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The Importance of Music in Early Childhood: Perspectives from Research and Practice

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Music seems to elicit strong reactions from infants. Those who spend some time with infants and small children have probably noticed that music attracts their attention very easily - whether it is through recordings, musical toys, live instruments, human singing or other forms. Music often induces physical reactions such as rhythmic movements followed by positive emotional behaviour that looks very much like dancing and musical enjoyment in older children and adults. Parents and caretakers are often amazed at these responses in very young infants because such responses give an impression of a sophisticated perception and behaviour not necessarily associated with early infancy. But how much is known about the musical abilities of infants and toddlers? And what can this information tell us about the role of music in the life of infants and toddlers?

As a music educator and a mother of three, I have long been fascinated with the power of music and musical communication with children from birth onward. Even before birth, mothers notice how music seems to have a calming or arousing effect on the unborn child. My first encounter with formal music education and young children was during my graduate studies in Canada. I taught 4- and 5-year-olds in a preparatory music program at a conservatory music school. The children in the class spoke different languages, but I soon discovered that everyone could be reached through the music. And we didn't need the words to make the music happen and enjoy it together. Later, I enrolled in a music class for infants and parents with my 8-month-old daughter and discovered that exactly the same thing occurred. The infants in the class were not able to walk or talk, but enjoyed the musical rituals and the musical community. The infants could transmit their own enthusiasm and preferences to other participants through smiling, body language, and positive vocalisations. I discovered that the infants were just as active participants as their parents, and in many cases, exceeding their parents in positive music-related social behaviour. Later, I developed a method for parent-infant music courses in Iceland; my program has been taught now for over a decade (Gudmundsdottir & Gudmundsdottir, 2010). Eventually, I turned toward research on music in early childhood in order to better understand what young infants are cognitively capable of in terms of their music-perceptual abilities and, furthermore, their communicative and participatory musical abilities (Gudmundsdottir, 2011).

In this paper, I review the literature on music in early infancy and toddlerhood. More is known about music perception in the first year than about music production abilities; however, by learning about infants' abilities early in life, we may be better equipped to understand ways to foster and nourish musical abilities. First, I review research on the musicality of the infant and the idea of the innateness of music in the human being. Then, the importance of sound at the very beginning of life is discussed, with references to research on the perception abilities of the newborn. This is followed by a summary of studies on music perception and musical enculturation early in life, leading into a section about what is known about music production abilities early in life such as singing and moving to rhythm. For the purpose of outlining the value of musical activities with infants and toddlers, a section follows on existing research on the effects of musical activities with infants and toddlers, including some of my own observations and findings from my own practice. Finally, I offer some implications for educators of young children.

Musical infants

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There seems to be a consensus in the modern music psychology literature that the human is born musical (Malloch & Trevarthen, 2009; Trehub, 2003). That is, a typically-developing human is born with the capacity to hear, understand, and learn music. Furthermore, music seems to be a powerful medium for conveying basic human emotions and can consequently affect the emotional states of individuals. This means that infants learn early on to hear and expect certain patterns inherent in the music of their own culture. They also are capable of displaying various physical and emotional responses to different types of music. The infant is not merely a passive listener. As Canadian psychologist Sandra Trehub expressed, the infant is in fact a “musical connoisseur,” who can discriminate melodic contour, tonality, dissonance and metric structures in music (Trehub, 2006a). The infant is an active participant in the surrounding musical environment, who is seen communicating actively with the caretaker very soon after birth. Such communication is viewed by some researchers as inherently musical in nature (Trevarthen, 2009). The interactive play of turn taking, mirroring and imitation through facial expressions, gestures and vocalisations between mothers and infants have been interpreted as a possible origin of musicality in the human being (Dissanayake, 2009).

Music and sound at birth

The newborn infant may not seem to encompass the ability of complex cognitive processes; however, careful study of newborns has demonstrated that infants are capable of more than what was possible to know before inventive experimental methods could be applied with them. Newborns recognise their mothers voice from other female voices (DeCasper & Fifer, 1980), and can tell their mother tongue from other languages (Moon, Cooper, & Fifer, 1993). Newborns have also been shown to recognise music that they were exposed to prenatally (Hepper, 1991; Wilkin & Cowan, 1996), and a story read to them repeatedly before birth (DeCasper & Spence, 1986).

These amazing cognitive abilities apparent early in life demonstrate that an infant is capable of more complex processing of their sound environment than previously thought. It is clear that some learning can take place before birth in terms of processing auditory stimuli. The unborn fetus is capable of hearing, processing and remembering musical patterns heard during the third trimester of pregnancy, with sound being the most complex stimulus available prenatally (Parncutt, 2006). It is therefore worth considering the role of music and the auditory environment as a relatively stable feature in the transition from the fetal stage into postnatal life. The infant’s hearing and auditory processing is more advanced at birth than for example the visual system and visual processing (Wilcox, 1999), which can be explained by the wealth of experience a normal newborn has had with sound prior to birth. In fact, a newborn has little experience with looking at objects, shapes and colors before birth. Soon after birth, the newborn discovers other senses for the first time such as new tastes and smells, the feeling of heat or cold, and the touch of different surfaces against her/his skin. The sound environment, on the other hand, is familiar and can therefore be a source of comfort in the postnatal life. Recognising the mother’s voice and other sound sources in the environment after birth is an important feature in the coping and bonding mechanisms taking place in the life of the newborn.

There are many anecdotal accounts of newborn infants being calmed down by a familiar voice or music she/he had been exposed to before birth. It seems clear from empirical evidence that infants have a memory of sounds they heard before birth (Hepper, 1996). Regardless of the possible emotional and behavioural effects on the newborn of hearing voices or music familiar from before birth, it is safe to state that a normally-hearing newborn is capable of recognizing voices and music heard during the last trimester of pregnancy immediately after birth, and possibly longer; however, knowing that the newborn has the ability to discriminate and process complex sounds does not provide much information about his/her responses to music, nor whether he/she can in fact enjoy listening to music.

After only a few months of experience outside the womb, infants do prefer to listen to infant-directed speech over adult-directed speech. They also prefer infant-directed singing over adult-directed singing, and over infant-directed speech. Infants seem to prefer consonant intervals over dissonant intervals, but it is not clear whether they prefer consonance over dissonance in a musical context (Adachi & Trehub, 2012). Although infants’ preferences have been established on several types of auditory stimuli, infants’ emotional responses to music have not been investigated to a great extent. For example, infants do not associate happy and sad faces to happy and sad music in the same way that children and adults do (Nawrot, 2003); however, physiological responses to music provide some indications of emotional

responses to music. Measuring respiration, heart rate and blood pressure when listening to music has been used in studies on affect and music with adults (see, for example, Gomez & Danuser, 2007). One researcher measured physiological responses in premature infants in an intensive care unit during two conditions with and without music. It was found that during the music condition, in which a recording of sung lullabies was played, physiological measures improved compared to the non-music condition. That is, during music listening the infants' heart rate and respiratory rate became more regular than when no music was played. Furthermore, oxygen saturation was greater, and outbursts of inconsolable crying were fewer and shorter in duration in the presence of music (Keith, Russell, & Weaver, 2009). Results like this provide an important indication that music can be used to modulate physical and emotional states not only in older infants but already with newborns.

Music perception in infancy

> It is clear that infants do not begin life with a blank musical slate. Instead, they are predisposed to attend to the melodic contour and rhythmic patterning of sound sequences, whether music or speech. They are tuned to consonant patterns, melodic as well as harmonic, and to metric rhythms. (Trehub, 2006b, p. 11).

Although newborns do, indeed, prefer listening to their mothers' voice over other voices, they do prefer a recording of their mothers' voice manipulated to sound as "in utero" over a recording of the maternal voice "out of the utero" (Fifer & Moon, 1988). These preferences indicate that some habituation does occur prior to birth; however, previous exposure to the maternal voice does not seem to be necessary for creating preferences after birth. Infants of deaf mothers showed a preference for infant-directed singing over adult-directed singing only 2 days after birth, presumably without having any prenatal exposure to maternal singing and a lack of exposure to maternal speech (Masataka, 1999).

Later in infancy (when babies are around 6-9 months), there are clear signs of musical memory as infants can learn to recognise simple folk tunes (Trainor et al., 2004) or more complex symphonic music by Mozart and Ravel, keeping this music in long term memory for a couple of weeks (Ilari & Polka, 2006; Saffran et al., 2000). Infants perceive melodies in a similar way as adults and are sensitive to the musical systems of their environment, both in terms of tonal systems and rhythmic regulation (Trehub, 2006b). Furthermore, infants outperform adults and older children when it comes to the perception of musical systems from cultures other than their own (Hannon & Trehub, 2005).

So, not only are humans more sensitive to perceiving linguistic sounds when they are younger, infants are also more attuned to attributes of music from other cultures than adults. Thus, we can conclude that infants and very young children are capable of acquiring sensitivity to and knowledge of more diverse music than they are usually exposed to in a typical home or preschool environment. For concerned parents and music educators, this provides an excellent example of the importance of an enriched musical environment. Infants absorb information in the surrounding sound environment, be it linguistic or musical. For certain key elements to be acquired, an appropriate exposure is necessary.

Music production in infancy

Having established that infants' music perception skills are far more advanced than many people would expect, it is perhaps surprising that infants and young children seem to develop their music production skills at a much slower rate (Davidson, McKernon, & Gardner, 1981; McKernon, 1979; Welch, 1998). Even the common act of singing a simple song takes most typically-developing individuals years to master in such a manner as to render an accurate replicated version of an existing song. This is even more perplexing in light of evidence showing that infants enjoy and attend more to singing than to other modes of communication such as speech. Infant-directed singing is believed to be a universal practice in all cultures. Infants seem to practice their own singing through vocalising using what is called speech babble and song babble, which starts to occur between 4 and 7 months after birth. Song babble is believed to eventually develop into song fragments and phrases "borrowed" from the repertoire of songs found in the environment (Björkvold, 1990; Moog, 1976; Sundin, 1998; Young, 2002; Whiteman, 2001). These song fragments often become the material for improvisational play in which young children are observed repeating and experimenting with their own vocal sounds and some of the musical material found in their surrounding culture. This type of behaviour is often called "spontaneous singing" and is seen by some researchers almost as a genre of music in itself, as it resembles creative adult musical

genres such as improvisational jazz music, whereby the performer plays with musical forms in a relatively free structure; however, the adult observer can only speculate about the musical intentions of the spontaneously singing child. According to observations, the preschool child seems to sing with a purpose related to whatever activity she/he is involved in at a given moment, with the singing act appearing to be secondary or a mere accompaniment to a particular act (Björkvold, 1990). Björkvold identified three main types of spontaneous singing ranging from fluid singing and formula singing to the singing of *preset* songs; however, it seems that development of singing does vary among individuals even within the same cultural environment. As an example, in a study of the spontaneous singing produced by six children from a same preschool over a period of 3 years, considerable individual differences were found in the spontaneous songs produced (Whiteman, 2001).

The mastering of singing songs “in tune” also seems to develop differently in individuals and it is not clear how much of it is due to individual aptitude and how much can be attributed to the environment. Anecdotal accounts indicate that some infants are capable of singing whole songs in tune by their second birthday, while other accounts indicate that a 2-year-old is only just beginning to form fractions of melodies at that age (deVries, 2005). Some have suggested that children only master in tune singing by the age of 5 years or later (Flowers & Dunne-Sousa, 1990; Welch, Rush, & Howard, 1991). In another account of song acquisition, some children seemed to focus on singing lyrics correctly, paying little attention to melodic accuracy while in other children the reverse pattern was found (Kelley & Sutton-Smith, 1987). According to studies on singing accuracy conducted in Western cultures, many individuals do not sing “in tune” when they start school, at least not according to measures from singing tests. A summary of such studies indicates that approximately 35% of 7-year-olds sing out of tune and that this number is reduced to only 7% out of tune singers among 11-year-olds (Welch, 2006). No studies to date have established with sufficient evidence how much musical practice and exposure to musical content affects children’s acquisition of singing ability, although many scholars have expressed their beliefs that a musically rich environment is important for individual development (Gordon, 2003; Kelley & Sutton-Smith, 1987; Stadler-Elmer, 2012). Reports from non-Western cultures with strong singing traditions suggest that out of tune singing is rare after age 5 (see, e.g. Kreutzer, 2001). Although more evidence is needed from cross cultural studies, such accounts of earlier singing accuracy indicate that a culture with a rich singing environment may foster earlier singing development than can be observed in cultures where individuals get less singing practice in their everyday lives. Just as it has been shown that singing instruction in groups at school age does improve performance on singing tests (e.g., Welch, 2012), it is reasonable to assume that the amount of singing experiences in early childhood wherein the child gets an opportunity to exercise their own singing voice will affect how early “in-tune” singing will be acquired. In fact, 3-year-olds have been shown to respond to age-appropriate singing exercises, improving their singing ability following a few weeks of training (Jersild & Bienstock, 1931), and younger children have also improved their singing through one-on-one interactions with an adult (DeVries, 2005).

Rhythm at the beginning of life

Infants and toddlers perceive rhythm and beat in music. Amazingly, newborns demonstrate sensitivity to the downbeat in metrically regular music. This has been measured through observations of brain activity in newborns as they listen to regular rhythmic cycles. The newborn’s brain shows a response indicating an expectation of a beat even when a beat is skipped (Winkler et. al, 2008). Another interesting finding is that 6-month-old infants habituate to a triple meter if they are bounced to every third beat of a metronome, and to a double meter if bounced to every second beat (Phillips-Silver & Trainor, 2005). Infants are also good learners of more complex irregular rhythmic patterns. Between 3 and 6 months, infants can learn to discriminate irregular patterns common in foreign music like Bulgarian folk music, which North-American adults and children older than one year could not discriminate (Hannon & Trehub, 2005).

Most of the music perception abilities of infants have been discovered in laboratories and are not obvious during everyday interactions with infants, because the latter may not be very good at showing how much they know and understand. Or perhaps adults are not very good at noticing infants’ abilities during everyday life. Nevertheless, infants show an unmistakable affinity to music through their everyday behaviors. To most adults, it is obvious that infants can be aroused and calmed by music. Although they are not able to tap to a beat with measurable accuracy, infants and toddlers between 5 and 24 months of age attempt to follow

the musical beat that they hear as they move faster to a fast beat than to a slower beat (Zentner & Eerola, 2010). It is therefore reasonable to conclude that infants are excellent at perceiving the beat in music, but their slower pace of motor skill development inhibits them in applying what they can perceive. In fact, 7-month-old infants can perceive the difference when a hammer moves in and out of synchrony (Pickens & Bahrick, 1995) long before they can accurately match their own movements to a steady beat.

In a natural environment, parents and caretakers notice the apparent inborn disposition of infants and toddlers towards rhythm; They are attracted to all rhythmic sounds in the environment including non-musical ones. Infants show early on that they like music with a strong beat by moving their hands up and down, or by kicking their feet in response to musical beat. Soon after an infant can sit upright securely, a bouncing movement is commonly observed in relation to music wherein the upper body moves or bounces towards the lower body. This behaviour is sometimes accompanied by a repeated head nod. The standing infant soon discovers that a bouncing movement can be achieved through bending the knees. This knee-bending type of dance can even occur before the infant is able to walk. When noticed, this type of movement elicits much delight in the surrounding adults. Hence, the ABBA lyrics: “Mother says I was a dancer before I could walk[1].” In fact, this type of dance behavior is often the first independent musical behavior noticed in infants by adults, and one that can spark curiosity and speculations about the infant’s musical inclinations and talent for music.

Research on infants’ rhythmic abilities does not only involve the perception of rhythm in music in the strictest sense. Some researchers see the ability to communicate nonverbally with another human being as an act that requires some rhythmic sensibility and even use the term *communicative musicality* in this context (Cross & Morley, 2008; Malloch, 2000; Malloch & Trevarthen, 2009). This type of communication is what we can see in the earliest form of face-to-face interactions between an adult and a newborn infant. As early as the second month after birth an infant can engage in a “conversation” by cooing back at the caring adult in a sequence that sounds like a conversation where both partners take turns. Although both the intentions of infants in a non-verbal communication with an adult and its implications for understanding the origin of music are debatable (Trehub, 2010), it is important to pay attention to infants’ communicative inclinations in the context of music. Music is a medium of communication: It mediates emotions and facilitates social bonding in all age groups. From observing infants in musical contexts, whether in a daily singing routine during diaper change or in a structured musical context such as a parent-infant music class, it is obvious that infants are active participants who enjoy contributing to musical rituals to the best of their abilities.

Before infants can use words to communicate they can express themselves with sounds and gestures. This type of communication tends to be musical in nature; however, the caring adults in a young infants’ life need to be attuned to this type of communication in order for it to be successful. Before adults can communicate verbally with an infant, they can use this musical medium of sounds and gestures to help the infant make sense of different situations and routines. Adults are known to intuitively use a modified version of normal speech when talking to infants, called infant-directed speech or *motherese*. This type of speech is higher in pitch and more exaggerated in contour than in normal, adult-directed speech (Trehub, 2006). There is ample evidence suggesting that infants prefer and are more attentive to this type of speech than to the less nuanced adult-directed speech. The musicality found in infant-directed speech helps to sustain infants’ attention and attunement with their adult caregiver. Making good use of infants’ sensitivity to exaggerated tone production can be helpful when communicating with an infant who does not yet understand spoken language.

Musical activities with infants and toddlers

Infants seem to be naturally attracted to music; they are attuned to the musical structures of their own culture and form preferences for the different types of music that they hear. Infants encounter music in their home and everyday environments. Parents of young children everywhere seem to sing and play musical games, although there may be some cultural variations in these traditions (Adachi & Trehub, 2012). In the daycare environment, music is often used as background sound and there are also short sessions of musical activities, particularly group singing through musical games, including songs with movements that infants and toddlers seem to adore. In many affluent societies, music lessons for infants and parents have gained increasing popularity (Gudmundsdottir, 2010). The activities found in these classes differ widely as do the underlying theories and aims that sustain them

(Gudmundsdottir, 2011). Some programs aim at enhancing children's musical abilities and preparing them for a life of formal music study. Other programs have as goals the infants' general intellectual development or social and emotional development in terms of secure bonding with their caregivers. Whatever the approach, it is clear that the level of infant participation is crucial for the effectiveness of any program.

A recent study on 6- to 12-month-olds compared parent-infant music courses who differed in terms of professional instruction and the level of infant participation. The researchers concluded that participation in professional music courses that actively engaged the infants in musical games provided several benefits over a more passive type of music exposure (e.g., listening to a commercial audio material marketed for infants), including superior development of pre-linguistic communicative gestures and social behavior compared to infants assigned to the passive musical experience (Gerry, Unrau, & Trainor, 2012). Another study conducted with older toddlers found that musical activities in small groups promoted more prosocial behavior in 4-year-olds than other social activities without music (Kirschner & Tomasello, 2010). Both studies suggested that music activities in a group provide positive social benefits beyond what can be expected through other types of group activities without music, and that these musical benefits can be found both in infancy and in later toddlerhood.

In my own practice with parent-infant music courses, I have learned that in music class magical things happen because of the music that is shared. Parents discover a "new" side of themselves as they interact musically with other parents and infants in the group, and they also get to discover their infant as a social being in a new context outside of their "normal" surroundings. Parents in these classes range from professional musicians to adults with a very low self-confidence in terms of musical abilities, but all seem to experience a great joy when taking part in musical activities with their infants. Even those who are used to doing a lot of musical activities at home testify that experiencing music in a group is far more fulfilling than they had imagined. The role of the group in parent-infant music courses seems to be highly important, with group dynamics being driven and facilitated by the music. These group dynamics in parent-infant music courses need further investigation. From studying video recordings of 14 classes (45 minutes each) with parents and their 8- to 9-month-olds, it became obvious that infants at that age react very strongly both to the music and to their associated social activities. Although infants at this age are not speaking or walking, they already display a varied repertoire of movement responses to music. They can wave hands, kick feet, nod heads and twist their torsos in response to music. They enjoy shaking instruments and shakers and banging drums with their hands or mallets. They also like being "taken for a ride" in various musical games in the arms of their parents. Sometimes their responses are physically expressive, and other times the infants respond with a passive-alert attention to the musical activities that they like. For example, in a simple dance to Baroque music, the infants enjoy being held by their parents who are standing in two rows facing each other, each row taking turns in taking forwards steps in unison and making a bow to the row that is standing still. This activity can, without exception, calm all infants within a few seconds, no matter how restless they were before the activity started. Infants who know the activity well do not even need the dance to calm down. In an experiment with two groups of 8-to 9-month-olds, who knew the Baroque dance from previous sessions, parents were asked to stand still without making any dancing movements as the music played. Before the music started, the infants were extremely restless and agitated in both groups as this was towards the end of the 45-minute long class. As soon as the music started, all 23 infants in both groups became calm, stopped moving, and looked attentive. This attentive state lasted for the entire duration of the familiar Baroque music piece, which lasted for 75 seconds. Not only was it interesting to observe how powerful the music was in regulating the infants' group behavior but it came as a surprise that most of the infants showed very little movement during the entire episode of attentive state (Gudmundsdottir, 2012). This discovery was a reminder that not all musical responses of young infants are necessarily associated with increased movement. In fact, a heightened attention to music can just as well cause the infant to stop moving; however, if an adult is only looking for movement responses to music in an infant, there is a chance that more calm attentive responses to music may be missed or overlooked.

An anecdotal example of how powerful music is when it is associated with a positive group experience also comes from my practice with parent-infant courses. Numerous parents reported that nothing seemed to calm their infant/toddler during car trips as much as a particular CD associated with the parent-infant music courses attended previously, even long after the courses had ended. This effect was not attributed to the content of the CD as such,

but more to the power of a combined effect of a positive memorable experience during the courses that could be relived as the child listened to the recording. The conclusion is that creating positive musical group experiences even with very young children offers opportunities for revisiting the same sentiment later in a different context. The powerful musical experiences attained in group-settings can be relived in order to cope with challenging situations outside the group through the use of the familiar musical material either through live singing or using recordings of that music.

Implications for educators

From systematic experiments and observations of infants we learn that we should not underestimate their musical and cognitive abilities. Because infants develop music production abilities much later than their music perception abilities, there is a tendency to dismiss and overlook what infants are capable of understanding in terms of music. There is very strong evidence supporting the idea that infants are born musical or at least with a predisposition for becoming musical beings; however, caretakers of infants and small children should be aware that individuals may follow different paths in their musical development and these differences need to be respected rather than used to label some infants musical, but not others.

In respect to fostering musicality it is important that parents and music educators search for a balance in how to approach young children's music education. A balance between the child's free musical exploration and a stimulating educational environment is probably the best strategy for encouraging musical growth. Too much emphasis on formal education in early childhood may limit the child's potential in musical development. On the other hand, some opportunities may be missed if children are not exposed to a rich musical environment in the early years. This is true both in terms of exposure through casual music listening and also through stimulating musical communication with adults and older children.

Unfortunately, there is no magic formula to achieve such balance. The proportion between free exploration and a more structured educational environment must vary according to individual needs. We must acknowledge that every individual is different and be aware that different cultural contexts affect all musical relationships.

Nevertheless, if guidelines were constructed from research findings these would suggest that infants should be provided with a rich musical environment, which supports their natural predispositions towards acquiring musical elements in the culture and perhaps even beyond it. This might include adding a varied repertoire of tonalities and rhythm from foreign cultures to organized musical experiences. Caregivers should also systematically attend to the ability of infants to be aroused and calmed down by music both as passive listening and as a participatory activity. The power of musical material to affect and regulate mood in young infants and toddlers can be further enhanced through skillful use of material previously associated with positive musical experiences with others. Finally, it's suggested that parents and caregivers make good use of infants' innate need for communicating musically through musical acts in social situations and be aware of the great potential for social bonding through common musical experiences.

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each other with questions that may arise, as well as keep current with issues in the music world today.