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Mothers as Singing Mentors for Infants

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Abstract and Keywords

Mothers sing expressively while caring for infants. Initially, such singing is for emotion regulation: for promoting tranquility, sleep, playful engagement, or stress reduction, depending on the context. Infants' responsiveness to such singing encourages further maternal singing. Mothers act as singing mentors even though their mentoring is initially intuitive versus deliberate, emphasizing pleasure/comfort over precision. Their singing also has intuitive didactic aspects in its emphasis on pitch and temporal structure of songs. The face-to-face context provides infants with performances featuring distinctive visual/vocal gestures. As imitators, infants mimic maternal performances, prompting mothers to become deliberate mentors who coax increasingly complex contributions from infants. Initially, infants make single-syllable contributions to such duets, progressing to phrases and songs. Well before age two, many toddlers produce singing that preserves pitch contours, rhythms, and approximate range of familiar songs. Subsequent educator mentoring can build on these achievements if relationship building and maintenance have priority over skill building.

Keywords: mothers, infants, toddlers, singing, emotion regulation, mentoring

Introduction

This chapter focuses on maternal singing in the everyday lives of infants, its functions, intentional or otherwise, and its consequences for the onset and nature of early singing. Mothers in most cultures are the principal caregivers of children from birth until at least two years of age. In many cultures, fathers, siblings, and grandparents also play an important role in infant care. For our purposes, however, the mother serves as a proxy for the primary caregiver, whether she plays that role alone or in concert with others, or whether others assume the primary caregiving role.

In the first few months, mothers' efforts are aimed largely at promoting infant health and well-being by feeding, regulating arousal, and ensuring adequate rest. Once infants gain the ability to remain awake, quiet, and alert, mothers increasingly engage in interactions in which melodious talk and singing figure prominently. Such vocal behaviors are influenced by culture, infants' presumed needs, and mothers' specific caretaking goals. By singing in a way that brings comfort and joy to infants, mothers provide intuitive rather than deliberate mentoring. During the first year, their singing exerts its most noticeable effects on infant attention and affect while also enhancing mother-infant bonds. In the second year, the fruits of maternal mentoring become evident in toddlers' singing.

Framework

The perspective adopted here is that maternal singing to infants is, first and foremost, a caregiving tool aimed primarily at emotion regulation in those whose self-regulatory skills are extremely limited. Studies of informal singing in adulthood, even in childhood, tend to be concerned primarily with pitch accuracy, or singing in tune, and, at times, with timing accuracy, or singing in time (e.g. Dalla Bella et al. 2007; Pfordresher et al. 2010; Welch 1985). By contrast, studies of maternal singing focus on expressive features that convey maternal feelings or intentions (e.g. Rock et al. 1999; Trehub et al. 1997) and their consequences for infants (e.g. Masataka 1999; Trainor 1996; Trainor et al. 1997). Because maternal singing commonly occurs in face-to-face contexts, visual gestures are an integral part of the performance (Longhi 2009), even though scholars often ignore such non-vocal features. Infants not only hear maternal singing; they see and feel the multimodal performances orchestrated by their primary attachment figure. Infants' and toddlers' subsequent reproduction of maternal songs may be motivated, in large measure, by their propensity for imitation (Gergely and Csibra 2006; Over and Carpenter 2013).

Singing to infants: what, when, and how?

Mothers everywhere sing to infants in the course of caregiving, but what they sing, when they sing, and how they sing vary across cultures. Because maternal singing is a form of nurture, the nature of that nurture is influenced by cultural values and circumstances. For example, as agrarian societies in the developing world experience high levels of infant mortality and economic challenge, which in turn promote high birth rates, caregiving is geared to infant survival and almost constant physical contact between mother and infant (Hrdy 2009; LeVine 1988). Holding or carrying infants maximizes safety in sub-optimal environments while providing contact comfort. Where high contact prevails, lullabies seem to be the songs of choice, serving the important function of promoting infant tranquility and sleep (Trehub and Prince 2010; Trehub and Trainor 1998; Trehub et al. 1993). Lullaby singing in those cultures typically occurs with little or no face-to-face contact because infants are in slings, hammocks, or cradles, sometimes with their faces covered to eliminate visual stimulation

(e.g. Trehub and Prince 2010).

Freedom from the physical and economic stresses of agrarian life allows middle-class American and European mothers to focus on mental and social stimulation as well as protection for infants. They “childproof” their homes, making liberal use of secure devices (e.g. seats, swings, bouncers) that allow them to engage in vocal and visual play without physical contact (Richman et al. 1988). These mothers talk much more than they sing to infants (Eckerdal and Merker 2009). The melodious or music-like properties of their speech have been described elsewhere (e.g. Bergeson and Trehub 2007; Fernald 1991; Trehub et al. 2010). When they sing, these mothers mostly choose play songs (Trehub et al. 1997), with lullabies incorporated, at times, into pre-sleep routines.

North American surveys reveal more frequent singing by mothers with high levels of education (Custodero et al. 2003; Ilari 2005). Diaries of singing to infants reveal that mothers’ frequency of singing often exceeds their estimates, especially for mothers who initially claim to be infrequent singers (Trehub et al. 1997). According to the diary reports, singing to infants four months and older occurs primarily in the context of play and secondarily as an accompaniment to routine caregiving tasks such as diaper-changing, feeding, and bathing. Although mothers know many children’s songs, they generally sing only a few, singing those few songs repeatedly. When queried about their song choices, mothers often claim that they simply sing their infant’s favorite songs.

Acoustic analyses and independent ratings of maternal singing reveal that mothers sing more expressively, more slowly, and at a higher pitch level when they sing to their infant than when they sing informally on their own (Trainor, 1996; Trainor et al. 1997; Trehub et al. 1993). When they attempt to reproduce their manner of singing to infants in the absence of the infant, the renditions lack the expressiveness of renditions sung directly to infants (Trehub et al. 1997). Examination of the visual gestures that accompany maternal vocalizations indicates that mothers smile much more when they sing than when they talk to infants (Plantinga et al. 2011). Smiling not only adds visual interest to maternal vocalizations; it also makes those vocalizations sound happier (Tartter and Braun 1994). In effect, smiling can be heard as well as seen; for examples of maternal singing, see Video 1 <<https://vimeo.com/98542581>> and Video 2 <<https://vimeo.com/98535122>>.

Maternal songs are more like rituals than spontaneous performances in the sense that repetitions of the same song on different occasions are unusually stable, featuring nearly identical pitch level and tempo (Bergeson and Trehub 2002) and individually distinctive visual gestures (Trehub et al. 2013). There is no indication that mothers are aware of the stability of their performances, which contributes to the uniqueness and memorability of maternal songs. Mothers seem to be equally unaware that they emphasize the temporal structure of songs by marking phrase boundaries with pauses or phrase-final lengthening (Delavenne et al. 2013; Longhi 2009; Trainor et al. 1997) or that they emphasize the pitch structure of songs by singing higher pitches more loudly than lower pitches (Nakata and Trehub 2011). In essence, their singing to infants has intuitive didactic components.

Mothers are also sensitive to feedback from infants. As noted, they sing more expressively in infants’ presence than in their absence (Trainor 1996; Trehub et al. 1993, 1997). Even when infants are present, mothers sing less expressively when their view of infants is obscured.

Infants' responsiveness to singing

Maternal singing sounds pleasant to adults largely because of its positive emotional expressiveness. It is even more engaging to infants. For example, newborns and six-month-old infants listen longer when unfamiliar women sing in a maternal style rather than a non-maternal style (Trainor 1996; Masataka 1999). Evidence of such listening dispositions in hearing newborns who have deaf, signing parents (Masataka 1999) suggests an innate bias for positive vocal expressiveness. Just as infants listen preferentially to speech that is happy-sounding (Kitamura and Burnham 1998; Singh et al. 2002), their choice of listening to speech or singing by an unfamiliar person who speaks or sings in a foreign language is determined by its happy-sounding qualities rather than its musical or speech status (Corbeil et al. 2013).

To date, infants' responsiveness to singing has been examined primarily with audio recordings from unfamiliar women (Corbeil et al. 2013; Masataka 1999; Trainor 1996). One would expect familiar songs by a familiar singer (e.g. mother) to have much more dramatic effects. In fact, live maternal singing modulates infant arousal, with arousal reductions for infants with higher initial levels and modest arousal increases for those with lower initial levels (Shenfield et al. 2003). Infants are attentive to audiovisual recordings of maternal speech, but they are much more attentive to comparable recordings of maternal singing (Nakata and Trehub 2004). Undoubtedly, maternal smiling during singing (Plantinga et al. 2011) adds to its engaging qualities.

It is clear that maternal singing has salutary effects on the arousal and attention of infants who are initially content, but what about infants who are distressed? In the first year of life, when self-regulatory skills are limited, caregivers' management of infants' negative emotions is crucial (Kopp 1989). Mothers' success in regulating these negative emotions is thought to have implications for the subsequent development of self-regulation skills (Thompson 1994). Interestingly, when 10-month-old infants are acutely distressed, their arousal and distress are reduced more rapidly and more completely by multimodal maternal singing (face-to-face singing with contact) than by multimodal maternal speech (Ghazban 2013). Interestingly, playful or arousing maternal singing is more effective than soothing maternal singing (i.e. lullabies) in reducing infants' distress. Infants in those circumstances become progressively more absorbed by mothers' rhythmic singing, which seems to offer welcome distraction from their distress. In short, lively maternal singing makes happy infants happier and transforms distressed infants into happy infants.

Other indications of infants' sensitivity to music

Perhaps it is not surprising that infants are sensitive to expressive variations in singing. What is more surprising is the scope and precision of their music perception abilities. After infants hear several repetitions of a brief non-vocal melody (five to ten notes), they are able to notice a small pitch change (e.g. one semitone) in a single note of the melody, even when the altered melody is presented in a different key (Trainor and Trehub 1993; Trehub et al. 1986). For infants, the pitch contour of a melody (i.e. pattern of directional changes) seems to be its most salient feature (Trehub et al. 1985, 1987). At times, however, infants can detect interval changes when the melodic contour remains unchanged (Cohen et al. 1987; Trainor and Trehub 1993).

Infants' perception of musical rhythm and meter is equally impressive. For example, they detect changes in rhythmic grouping (Chang and Trehub 1977; Thorpe et al. 1988) even in the context of concurrent tempo changes (Trehub and Thorpe 1989). They focus on relative rather than absolute durations, as is the case for adults. Moreover, they more readily detect pitch or timing changes in melodies with "good" rhythms (as judged

by Western adults) than in those with “bad” rhythms (Trehub and Hannon 2009). It is possible, indeed likely, that these infant skills do not depend upon learning, arising instead from inherent preferences for temporal regularity. In addition, infants are more accurate at detecting timing changes to patterns with duple rather than triple meter (Bergeson and Trehub 2006). Enhanced processing of patterns with duple meter could arise from greater exposure to duple meter in maternal songs or to the greater simplicity of duple over triple meter.

In other situations, the role of exposure is clear. For example, infants’ perception of metrically ambiguous patterns is influenced by the pattern of movement that they experience while listening (Phillips-Silver and Trainor 2005). For example, infants who are bounced on every second beat subsequently respond to a duple version of the pattern as familiar, and those bounced on every third beat respond to a triple version as familiar. By six or seven months of age and thereafter, spontaneous movement to rhythmic music becomes increasingly common (Zentner and Eerola 2010). Although early movement to music is rhythmic, it is not coordinated with the musical rhythm or beat. The early swaying, kicking, and bouncing to music is a precursor to the dancing that is commonly observed in toddlers, as can be seen in Video 3 at <<https://vimeo.com/98542344>>.

Infants as super-listeners

Exposure to music, whether formal (e.g. music lessons) or informal (e.g. enculturation by incidental listening), increases listening proficiency and memory for culturally relevant musical features (Bigand and Poulin-Charronnat 2006). Such selective attention skills are advantageous when listening to music in a familiar style, but they can be disadvantageous when listening to music that is foreign or unfamiliar in style. For example, adults readily detect a small pitch change (less than a semitone) in music based on the familiar major scale, but they fail to detect a comparable change in music based on an unfamiliar scale (Trehub et al. 1999). Their implicit knowledge of major scale structure interferes with the perception of melodies with different pitch organization. By contrast, nine-month-old infants detect both types of changes because they are not yet attuned to the pitch structure of Western music. In this instance, ignorance of the conventions of Western music is advantageous.

In the rhythmic domain, Western adults detect metrical changes in the context of Balkan music with simple meter (i.e. duple or triple) but not complex (non-Western) meter, whereas six-month-olds detect changes in both metrical contexts (Hannon and Trehub 2005a). This is another favorable consequence of infants’ ignorance of Western musical structure. By the time infants are 12 months of age, they perform like Western adults, succeeding with simple meter and failing with non-Western meter (Hannon and Trehub 2005b). The preferential processing of Western metrical structure by 12-month-olds indicates that their musical enculturation is under way. Nevertheless, their implicit knowledge of Western music is fragmentary and superficial rather than deeply entrenched like that of adults. One consequence is that infants retain greater perceptual flexibility than adults, which means that they are more receptive to foreign musical materials. For example, limited exposure to music with complex metrical structure enables 12-month-olds but not adults to succeed on the complex-meter task (Hannon and Trehub 2005b). In effect, six-month-olds outperformed adults on a task involving complex meter, and 12-month-olds learned the task more readily than adults.

Children as vocal imitators

It is clear that infants are keen music listeners, especially for singing, but what assists them in the transition to song production? The ability to copy what they hear is critical, but even more critical is the motivation for

such imitation. Children's imitation of others' actions is often aimed at attaining some goal (e.g. a desired object) rather than being focused on the behavior for its own sake, as is the case with singing. At times, children only copy actions that are relevant to achieving a goal but, at other times, they reproduce irrelevant as well relevant actions (Whiten et al. 2009). Some scholars contend that the propensity for exact copying arises from an innate system for facilitating the transfer of information from one person to another (e.g. Gergely and Csibra 2006). Others emphasize the social functions of imitation, for example, the conscious or unconscious desire to be like other valued persons, to be liked by them, or to communicate affiliation or liking (Over and Carpenter 2013). The onset of singing may be triggered not only by the availability of a model and the requisite vocal skills but most especially by identification with the mother, a desire to be like her, and to join in her joyous vocal activity. The mother, for her part, provides appropriate models of singing by virtue of the limited number of songs that she sings repeatedly in a highly stereotyped manner (Bergeson and Trehub 2002).

The path to singing

Before the onset of meaningful speech and often continuing through the single-word phase, infants produce rhythmic babbling (Dolata et al. 2008), which consists initially of reduplicated syllables (e.g. *bababa*), and subsequently of varied syllables (e.g. *badagoo*). As early as eight months of age, the babbling of infants from different backgrounds differs noticeably in intonation (e.g. rising versus falling pitch), rhythm, and component vowels, reflecting differences in the ambient language (Lee et al. 2010; Levitt and Wang 1991; Rvachew et al. 2006; Whalen et al. 1991). There are claims that infants and toddlers engage in song babbling, a form of pre-singing that is distinct from speech babbling (Moog 1976), but there is little consensus about its age of onset or distinctiveness from speech babbling (Dowling 1988). Nevertheless, there is preliminary evidence that nine- to 11-month-old infants use different vocal modes in response to caregivers' speech or singing (Reigado et al. 2011).

The path from song babbling to singing is unclear. What is clear, however, is that mothers' role as singing mentor undergoes considerable change as infants' response to maternal singing changes gradually from attention capture and stillness to more active engagement that includes movement (e.g. rhythmic movement induced by excitement) and vocalization (e.g. vocalizations of approval). These infant signals prompt mothers to encourage fuller participation, first, by inviting infants to reproduce their pantomimed actions for some songs (e.g. *Itsy, Bitsy Spider*, *The Wheels on the Bus*; *If You're Happy and You Know It*) and then by inviting their participation in rudimentary vocal duets. The earliest duets take the form of the mother pausing at the end of each line of a highly familiar song so that the toddler can fill the gap with a sound resembling the missing "word," as can be seen in Video 4 at <<https://vimeo.com/98542342>>.

Initially, the toddler fills the gap with a single sound (e.g. *tah* for *star*), often ignoring the target pitch, which may stem from the mother's primary focus on the lyrics as she plays this game. Her pronunciation of words is more precise at this phase than it was a month or two earlier, perhaps reflecting her initial view of singing as a pleasurable and fruitful means of promoting language acquisition. The duets, which are highly energizing for mother and infant, become increasingly frequent, extending to other songs. The gaps to be filled become progressively larger, eventually leading to simultaneous singing of entire songs. Such synchronous singing, like other forms of synchronous activity, promotes cooperative behavior not only in toddlers but also in

preschool children (Kirschner and Tomasello 2010) and adults (Wiltermuth and Heap 2009). As soon as the mother witnesses the toddler's pleasure in singing, she encourages singing for its own sake. She models songs without correcting the toddler's missteps and exposes the toddler to more and more singing, including recordings of children's songs. Ultimately, the toddler needs no prompting to initiate independent singing.

The nature of toddlers' singing

Some classifications of toddlers' spontaneous singing include chants as well as melodic singing, the former being more speech-like than the latter and relying more on rhythm than on melody (Björkvold 1992; Moorhead and Pond 1941; Sundin 1998). Although there is disagreement on the nature of toddlers' singing, there is general consensus that toddlers engage in singing or song-like behavior throughout the day (Björkvold 1992; Whiteman 2001), with considerable individual variation (Whiteman 2001; Young 2002). Toddlers reproduce songs from their everyday environment, and they also invent their own songs (Barrett 2011; Björkvold 1992; Whiteman 2001; Young 2002), with standard and invented songs typically featuring words, pseudo-words, or speech syllables (Whiteman 2001).

The singing of two- to three-year-olds is often characterized as lacking fixed pitches and scale structure (Davidson 1985), having a very compressed pitch range (Davidson et al. 1981), being rhythmic but largely monotonic (McKernon 1979), or having an extremely rough approximation to the contour of the target song (Davidson et al. 1981). Although these problems are thought to stem from physical constraints, it is puzzling that the constraints underlying toddlers' small singing range (Davidson et al. 1981; Werner 1917) do not preclude a larger vocal range during non-singing vocalizations (Fox 1990; Mang 2001; Reigado et al. 2011).

Physical constraints on early song production may be accorded an oversized role in early singing development, with cognitive constraints playing an even greater role. For example, toddlers are more accurate at matching pitches and tonal patterns when words are absent (Flowers and Dunne-Sousa 1990; Levinowitz 1989; Welch et al. 1998). Producing a familiar song with words adds to children's cognitive load because words and tunes must be retrieved from memory to serve as internal models, after which their production must be planned and produced. Even adults' production of pitches is less accurate when they sing a familiar song with words rather than on a neutral syllable such as "la" (Berkowska and Dalla Bella 2009). Their accuracy also decreases as the length or complexity of the target material increases (Pfordresher and Brown 2007; Wise and Sloboda 2008). In other words, the material sung (e.g. single pitches, single intervals, unfamiliar or familiar melodies, lyrics or no lyrics, examiner-selected or self-selected songs) and the conditions of singing (e.g. copying or singing from memory, comfort in the presence of others) influence the proficiency of singing observed in those contexts.

Well into the preschool period, linguistic dominance is thought to prevail (Welch, et al. 1998), with the child's initial songs described as verbal chants with few melodic components. That situation may be relevant to song production or song learning in formal settings such as schools, but it does not seem to reflect the capabilities observed at home, where singing and language acquisition proceed informally and in parallel, guided by maternal mentoring. Home recordings of individual toddlers two years or younger reveal recognizable melodies sung with meaningless syllables (Barrett 2011; Stadler-Elmer 2012). In another study involving home recordings from 24 children of 16 months to three years of age, adults were highly accurate at identifying familiar tunes (*Happy Birthday*, *Twinkle, Twinkle Little Star*) sung in an unfamiliar language (Gudmundsdottir and Trehub 2013, in preparation). The toddlers in question were relatively accurate at reproducing the melodic

contours and rhythms of the songs (please see Video 5 <<https://vimeo.com/98557103>> and Video 6 <<https://vimeo.com/98557102>>). Surprisingly, they used a pitch range of 6–17 semitones for an average range of 9.75 semitones. Their range approximates the average notated range of 10.5 semitones for the target songs, but it is in marked contrast to the singing range of 2–7 semitones that is commonly reported for preschool and kindergarten children (Flowers and Dunne-Sousa 1990; Rutkowski and Miller 2003; Welch 1979; Welch et al. 1996).

Toddlers' singing range, as observed in the home setting, calls into question the very small singing range reported for older children. The apparent skill deficiencies of older children may be attributable to the test materials (e.g. songs acquired in school, educator-selected rather than child-selected songs), the context of evaluation (e.g. school versus home), and the prevailing atmosphere (e.g. pressured versus leisurely). It is also possible that singing in school settings does not make use of the child's most comfortable vocal register (Welch 1979) or the vocal register used at home, which may be closer to the child's speaking range. Children's "natural" vocal register may not be ideal in terms of conventional standards of singing, but its use in the early years may prevent the disconnect between singing at home and at school.

Just as the nature and pace of language acquisition vary considerably across children (Nelson 1973), the acquisition of singing may show comparable individual variation, depending, in part, on the home environment. A longitudinal study of three families, two of whom were considered "musical," revealed musical babbling at 9–10 months of age in the two infants from musical homes and in-tune singing by two years of age for the child from the most musical family (Kelley and Sutton-Smith 1987). Some toddlers may show a words-first or melody-first pattern, but it is possible that a number of toddlers focus on lyrics in some contexts and on melody in others, depending on the song and situation. For an example of a "words-first" strategy, see "Toddler Chanting Words," Video 7, at <<https://vimeo.com/98557104>>, and for examples of a "melody-first" strategy, see "Toddlers Singing Melody" Video 8 <<https://vimeo.com/98557104>> and Video 9 <<https://vimeo.com/98330008>>. In any case, whether words or melodies appear first may be of less importance than understanding the reciprocal influences of toddlers' developing speech and singing abilities. To date, no research has addressed this critical question.

The notion of linguistic dominance is consistent with the prevailing belief, in popular culture as well as science, that language acquisition is rapid and effortless but music acquisition is effortful and protracted (e.g. Pinker 1997). Children take several years to understand the intricacies of their native language, which is also the case for the nuances of their musical culture. Perhaps it is inappropriate to apply very different evaluative standards to the linguistic and musical elements in young children's singing. Toddlers and preschoolers commonly mispronounce the words of songs, but the words are typically considered acceptable, even correct, if they are barely intelligible. Their melodies, by contrast, are not evaluated in terms of identifiability, but rather by conventional adult standards involving contour, intervals, and key stability. Such divergent standards for verbal and melodic aspects of sung performances may create the illusion that young children's progress in speech proceeds rapidly but progress in singing proceeds at a snail's pace.

It is also important to consider young children's conception of songs and singing and their limited knowledge of the musical conventions of their culture. For children who have yet to master most of the social and linguistic conventions, how can we expect them to understand the features of songs that require precise reproduction (e.g. contour, intervals, rhythm) and those that are free to vary (e.g. tempo, timbre, dynamics)? Presumably, they must first gain implicit knowledge of the conventions of Western tonal music, which can be accomplished

by incidental exposure (Bigand and Poulin-Charronnat 2006). Focusing on precision may come at the cost of the exuberance that is the hallmark of toddlers' and preschoolers' singing .

Singing in moments of solitude

As noted, toddlers sing more frequently and more proficiently when they are in the familiar surroundings of their own home. Although singing is an inherently social activity, toddlers also engage in solitary singing (Davidson et al. 1981), either during play when others are out of sight or as part of their pre-sleep monologues (Nelson et al. 1989; Weir 1962). They sometimes invent songs during these periods of solitude (Davidson et al. 1981; Sundin 1998). Such vocal play may function as practice or exercise of their developing skills. Solitary singing in toddlers also indicates that it has become functional for emotional self-regulation. The opacity of toddlers' intentions and the theoretical biases of observers preclude objective interpretation of these solitary productions (Mang 2005; Young 2002). It is possible, however, that acoustic analyses of these productions could indicate whether such melodic play includes elements of the ambient tonal system.

Are all mothers singing mentors ?

Middle-class mothers in the developed world typically sing to their infants in the ways described even if they are not inclined to sing in other contexts. Nevertheless, some mothers sing to infants infrequently, if at all. The factors associated with diminished talking to infants—poverty, depression, and low educational attainment, among others—are also associated with diminished singing to infants . Young children from socially disadvantaged families receive dramatically less verbal input than do children from more advantaged families (Hart and Risley 1995), and their vocabulary at 24 months of age lags six months behind their peers (Fernald et al. 2012). What is critical is not the overall amount of speech in the environment (i.e. overheard speech) but rather the amount directed specifically to infants and toddlers. The quantity of infant - or child-directed speech predicts the efficiency of language processing and vocabulary size at 24 months of age (Weisleder and Fernald 2013), which are linked to subsequent academic achievement. Limited exposure to maternal singing , in itself, may seem trivial, but it may reflect caregiving that features limited one-on-one interaction and limited sensitivity to infants ' and toddlers' social, emotional, and intellectual needs.

Some circumstances that preclude or limit vocal interactions with infants need not have unfavorable consequences. For example, deaf, signing mothers do not engage in infant-directed speech or singing , but they provide other sensitive, one-on-one interactions with infants . Their signed communications with infants incorporate slower tempo and more exaggerated movements than their signed communication with adults, resulting in visual stimulation that is highly engaging to hearing as well as deaf infants (Masataka 1996, 1998). In effect, infants of deaf signing parents receive rhythmic dance-like gestures rather than the rhythmic singing provided by hearing parents. In short, sensitive mothering can occur in the absence of specific behaviors such as maternal speech and singing so long as there are other means of communicating expressively with infants .

Implications for music educators

In the course of being sensitive caregivers, mothers sing to their infants, first for the sole purpose of soothing or amusing them, later for encouraging collaborative and independent singing. Mothers model singing as pleasure, comfort, shared feelings, and common purpose. Singing continues to function in that manner, even outside the home, as long as the spirit of the endeavor continues to have priority over the precision of execution. Increasing precision is typically a natural consequence of practice, even the very informal practice of singing for pleasure. Despite high self-reports of inaccurate singing (Pfordresher and Brown 2007), the overwhelming majority of adults sing in tune (Dalla Bella et al. 2007), which means that most maternal singing is likely to be in tune, and it is even more likely to be temporally regular or in time (Nakata and Trehub 2011). The small minority of infants and toddlers who hear out-of-tune singing still benefit from the expressiveness of their mothers' multimodal performances. After all, maternal singing is primarily an introduction to the pleasures of singing and secondarily an introduction to the music of the mother's culture. Nevertheless, the one-on-one context optimizes infants' and toddlers' opportunities for learning. With some exceptions, toddlers' singing capabilities may be related to the amount of maternal singing that they have experienced as well as the extent of their participation in maternal duets.

Maternal mentoring is, first and foremost, about sensitive caregiving and only incidentally about singing. For toddlers, singing is associated with joy, comfort, and security. Subsequent mentoring under the auspices of music educators may have the best chance of success if relationship building and relationship maintenance continue to have priority over skill building.

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Further reading

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Video examples mentioned in the text:

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Video 2 <<https://vimeo.com/98535122>>

Video 3 <<https://vimeo.com/98542344>>

Video 4 <<https://vimeo.com/98542342>>

Video 5 <<https://vimeo.com/98557103>>

Video 6 <<https://vimeo.com/98557102>>

Video 7 <<https://vimeo.com/98557104>>

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