# Music Together® Supports Early Brain Development

*Music Together uniquely and comprehensively supports programs focused on nurturing early brain development and can serve as an integral tool in achieving desired outcomes, while providing families and service providers with engaging and enjoyable activities.*

Ongoing research continues to underscore the profound impact of 'nurture' on a child's brain development during their first three years. Early experiences and social interactions play an integral role in shaping physical brain architecture, gene expression, biological processes and, therefore, a child's social, emotional, physical, and cognitive development[i]. Encompassing the early childhood years, the developmentally appropriate and research-based Music Together program not only supports music learning and development but also can help to promote overall healthy brain development in infants and young children, benefitting the child in multiple developmental domains.

## Music Together provides opportunities for stimulation of important neural networks and areas of the brain.

- ***During early childhood, the brain is extremely "plastic," meaning it is more malleable, sensitive, and adaptable to its environment.*** *At birth, there is an overproduction of neurons and synapses; those that are used most are strengthened, while those that are not exercised are weakened or eventually lost, referred to as "pruning." Infant brain structure and neural connections are therefore shaped, either positively or negatively, by early experiences[ii].*

  The Music Together program is designed to begin in infancy so that children are exposed to the great positive benefits of developmentally appropriate, parent-child music experiences during this heightened stage of brain development, and so that those neural networks essential to music development and development in other domains are used and strengthened.

- ***Infant neurological development is stimulated through 'purposeful touch' and is optimally effective when accompanied by face-to-face, responsive interactions.*** *For an infant, tactile and kinesthetic stimulation of their millions of sensory cells can help to release important chemicals in the brain and decrease heart rate, blood pressure, and the stress hormone cortisol, which can be particularly damaging in infancy. Appropriately stimulating touch can also enhance muscular coordination and tone; promote regulation of the digestive, respiratory, and circulatory systems; and strengthen the bond between a caregiver and infant. On a practical level, this touch stimulation can calm an infant and help him sleep better[iii].*

  The adult-infant interactions in a Music Together class are grounded in the understanding of the developmental benefits of 'purposeful touch' for the infant. Parents and caregivers can learn about the positive benefits of tactile and kinesthetic stimulation in early infancy through musically and rhythmically engaging interactions, where purposeful touch helps to stimulate their infant's neurological development.

- ***Visual and auditory input also stimulates an infant's neural connections.*** *Sensory input taken in through the eyes and ears feeds into the brain through the thalamus, which then routes this information to the visual and auditory cortex where the information is processed*[iv].

  In a Music Together class, when a caregiver and an infant engage in dyadic music-making, the infant receives both auditory and visual stimulation (the caregiver's singing combined with movement of the mouth), strengthening the important thalamus-to-cortex connection that processes information.

- ***When singing, two areas in the brain essential to language ability are engaged: Broca's area (associated with the production and output of speech) and Wernicke's area (associated with the processing and input of speech).*** *Some brain imaging has also shown increased activity in Broca's area when processing rhythm and melody, and when playing an instrument.*[v]

  Music Together songs include melody and rhythm in songs both with and without words. Therefore, children of all ages are exposed to the elements of song that activate those regions of the brain integral to both music learning and language learning. Furthermore, by exposing infants to music that is rich and varied in tonality and meter during their first year of life when it is vital to hear, process, and decode the sounds of any language, Music Together classes help young children learn to "speak the language" of music.

## Music Together activities foster the positive parenting and caregiver-child interactions that support healthy brain development.

- ***The parent[1]-infant attachment relationship has been connected to gene expression and even to the physical development of an infant's right brain, which regulates stress, emotion, and ability to self-regulate***[vi]. *In addition, high levels of the stress hormone cortisol have been found to harm both cells and connections in an infant's brain during this early period of development, which can lead to aggressive behavior and difficulty coping with stress, both as a child ages and into adulthood*[vii].

  Music Together understands that the involvement of important adults in a child's life is fundamental during the period of Primary Music Development. For this reason, the program provides parents and caregivers with a supportive environment and the at-home tools to engage in parent-child activities that are appropriately stimulating. This promotes the positive, sensitive, responsive, and loving interactions that lead to healthy attachment relationships. Music Together classes can also help parents and caregivers learn how to effectively and empathetically listen for and attend to their infant's needs and distress signals. This can help their child to develop emotion-regulation and navigate stress.

[1] The term "parent" is inclusive of a child's primary caregiver or important adult in his/her life who has taken on a significant share of parenting duties.

- ***Sensitive and responsive caregiving during the first year of life also helps to build the foundation for essential cognitive skills called executive functions*** *(e.g., working memory, cognitive flexibility, and inhibitory control). All children have the potential to develop these skills, but it is the early experiences, environments, and relationships in infancy that activate the neural networks underlying executive function abilities*[viii].

  Music Together activities naturally help to support the development of executive functions, particularly during the preschool years but even during the first year of life. The integration of parent education moments with in-class music-making helps parents understand how and why music and movement activities can support the earliest stages of their child's executive function development.

- ***Early communication between an infant and a mother/caregiver (often referred to as "motherese" or infant-directed speech) has been labeled as having a musicality, suggesting that the infant brain may be predisposed to certain universal melodic and rhythmic elements of communication***[ix].

  The dyadic music-making experience in Music Together class is therefore a natural extension of this communication for both infants and caregivers. Helping parents attune to, and appropriately respond to, their child's earliest musical expression and behavior supports and enhances the child's music learning and development, while also supporting the positive communication and essential bonding that contributes to healthy brain development.

## Music Together provides opportunities for active learning.

- ***Brain research has emphasized that it is an infant's active engagement with his surroundings that influences brain development***[x]***.***

  The design of the Music Together learning environment is based on the understanding that children learn through play. Classes involve active modeling and participation by the grownups (teacher and caregivers), inviting but never pressuring children to join in the music play and exploration. This relaxed, playful, and musically rich environment creates ample opportunities for infants, toddlers, and preschoolers to observe, explore, engage, and process in their own ways, leading to active and joyful learning experiences. Because learning cannot truly succeed with only once-a-week opportunities, parents are supported and encouraged to continue this stimulating and playful active music-making with their child outside of class.

[i] For reviews see, Fox, S. E., Levitt, P. & Nelson, C. A. (2010). How the timing and quality of early experiences influence the development of brain architecture. *Child Development, 81*(1), 28-40; National Scientific Council on the Developing Child (2010). *Early Experiences Can Alter Gene Expression and Affect Long-term Development: Working Paper No. 10*. Retrieved from www.developingchild.harvard.edu.

[ii] ibid; Flohr, J. W. & Persellin, D. C. (2011). Applying brain research to children's musical experiences. In, S. L. Burton & C. C. Taggart (Eds.), *Learning from Young Children: Research in Early Childhood Music*. MD: Lanham; Tierney, A.L. & Nelson, C. A. (2009). Brain development and the role of experience in the early years. *Zero to Three, 30*(2), 9-13.

[iii] Field, T. (2010). Touch for socioemotional and physical well-being: A review. *Developmental Review, 30*, 367-383; Hernandez-Reif, M., Diego, M. & Field, T. (2007). Preterm infants show reduced stress behaviors and activity after 5 days of massage therapy. *Infant Behavior & Development, 30*, 557-561; Pelaez-Nogueras, M., Gewirtz, J.L., Field, T., Cigales, M., Malphurs, J., Clasky, S. & Sanchez, A. (1996). Infant preference for touch stimulation in face-to-face interactions. *Journal of Applied Developmental Psychology, 17*, 199-213.

[iv] Herschkowitz, N. & Herschkowitz, E. (2004). *A Good Start in Life: Understanding Your Child's Brain and Behavior*. New York: Dana Press; MacDonald, A. (2006). Brain development in childhood. In F. E. Bloom, M. F. Beal, and D.J. Kupfer (Eds.) *The Dana Guide to Brain Health: A Practical Family Reference from Medical Experts.* New York: Dana Press.

[v] ibid; Trollinger, V. L. 2010. The brain in singing and language. *General Music Today, 23*(2), 20-23.

[vi] e.g. Meaney, M. J. (2001). Maternal care, gene expression, and the transmission of individual differences in stress reactivity across generations. *Annual Review of Neuroscience, 24*(1), 1161-1192; Schore, J. R. & Schore A. N. (2008). Modern attachment theory: The central role of affect regulation in development and treatment. *Clinical Social Work Journal, 36*(1), 9-20; National Scientific Council on the Developing Child. (2004). *Children's emotional development is built into the architecture of their brains: Working Paper No. 2.* Retrieved from www.developingchild.harvard.edu.

[vii] For review, see Gerhardt, S. (2006). Why love matters: How affection shapes a baby's brain. *Infant Observation, 9*(3), 305-309.

[viii] Center on the Developing Child at Harvard University (2011). *Building the brain's "air traffic control" system: How early experiences shape the development of executive function: Working Paper No. 11.* Retrieved from http://www.developingchild.harvard.edu;

[ix] For reviews see, Custodero, L. A., Britto, P. R., & Brooks-Gunn, J. (2003). Musical lives: A collective portrait of American parents and their young children. *Applied Developmental Psychology, 24*, 553-572; Flohr, J. W. & Persellin, D. C. (2011). Applying brain research to children's musical experiences. In, S. L. Burton & C. C. Taggart (Eds.), *Learning from Young Children: Research in Early Childhood Music*. MD: Lanham; Trevarthen, C. & Aitken, K. J. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *Journal of Child Psychology and Psychiatry, 42*(1), 3-48.

[x] For review see Tierney, A.L. & Nelson, C. A. (2009). Brain development and the role of experience in the early years. *Zero to Three, 30*(2), 9-13; Thompson, R. A. (2001). Development in the first years of life. *The Future of Children, 11*(1), 21-33.