers to develop a consistent method for observing and documenting information about social and emotional behavioral concerns and difficulties and for sharing this information with parents/guardians.
- Assist the child caregivers/teachers to develop policies about when and how to seek professional early childhood mental health consultation and how to implement it.
- Ensure that the child caregivers/teachers are aware of important environmental and physiological risk factors and behavioral indicators for social and emotional difficulties.
- Assist the child caregivers/teachers in learning how to interpret problem behavior and in developing strategies for responding to it.

WHAT THE CCHC SHOULD KNOW: PREVALENCE AND PREVENTION OF CHILD CARE EXPULSION

Prevalence of Child Care Expulsion

Little national data have been collected on the expulsion rates of children below six years of age from child care facilities, but evidence suggests that the rates are high. In one national pre-kindergarten study, in all but three states (Kentucky, South Carolina, and Louisiana), child care expulsion rates exceeded the K-12 expulsion rates (Gilliam, 2005). According to Walter Gilliam and Golan Shahar (2006 p. 228), “the preschool expulsion rate in Massachusetts for the 2001 school year was 27.42 per 1000 enrollees which is more than 34 times the Massachusetts K-12 rate and more than 13 times the national K-12 rate....” They found that K-12 programs were quick to suspend while preschool programs moved quickly into permanent removal of the behaviorally challenged child (p. 240). Expulsion of children from child care is an issue for which child care staff and families nationwide need support and solutions. Once a child is expelled, it can be difficult to find another placement for him/her if the new placement is told that he/she was asked to leave another facility. The child’s self-concept can be damaged by the message that he/she is a failure and his/her school readiness compromised by the discontinuation of child care. Additionally, behaviors that lead to expulsion are often predictive of problems into kindergarten and beyond. Parents/guardians of these children experience stress at the workplace and some lose work as a result of the loss of child care.

The strongest predictors of expulsion for children in child care include:

- Low caregiver/teacher-child ratios (more children per caregiver/teacher)
- Job stress in caregivers/teachers
- Larger classes
- Liability issues related to aggression in young children
- Maternal mental health issues
- Mental health issues in caregivers/teachers
- Long hours of out-of-home care for very young children
- Inappropriate expectations of children (i.e., expecting children of different ages to respond the same to directives, impulse control, self-regulation etc.)
- Limited access to mental health consultation for caregivers/teachers

Prevention of Child Care Expulsion

Gilliam and Shahar (2006) found that the expulsion rates of children in child care related directly to the access caregivers/teachers had to classroom-based mental health consultation. The incidence of expelling a child is reduced with increased access to mental health professionals on site. The lowest rates of expulsion occur when the mental health professional either has an office on site or makes scheduled visits to the classroom. The sooner intervention occurs the fewer expulsions and the better the outcome for children and families.

Child care programs should have a comprehensive discipline policy that includes an explicit description of alternatives to expulsion for children exhibiting extreme levels of challenging behaviors, and should include the program’s protocol for preventing challenging behaviors. Programs should attempt to obtain access to behavioral or mental health consultation to help

establish and maintain environments that will support children's mental well-being and social-emotional health, and have access to such a consultant when more targeted child-specific interventions are needed. [2.2.0.8](#) Interventions could take place at all levels, including the child care facility, the child's home, and with the child directly. If the child cannot be managed in the regular classroom, a referral for psychological and/or sensory integration evaluations should be made. The facility's formalized system [of developmental screening] should include a process for determining when a health or developmental screening or evaluation for a child is necessary. This process should include parental/guardian consent and participation. [2.1.1.4](#)

Most of the time a mental health professional can work with the child, child care setting, and family to make needed changes in the environment to maintain the child's placement if the staff will follow the recommendations. Gilliam and Shahar's study also suggests that better screening and intervention for mental health issues in child care are needed. All of these areas should be addressed by the CCHC in assisting staff to maintain enrollment of children. By following these guidelines children are more likely to meet the important emotional development milestones of the preschool years.

In addition to the important step of seeking the help of trained mental health consultants, the CCHC can assist caregivers/teachers with the following tasks when a child's behavior becomes unmanageable:

- Document the behavior in great detail: determine the precursors, time of day and pertinent information to see what sets the child off
- Place these children near staff at all times for a quick response and to prevent escalation of behaviors.
- Provide a safe place for the child to have tantrum and remove other children from the area where a child is being aggressive
- Extra staff may be needed if funding allows.
- If a child must be removed from a facility, seek specialized therapeutic settings with lower staff: child ratios and trained staff to handle children with challenging behaviors.

Action Items for the CCHC

The CCHC should:

- Connect the staff with local resources to support mental health.
- Educate the child care staff about ways to reduce their own stress. (See the NTI Training Module, *Promoting the Health and Safety of Child Care Staff* for more information.)
- Assist the caregiver/teacher with creating policies that outline responses to challenging behaviors.

WHAT THE CCHC SHOULD KNOW: CHILDREN'S MENTAL HEALTH SERVICES

The CCHC should be able to perform or arrange for a range of activities such as providing community resources and referral for health, mental health and social needs. 1.6.0.1. Several states now have mental health consultants specifically serving the child care community. To find such specialists, contact the Department of Pediatrics at academic centers or the State Department of Mental Health. [10.3.4.3](#)

How Early Childhood Mental Health Professionals Can Benefit Child Care Programs

Child care programs can work with early childhood mental health professionals in a variety of ways depending on the program's mental health needs (i.e., those of the children, families, and caregivers/teachers), the program's priorities, and its available resources. Early childhood mental health professionals have training and experience in both mental health and child development. They may come from a variety of professional backgrounds including licensed Clinical Social Worker; Marriage, Family, and Child Counselor; Clinical Psychologist; Psychiatrist; or Developmental Pediatrician. Early childhood mental health professionals may work in an office-based setting and/or on-site at early childhood programs. They may have different approaches to working with children based on their professional background and their assessment of the needs of the situation.

Most child care programs make limited use of mental health services, calling for mental health consultation only when severe crises occur. Others consult mental health professionals by telephone or refer children and families to their primary care provider and outside mental health services for assessments and therapy.

Some child care programs, however, establish and maintain a relationship with a mental health consultant to work with the entire program, including the children, their families, and child care staff, to promote mental health as well as to respond to difficulties. By working on-site, mental health consultants can help child care staff create and maintain an environment that supports healthy social and emotional development for all children, families, and caregivers/teachers, not just those identified as having problems.

On-site mental health consultants provide a broad range of preventive and therapeutic services. They work with children, families, and caregivers/teachers as individuals (i.e., an individual child, a parent/guardian, or a caregiver/teacher) and/or in groups (i.e., groups of children, parents/guardians, or caregivers/teachers). Examples of child care mental health services include:

- Observations of a child in the classroom
- Assessments of a single child
- Individual therapy with a child
- Therapy with parents/guardians/families
- Therapeutic play groups for children
- Education and support groups for parents/guardians
- Consultation, education, and support for caregivers/teachers
- Consultation for directors
- Referral of children and families to outside services
- Mental health support for staff

Through regular visits to the child care program, the on-site mental health consultant gets to know caregivers/teachers, families, and children and becomes familiar with the child care program (e.g., its philosophy, management, environment, and curriculum). Over time, the mental health consultant can build a level of trust with the director, caregivers/teachers, families, and children that facilitates honest and effective communication about mental health needs. Having ongoing mental health services available for all children and families normalizes mental health, thus increasing the family's acceptance of services.

On-site mental health consultation also helps promote early identification and intervention for social and emotional difficulties, thereby reducing mental health problems. In addition, the on-site consultant has the opportunity to observe, assess, and provide therapeutic interventions for children within their daily child care environment, in the context of their daily activities, and through their relationships with their caregivers/teachers, family members, and other children. This helps insure that the mental health services apply directly to the child's daily life.

Funding for Mental Health Services

The majority of mental health services are available to children, families, and child care programs on a fee-for-service basis. Some families may have mental health services covered under their health insurance plan when referred by their primary care provider. Most child care professionals bemoan the limited availability of free or low-cost child mental health services for low-income families.

Some children may be eligible for services under the federal Individual with Disabilities Education Act (IDEA). Services for infant and toddlers (up until the third birthday) are provided under Part C of the IDEA. These services sometimes called Early Intervention. The agency responsible and the eligibility criteria for early intervention services vary from state to state. A list of state contacts can be found at <http://nectac.org/contact/ptccoord.asp>. Dunst, Trivett, and Hill (2007) have published *A Universal Checklist for Identifying Infants and Toddlers Eligible for Early Intervention*, which provides general guidance for referring children for early intervention services. Once a child is found to be eligible, a team develops an Individual Family Service Plan (IFSP) which describes the outcomes and services.

For children between three and five, mental health services may be available through their local school system. To determine if a child is eligible for these services, the child must have a diagnosed disability and, as a result, need specially designed instruction (special education services) and/or related services in order to participate in age-appropriate activities. To determine if the child is eligible for these services, the child should be referred to the school system, with a request for a special education evaluation. If the school determines the child is eligible, a team, which includes school personnel, the child's parents/guardians, and others will develop an Individual Education Program (IEP) that outline the desired outcomes, the services the school system will provide to achieve those outcomes, and where those services will be provided and by whom. Those services may be provided at the school, at the early childhood program in which the child participates, or at the child's home. To find out more about preschool special education services under IDEA, contact the local school system or the state Department of Education.

The state Parent Training and Information Center in each state will also have information about services under IDEA. A list of centers can be found at <http://www.taalliance.org/ptidirectory/index.asp>

Children who are in Head Start also may access mental health services available through Head Start Health or Disabilities Services. Publicly-funded mental health services may be available through Community Mental Health Services at the local Department of Health and at community clinics. In most communities, however, these services focus on treating individuals with psychiatric diagnoses and have limited services available for children with emotional and behavioral difficulties. Child care programs can also collaborate with local early childhood mental health services to obtain grants to fund child care mental health services.

Action Items for the CCHC

The CCHC should:

- Assist the child care staff in researching local mental health services and developing a mental health resource file.
- The file should include information regarding eligibility criteria, hours of operation, types of services available (e.g., on-site and/or office-based), fees, and insurance coverage. All services should be contacted once a year to update information.
-
- Seek alternatives if their local area does not have mental health consultants working in child care settings. For example, find out if state-level consultants are available.
- Encourage and assist the child care director in developing mental health policies and procedures appropriate for his/her staff and children.
- The cost of contracting and implementing mental health services is an important consideration in formulating policy. For example, contracting with a mental health consultant to provide regular on-site services to the child care caregiver/teacher may be more costly than consultation only during crises. However, the additional benefits may far outweigh the higher cost. The CCHC can assist the child care caregiver/teacher by researching the funding resources (e.g., Community Mental Health Services, Civitans, Junior League, child advocacy groups) and granting agencies (e. g., United Way) available in the community that might help with financing assessment and treatment for children's emotional and behavioral difficulties.

WHERE TO FIND MORE INFORMATION

Characteristics of Mental Health in Children

American Academy of Pediatrics
www.aap.org/mentalhealth

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Maternal & Child Health Library
Knowledge Path: Healthy Social and Emotional Development in Children and Adolescents
http://www.mchlibrary.info/KnowledgePaths/kp_Mental_Healthy.html#General

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Jewish Family and Children's Services of San Francisco, the Peninsula, Marin and Sonoma Counties
Early Childhood Mental Health Project
<http://www.jfcs.org>

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How Child Care Programs Can Support Children with Social and Emotional Difficulties

Bright Futures

What to Expect and When to Seek Help

<http://www.brightfutures.org/tools/index.html>

Center for Evidence-Based Practices

<http://www.challengingbehavior.org/>

ChildTrauma Academy

<http://www.childtrauma.org>

Child Care Information Exchange

Out of the Box Training Kit: Time Out: How it is Abused.

This training kit is available for \$25.00 from

http://secure.ccie.com/catalog/product_info.php?products_id=4400903

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Eyes on Bullying

<http://www.eyesonbullying.org/>

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Maternal & Child Health Library

Knowledge Path: Children and Adolescents with Emotional, Behavioral, and Mental Health Challenges

http://www.mchlibrary.info/KnowledgePaths/kp_Mental_Conditions.html

SAMHSA: Early Childhood Mental Health Consultation

<http://store.samhsa.gov/shin/content//SVP05-0151/SVP05-0151.pdf>

Zero to Three

Prevention of Child Abuse and Neglect: Parent-Provider Partnerships in Child Care Curriculum for Child Care Providers

http://www.zerotothree.org/site/PageServer?pagename=ter_pcan_curriculum

Prevalence and Prevention of Child Care Expulsion

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<http://www.fcd-us.org/resources/implementing-policies-reduce-likelihood-preschool-expulsion>

Children's Mental Health Services

American Orthopsychiatric Association

<http://www.aoatoday.com/>

Council for Exceptional Children

Division for Early Childhood

<http://www.dec-sped.org>

Federation of Families for Children's Mental Health

<http://www.ffcmh.org>

Maternal & Child Health Library

Knowledge Path: Community Services Locator: Locating Community-Based Services to Support Children and Families

http://www.mchlibrary.info/KnowledgePaths/kp_community.html

National Mental Health Association

<http://www.nmha.org>

Research and Training Center on Family Support and Children's Mental Health

<http://www.rtc.pdx.edu/>

SAMHSA: Mental Health Services Locator

<http://store.samhsa.gov/mhlocator>

U.S. Department of Health and Human Services

Substance Abuse and Mental Health Services Administration National Information Center.

<http://www.samhsa.gov/prevention/>

Zero to Three

<http://www.zerotothree.org>

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APPENDIX A: EARLY BRAIN DEVELOPMENT

**Early Brain Development:
Implications for Early Childhood Programs**

**by Betty Rintoul, Ph.D
Encouraging Connections™
March 13, 2005**

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Early Brain Development: Implications for Early Childhood Programs

Introduction

In July 1990, the first President Bush proclaimed the years from 1990 to 2000 to be the “Decade of the Brain.” During that time period, the National Institute of Mental Health of the National Institutes of Health sponsored a unique interagency initiative to enhance public awareness of the benefits to be derived from brain research. Earlier findings from the field of neuroscience were integrated with and applied to other disciplines, including child development, psychology, and education. The resulting synergy produced tantalizing research and speculation about the possible ways nature and nurture stimulate and regulate one another. In addition, new brain imaging techniques produced visual images that intrigued and attracted the attention of many, including the media.

The development of the brain is a complicated matter. Some neuroscientists have called this organ the most complex structure in the universe. So it is not surprising that the spotlight of excited public attention has sometimes led to oversimplification and misunderstanding, as well as faulty generalizations and applications. The purpose of this paper is to help child care health consultants sort through the science and the hype with the goal of discovering how the emerging field of developmental neurobiology may inform us in our efforts to provide the best to the children in our care.

In this paper we will:

- Provide a basic overview of how the brain develops from conception to school age, including the basic principles of brain development.
- Explore a variety of factors that may affect the development of the brain, for better and for worse.
- Suggest some practical implications of this knowledge for early childhood programs.

As we proceed through the paper, we will refer to specific research and findings. This will help the reader understand the source of the recommendations for practice. It is important to bear in mind that scientific study is a process rather than a product. This is a rich, active, and expanding field of study and, as such, our understanding is continually evolving. Some believe that neuroscience findings must be narrowly interpreted to protect us from overestimating what we really know (Bruer, 1999).

Although we must always be cautious in our conclusions and open to new information, for the purposes of this document we will examine the subject from a broad interdisciplinary viewpoint. When we discuss brain development, we mean both the growth of the physical brain as well as the elaboration of brain functioning. We will seek to integrate findings from the fields of neurology, neurochemistry, psychology, education, and child development. This interdisciplinary approach fits well with a transactional view of child development, and is increasingly represented in new graduate programs and laboratories across the country. Those programs use terms such as “affective neuroscience,” “psychophysiology” or “neurobehavioral development” to reflect the complexity of the interfaces among brain, mind, and behavior.

General Concepts

1. All behavior and learning are represented in the brain.

The brain is a natural for interdisciplinary study. This organ has sparked the interest of students of a range of fields from biology to philosophy. Although clearly a biological structure, the brain is also where all human emotion, learning, and behavior are represented. This obvious fact is often treated as a revelation. However, as one down-to-earth preschool teacher commented, “Where else would it be?”

2. Brain functioning is influenced by the interaction of genetics and experiences.

Neuroscientists are gradually discovering some of the specific ways that a person’s environment interacts with biology to produce a variety of developmental outcomes, including brain functioning. Recent research indicates that experience is needed to “turn on” selected genes, thus shaping the expression of genetic characteristics. This dance of biology and experience is an intricate, complex and continually interactive process that probably continues throughout life.

3. The brain continually grows and changes in response to experience.

Neuroscientists call this characteristic “plasticity.” It is most apparent in the early years of development, but it continues throughout life. Although many organ systems respond to environmental stimuli with structural and/or functional modifications, the brain may be the organ that is the most adaptable.

4. The human brain is “unfinished” at birth.

Many of the body’s organs are mature at birth. A healthy newborn’s heart and lungs work much like those of an adult – only smaller. The brain on the other hand completes its structural and functional development largely after birth. During the first few years of life, the brain forms many connections between brain cells, as well as developing cells that insulate and support those connections.

5. Understanding how the young brain develops and functions can help us promote optimal development.

Because experience and other environmental factors have an impact on how the brain grows and develops, knowledge of that process gives us guidance on how we can help children achieve the brains they will need for happy and successful lives.

Basic Brain Structure

We will use a simple triune model (brain stem, limbic system, and cortex) to discuss the basic structure of the brain. The brain develops from the inside out. The first and most basic structure to form is the brain stem. Sitting right at the top of the spinal column, the brain stem is responsible for managing the biological functions that keep us alive, such as respiration, heart rate, and blood pressure.

Nestled just above the brain stem is the limbic system – often referred to as “the emotional brain.” This is where the basic survival instinct appears to originate, including fear, rage, sexual urges, and the drive to associate with other human beings. The limbic system is composed of a

host of interactive structures that work together to regulate our responses to stress and threat – that “fight or flight” response we learned about in high school biology. When neuroscientists refer to the HPA system (hypothalamic-pituitary-adrenal axis), they are referring to the way the hypothalamus (in the limbic system) secretes a releasing hormone which causes the pituitary gland to release its stimulating hormone which in turn prompts the adrenal cortex to release cortisol. This system’s development appears to be influenced by the pattern of stress a child experiences in his or her first few years of life and whether it is followed by comforting from the primary parent/caregiver (Schore, 2001a: 2001b).

The last part of the brain to complete development is the cerebral cortex (also referred to as the cortical area). The cortex actually wraps around the deeper structures of the brain. Various areas of the cortex are given different names and serve different functions. The part of the cortex toward the front of the brain (behind your forehead) is called the frontal cortex. The very last part of the frontal cortex to develop is the prefrontal cortex. The cortex is sometimes called “the executive brain.” This is where many higher level functions are processed, including problem-solving, predicting consequences, inhibiting action on emotional impulses, and planning behavioral responses, and which we now know is still developing late into adolescence.

So how do these three primary areas of the brain develop? Shortly after conception, as cells begin to divide, a neural tube is formed which eventually becomes the spinal column. At one end of this, cells cluster to form the brain stem. The basic brain cells are called neurons. As neurons are produced, they begin to migrate upward and find the places where they belong in the brain. In this way, the brain grows “from the inside out.” By the time a healthy, full-term baby is born, about 100 billion neurons have formed and found their proper locations in the brain stem, limbic system, and cortex. This is essentially the same number of neurons as in the adult brain. However, the baby’s brain at birth is only 25% of the adult brain’s volume. By age five, that volume will increase to 90% its eventual adult size. The most dramatic part of this growth involves the formation of connections between neurons.

Brain Connections

Imagine that you have a city where every home has a telephone, but no one has installed the wiring between the phones. No communication can take place. However, once the phones are wired together, people can talk to one another. In fact, depending on the complexity and expanse of connections, they can have call waiting, conference calls, and other sophisticated ways to communicate. Similarly, during infancy and early childhood, the brain is busy “hooking up” all the neurons to one another in ways to facilitate the brain’s functioning.

Despite the way we talk about the “wiring” of the brain, these connections are not literally wired together. Instead, electrical impulses travel between neurons over tiny gaps called synapses. Chemicals called neurotransmitters help the impulses jump smoothly over the synapse. Each neuron has a branch that sends electrical impulses (axon) and branches that receive (called dendrites). Immature neurons have fewer synapses, or connecting pathways. Mature neurons can have thousands. In some ways, you can compare the growth of these neuronal connections to the growth of a tree. Imagine that the trunk of a young sapling is the axon, branching into a few root structures. The few branches overhead are like the dendrite spines. As the tree grows and matures, the growth continues to branch off, both overhead and at the roots. In addition,

bark grows to protect the trunk. In our analogy, this bark is similar to the insulation that surrounds the axon to insure that the electrical signals move smoothly and efficiently. This insulation is called the myelin sheath, and the process is called myelination.

Neuroscientists believe that some of these connections are “programmed.” They call these “experience-expectant” connections. Experience-expectant connections grow spontaneously at given times, ready to receive the expected experience. One example is vision. In the first months of life, the brain produces connections that expect to receive visual input. However, if that visual input is not received (for example, due to an untreated cataract that prevents light from entering the retina), the connections are reabsorbed into the cell. In the case of vision, scientists have discovered that once a sensitive period of development passes without the needed experience, the brain loses the ability to form the appropriate connections. This is the research that gave rise to concerns about “critical periods” and “windows of opportunity” for brain development. Actually, definitive evidence for clear critical periods in brain development exists only for some sensory systems, particularly vision and some auditory discrimination (Bailey, 2002).

Scientists use the term “experience-dependent” to describe the kind of connections that form and are maintained in response to experience, or environment. For example, brain scans of professional musicians show more activity (or connections) in the part of the brain reflecting the control of the fingers involved in playing their instrument, as well as in the auditory cortex (Pantev, Engelien, Candia, & Elbert, 2001). These connections did not grow “expecting” that the user would be playing a musical instrument. Rather, the long years of practice and training are thought to trigger and then solidify the related motor and auditory connections. Many of the connections in the cortical part of the brain are thought to be experience-dependent.

Another far-reaching and influential discovery about brain connections was made by a neuroscientist named Peter Huttenlocher (1995). He found that, rather than increasing in a steady upward progression of brain growth, the number of synapses actually “overgrow” during the early years of life – then the developmental process is finished by the spontaneous “pruning” of about half of those connections. Scientists estimate the following pattern of growth:

- At birth – about 50 trillion synapses
- By age 3 – about 1,000 trillion synapses
- By age 18 – about 500 trillion synapses

This dual process of proliferation and pruning is a commonly misunderstood phenomenon, with some people believing that we should try to help the child “keep” more connections. Another faulty belief is that the number of connections represents intelligence or learning capacity, and, as a result, we must actively “teach” children all we can during this fertile period of growth. Actually, selective elimination is a critical part of the maturation of the brain. There is some evidence that this pruning process is faulty in children who are affected by disorders such as fragile X syndrome (Irwin, Galvez, & Greenough, 2000). These children have been found to maintain more of these early connections into adolescence and beyond.

It appears that healthy development proceeds by pruning faulty or unused connections while the remaining connections are strengthened and streamlined. In this way, each individual can grow

the brain that is most useful for his or her particular environment. Our real challenge during this period is to create an environment that provides active use for the kinds of connections that we want children to refine and keep for the future.

Factors that Influence Brain Development and Function

Biological Environment

A healthy pregnancy provides the best environment while neurons are forming and migrating to their appointed locations. Depending on when the developing fetus is exposed, numerous factors can adversely affect the process. Those factors include malnutrition, drugs (both legal and illegal), environmental trauma, toxins, and infections.

Environmental air quality is an important issue for all of us, but in pregnant women, the quality of the air they breathe has a direct influence on fetal development. Research has linked maternal smoking to attention deficit hyperactivity disorder (ADHD) in children (Sadowksi & Parish, 2005).

Maternal stress is another aspect of pregnancy that is known to influence fetal development. There is evidence that maternal exposure to extreme or chronic stress causes high levels of a stress hormone called cortisol which increases risk for prematurity and low birth weight, as well as affecting the developing nervous system (Sandman, et al., 1999).

After a baby is born, many of the same factors continue to be important. In addition to good nutrition, the love and support of a caring adult and protection from adverse substances, the child's optimal brain functioning depends on adequate oxygen, hydration, and blood flow. Other biological risks that affect significant numbers of children include:

- Lack of adequate sleep. Many young children are operating on a sleep deficit, and research indicates that sleep adequacy and quality are strongly related to neurological functioning and behavior regulation (Sadeh, Gruber, & Raviv, 2002). Recent research also suggests that certain sleep cycles are critical to the brain's ability to consolidate experiences into learning and memory, although there is disagreement about these conclusions.
- Second-hand smoke. About 40% of US children are exposed to someone smoking in their home. School-aged children exposed to even low levels of smoke have lower scores on measures of reading, math, and reasoning skills (Yolton, et al., 2005).
- Lead exposure. As the research data collect, we are increasingly aware that exposure to even very small amounts of lead affects brain function and development (Canfield, et al., 2003). Exposure to lead can result in a variety of effects including impairment in general intellectual functioning, attention deficits, speech and language disorders, problems with learning and memory, high activity level, reduced problem solving, and poor behavioral self-regulation.
- Head injury. Shaking a baby can cause a particularly dangerous brain injury and result in death or permanent disability (Karandikar et al., 2004). The brain is actually bruised by bouncing back and forth against the skull, causing global injury. In addition, other kinds of head injury can cause damage to the brain. Some research indicates that even minor blows to the head can cause subtle kinds of brain injury resulting in attention, emotional, or learning problems.

Sensory Environment

Just as Piaget noted by observing infant behavior many years ago, neuroscientists tell us that a child's sensorimotor areas are the first parts of the brain to be developed. These areas complete the process of myelination by around age five – one measure of development and maturation. For this reason, it is important that opportunities for motor and sensory experiences be available to the young child. Equipment such as walkers, wind-up swings, and baby carriers all limit the child's ability to actively seek kinesthetic and proprioceptive input.

One often-cited animal study (Greenough, 1987) found that rats that were raised in cages with a variety of toys, wheels, mazes, and other kinds of "enrichment" had more cortical density than their peers who were confined to the typical lab cage. Although rats of all ages benefited, the scientists saw the strongest effect in young rats.

Just as it is important to make sure infants and young children have access to interesting things to see, hear, touch, smell, and otherwise explore, it is also important to protect the developing brain from chronic overstimulation. Being exposed to continuous excessive, distressing, or confusing stimulation can inhibit a child's ability to develop auditory discrimination of sounds, as well as creating general stress, irritability or withdrawal. Under such conditions the nervous system is designed to protect itself by protesting (through irritability or fussiness) or by shutting down ("zoning out"). Nothing can tell you the "right" level of stimulation for any given child except that child's responses.

Early Relationships

The most important prerequisite of a baby's survival is his or her connection with an adult caretaker (ex. parent/guardian or caregiver/teacher). This process of developing a special, trusting relationship is called attachment. That relationship serves many functions, but there is increasing evidence that the qualities of such early relationships influences the way a child's brain develops, particularly the part of the brain that involves physiological, emotional and behavioral self-regulation. Developmental, psychological, and neurological research evidence all converge on the importance of sensitive, responsive, and emotionally positive interactions in a child's development.

One collaboration of neuroscientists, physicians, and social scientists has released a report, *Hardwired to Connect* (2003), suggesting that a recent upsurge in mental health problems in children may be traced to the lack of opportunity to form the kind of interpersonal connections that are needed for optimal development. The National Scientific Council on the Developing Child has released a recent series of working papers that highlight the importance of relationships and emotion to early brain development (2004).

Since early relationships are so important, anything that interferes with a parent's/guardian's or caregiver's/teacher's ability to respond to a child in a loving, positive, sensitive ways is a risk to that child's development. Very young children tend to "mirror" the emotional cues of the adults they depend on. Mothers who are depressed tend to be less emotionally available to their children. There is some evidence that this influences the way the child's brain processes emotions, resulting in more "withdrawal" activity and less "approach" activity. This pattern of

brain activity reverses when the mother's depression lifts and she is more engaged with the child (Dawson, 1992; 1994)

Another significant risk factor within early relationships is the presence of child maltreatment, domestic violence, parental/guardian substance abuse, or other frightening interpersonal experiences. Repeated activation of the developing child's stress response system appears to sensitize the system to stress. As a result, the part of the brain that responds to threat becomes very reactive. In some cases, this can produce lasting changes such as a high level of emotional reactivity or a tendency to "disconnect" from interaction.

Much of the research regarding the importance of interaction is focused on parent/guardian-child relationships. However, many children spend much of their early lives with substitute caretakers – caregivers/teachers, babysitters, or relatives. Those relationships also influence development. In fact, the quality of a child's relationship with a caregiver/teacher may be the single most important factor for overall quality of care. One researcher, Carolee Howes, has studied the impact of children's attachments to their child care caregivers/teachers and summarized ten years of longitudinal findings in her book, *A Matter of Trust* (2002).

We know that secure and responsive mother-child interactions are important to a child's ability to explore and learn. Howes (2002) found that children form similar attachments to their child care caregivers/teachers, and those relationships influence behavior and development. Toddlers and preschoolers who had warm, secure attachments to their parents/guardians engaged in more competent exploration and cognitive activity in child care. They also had fewer behavior problems and got along better with peers. Even more striking, early caregiver/teacher-child relationships seem to give the young child a kind of model for relating to subsequent caregivers/teachers. Secure attachment to the *first* caregiver/teacher are associated with a trusting relationship with the same child's elementary school teacher at age nine!

Practical Implications for Child Care

1. Health standards (such as those outlined in *Caring for Our Children*, 2002) regarding safety, nutrition, adequate sleep, and opportunities for active play support brain development as well as general child health.

Because the brain is a biological organ, it needs the same ingredients for growth and protection that the rest of the body needs. The sensory systems such as vision and hearing are particularly important during the early months and years of life, as those connections are formed in the brain. Early identification and treatment of health, vision, and hearing problems are critical.

2. Young children need to be free to pursue a variety of sensory and motor experiences in the context of a safe, encouraging environment.

No extraordinary materials are necessary to provide an environment that nourishes the brain. In fact, the active-learning, whole child approach that was advocated by early preschool and kindergarten theorists years ago is exactly the kind of environment that promotes early sensorimotor connections in the brain. Healthy children have an inborn drive to experiment and learn in their environment. Our job is to keep that environment safe and share the joy of moving, exploring, and learning within each child's individual style.

3. Fostering individual, stable, warm, and supportive relationships between children and caregivers/teachers should be a top priority within child care settings.

There is far more neurodevelopmental research supporting the importance of early relationships and emotion than there is supporting an emphasis on early cognitive functioning. Just as the limbic system (remember, the “emotional brain”) is a more basic and primitive structure than the cortex, a child’s emotional well-being is a more basic and fundamental need. Optimal cognitive exploration and learning depend upon the quality of secure, early relationships. Given the importance of continuing secure relationships, child care policies and procedures that encourage continuity of care, small group size, and small child to caregiver/teacher ratios should be strongly encouraged.

4. The “curriculum” of the child care setting should include social emotional development as an integrated core component.

Although the “new brain research” has been co-opted by marketers to promote all sorts of gadgets for “stimulating” cognitive development, the actual body of research provides far more support for the importance of social emotional growth during the infant, toddler, and preschool years. In fact, our knowledge of brain development suggests that experiences that integrate positive emotions, relationships, sensory inputs, and cognition are the ones that will be most likely to create enduring and meaningful learning within the brain. Interestingly, that is exactly what developmental research has told us for many years!

5. The child care setting can be a point of support for families in understanding and meeting their child’s need for positive emotion and loving interaction.

Like the child’s health care provider, the child care caregiver/teacher is the only person outside the immediate family who provides parents/guardians with information, support, or understanding about their relationships with their children. A strong collaborative relationship with each parent/guardian can help children feel secure, as well as promoting the family’s well-being. Child care staff can help parents/guardians reframe their children’s negative behaviors into opportunities for modeling and encouraging the coping skills that begin to develop in the frontal cortex during these years.

6. Child care staff have tremendous power in influencing a child’s development, but not all children need the same things.

Because of the continuous interplay between the child’s biological and genetic makeup and his or her environment, the experiences provided within the child care setting can have a significant impact on the way nature unfolds within a given child’s brain. Child care caregivers/teachers are responsible for structuring the experiences of children while the initial framework of the brain is being built. The possibilities for influence are likely to be relatively more powerful during this period. Our challenge is to provide the kind of environment where a child practices the emotions, behaviors, and interactions that we want to strengthen and sustain.

Each child brings a unique combination of temperament, experiences, biology, and other factors that causes him or her to respond to the child care environment differently. That is why individual relationships are so critical. A caregiver/teacher must really know and care about a child to be able to respond to that child in individual ways.

Resources for Further Exploration

Additional Reading

Science, Policy, and the Young Developing Child: Closing the Gap Between What We Know and What We Do (2004).

Jack Shonkoff, MD, outlines the policy implications of what we know about the developing child.

<http://www.ounceofprevention.org/news/pdfs/Shonkoff.pdf>

Young Children Develop in an Environment of Relationships (2004).

National Scientific Council on the Developing Child. Concludes that “relationships are the ‘active ingredient’ of the environment’s influence on healthy human development. Includes extensive research references.

http://developingchild.harvard.edu/index.php/resources/reports_and_working_papers/working_papers/wp1/

Children’s Emotional Development is Built into the Architecture of Their Brains (2004).

National Scientific Council on the Developing Child. Concludes that “it is essential young children’s feelings get the same level of attention as their thinking.” Includes extensive research references.

<http://developingchild.harvard.edu/index.php?CID=152>

Nature, Nurture and Early Brain Development (2001).

University of Missouri-Columbia Extension Service. An easy-to-read discussion of early brain development and child care. Includes illustrations of immature and mature neurons.

<http://muextension.missouri.edu/explorepdf/hesguide/humanrel/GH6115.pdf>

Understanding the Effects of Maltreatment on Early Brain Development (2001). National Clearinghouse on Child Abuse and Neglect, HHS. Provides an excellent overview of how and why early stress, abuse, or trauma can have lasting impact on the developing brain.

http://www.childwelfare.gov/pubs/issue_briefs/brain_development/brain_development.pdf

Low Priced Videos for Consultation and Training

Ten Things Every Child Needs

Available for order online. (Type the title information into a search engine for the best price.)

I Am Your Child video series

\$30.00 for set of seven DVDs , \$60 for set of 14 DVDs; also available in Spanish

<http://www.parentsaction.org/>

Websites with Helpful Resources

Brain Connection

<http://brainconnection.positscience.com/>

Center for Early Education and Development
<http://education.umn.edu/ceed/aboutceed/default.html>

Center on the Social and Emotional Foundations for Early Learning
<http://www.vanderbilt.edu/csefel/>

Parents Action for Children
<http://www.parentsaction.org>

School Readiness Indicators Initiative
<http://www.gettingready.org>

Talaris Research Institute
<http://www.talaris.org>

Zero to Three
<http://www.zerotothree.org>

Recommended Books on Neuroscience and Related Child Development

- Barnet, A.B. & Barnet, R.J. (1998). *The Youngest Minds: Parenting and Genes in the Development of Intellect and Emotion*. Simon & Schuster.
- Bowman, B.T., Donovan, M.S., & Burns, M.S (2001). *Eager to Learn: Educating Our Preschoolers*. National Academies Press.
- Butterfield, P., Martin, C., & Prairee, A. (2004). *Emotional Connections: How Relationships Guide Early Learning*. Zero to Three Press.
- Eliot, L. (2000). *What's Going on in There? How the Brain and Mind Develop in the First Five Years of Life*. Bantam.
- Gerhardt, S. (2004). *Why Love Matters: How Affection Shapes a Baby's Brain*. Brunner-Routledge.
- Gopnick, A., Meltzoff, A.N., & Kuhl, P.K. (1999). *The Scientist in the Crib: Minds, Brains, and How Children Learn*. William Morrow & Co.
- Hirsh-Pasek, K. & Golinkoff, R.M. (2003). *Einstein Never Used Flash Cards: How Our Children Really Learn – and Why They Need to Play More and Memorize Less*. Rodale.
- Howes, C. & Ritchie, S. (2002). *A Matter of Trust: Connecting Teachers and Learners in the Early Childhood Classroom*. Teachers College Press.
- Shonkoff, J. & Phillips, D. (2000). *From Neurons to Neighborhoods: The Science of Early Childhood Development*. National Academies Press.
- Siegel, D. J. (1999). *The Developing Mind: Toward a Neurobiology of Interpersonal Experience*. Guilford Press.
- Siegel, D. J. & Hartzell, M. (2004). *Parenting from the Inside Out*. Tarcher.

Brain Development Glossary*

Amygdala: This part of the brain is involved in our emotions, emotional learning, and memory. Each hemisphere contains its amygdala, shaped like an almond and located deep in the brain, near the inner surface of each temporal lobe.

Axon: The part of the neuron that transmits messages to other neurons, muscles, or glands of the body.

Brain: An oblong organ with folds, furrows, and a fissure or groove down the center. This groove separates the brain into two hemispheres. A baby's brain triples its weight in the first few years of life and quadruples in size by the time a child becomes an adult. This gain is not due to addition of new brain cells (most of which form before birth), but rather, to the massive growth, branching, and increased connections among individual brain cells.

Brainstem: The lower part of the brain that includes the medulla, pons, midbrain, and cranial nerves. It directs our reflexes, vital signs, and automatic control of the eye, face, and head. It also helps us interpret basic sensations involving taste, hearing, vision, and balance.

Brain Imaging: This process involves taking pictures of the brain. The most recent technologies can take images of areas that are especially active while the brain is processing specific types of information, for example, sound or visual input. Three examples of the technology used in imaging are called Positron Emission Tomography (PET), functional Magnetic Resonance Imaging (fMRI), and computerized tomography (CAT scans). Analysis of the electroencephalogram (EEG) is another way to study brain activity.

Central Nervous System (CNS): Term used to refer to the brain and spinal cord together.

Cerebral Cortex: The cortex is the "highest" region of the brain, both in location and function, that is, it controls the lower, older, more automatic parts of the nervous system. The prefrontal cortex, located behind the forehead, is linked with making decisions and judgments, as well as modulating emotional tone.

Cortisol: Cortisol is a hormone secreted by the adrenal gland, which increases during times of perceived stress. Like many hormones, it circulates through the bloodstream to the brain, and so can regulate the activity of brain areas that respond to stress.

Critical Period: A developmental phase in which the brain requires certain environmental input or it will not develop normally. Scientists have documented critical periods for the presence of certain nutrients (e.g., folic acid, iron, protein and calories) and for certain types of sensory stimuli (such as vision and speech sounds). However, there are many mental skills, such as reading, vocabulary, and the ability to see color, which do not appear to pass through tight critical periods in their development.

* Adapted from ZERO TO THREE's Brain Map, adapted from the BrainWonders collaborative project (http://www.zerotothree.org/site/PageServer?pagename=ter_util_babybrainflash)

Dendrites: These neuron branches are the major receptive surface of the neuron, receiving and

Glial Cells: The word "glial" comes from a Greek word meaning "glue." These supporting cells form a protective coating and nourishment for neurons. They are also essential in providing structural support ("scaffolding") for growing and developing neurons. Glial cells multiply throughout the human lifespan.

Limbic System: This network of interconnected structures is located deep within the brain, just above the brain stem. It plays an important role in human emotion, learning and memory.

Lobes: The four areas of the brain that are demarcated by major fissures (grooves in the surface of the brain). The occipital lobes, located in the back of the brain, are primarily responsible for vision. The frontal lobes are involved in movement, complex judgment, emotional regulation, problem solving, decisions, planning, and creativity. The parietal lobes, in the upper left and right sides of the brain, are involved in higher sensory-motor coordination and language functions. Temporal lobes located above and behind the ears on the left and right sides of the brain are involved in memory, hearing, language, and emotion.

Myelin: A butter-like insulation [greasy coating] around the nerves [axons]. Myelin enables nerves to quickly conduct electrical impulses from one brain area to another. Without myelin, the nerves work sluggishly and inefficiently.

Myelination: The process by which myelin is laid down on the nerves of the brain. At birth, most of the brain lacks myelin, which is an important reason why newborns are so comparatively helpless. As different parts of the brain myelinate, the function of that particular area (e.g., vision, movement, language) makes sharp gains.

Neural Tube: Origin of a baby's entire brain and spinal cord, which forms during the fourth week after conception. First, the neural plate elongates into a *neural groove*. Then the groove zippers shut in two directions, beginning in the middle of the embryo and progressing both towards the head and towards the "tail" end of the embryo.

Neurons: Brain cells that store and send information. There are about 25 types of neurons in a human brain, but they all consist of a *cell body* (which produces energy and makes chemicals to sustain the neuron); *dendrites* (tree-like branches that receive signals from other neurons); and an *axon* (a very long, branching cable that communicates signals to other neurons).

Neurotransmitter: A chemical that carries signals between brain cells. Neurotransmitters are released from packets located at the end of one neuron (the *presynaptic* cell). They then diffuse across the synapse, where they bind to special molecules called *receptors*, located on the outer surface of the next neuron in the chain (the *postsynaptic* cell). This binding stimulates electrical activity in the postsynaptic cell, which in turn releases neurotransmitters from its synaptic terminals. This chain of electrical-chemical activity carries signals from one brain area to another, such as from sensory areas (eyes, ears, skin, etc.) to the brain, and from the brain to the muscles. Some familiar neurotransmitters are acetylcholine, serotonin, dopamine, and glutamate.

Plasticity: The brain's ability to change as a result of experience or injury. The term derives from the original meaning of "plastic" as "a moldable or pliable material." The human brain remains plastic throughout life (which is how we are able to learn new facts or skills at any age), but it is massively more so in early life. Scientists believe that harmful behaviors or neglect in early life can affect the brain, leading to lifelong problems. A healthy and caring environment, however, can create opportunities for the child to develop to his or her full potential.

Proliferation: The phase in which a child's number of synapses exceeds the number present in adulthood. Although babies are born with relatively few synapses in the cerebral cortex, the number surpasses adult levels in just the first year of life, remains elevated throughout most of childhood, and finally declines to adult levels by the onset of puberty. This decline is a result of *synaptic pruning*.

Proprioceptive: Refers to the sensory receptors, found chiefly in muscles, tendons, joints, and the inner ear, that detect the motion or position of the body or a limb by responding to stimuli arising within the organism. Your sense of proprioception tells you how your body is moving in space, even when your eyes are closed.

Pruning: A process in brain development whereby unused synapses (connections among brain cells) are shed. Between about 2 and 10 years of age, a child's brain has about twice as many connections as an adult's brain. During the pruning phase, a child's experience and environment decide which synapses will be shed and which will be preserved.

Synapses: These are tiny spaces, or connections, between neurons through which nerve impulses travel. In the womb and during the first years of life, many more synapses form than a baby will use as an adolescent and adult. In time, unused synapses wither and die off. Those that survive grow stronger from being stimulated. The largest number of synapses is present between about one and ten years of age. In later life, the rate of production of new synapses seems to be about equal to the rate at which synapses are pruned, or perhaps slightly slower (so that there is a net loss of synapses as we age). Those that remain presumably process information more efficiently.

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