Primary caregivers throughout the world provide infants with life-sustaining care such as nutrition and protection from harm as well as life-enhancing care such as affection, contingent responsiveness and mentoring of various kinds. They nurture infants musically by means of one-on-one (i.e. infant-directed) singing accompanied by movement in some cultures and by visual gestures in others. Such singing, which is acoustically and visually distinct from solitary (i.e. self-directed) singing, is effective in engaging infants and regulating their mood and arousal. The repetition and stereotypy of caregivers’ performances contribute to their memorability and dyadic significance. Caregivers’ singing also influences infants’ social engagement more generally. Once infants become singers, their songs play an important role in social interaction and emotional self-regulation. Although caregivers sing to infants with playful or soothing intentions, their performances highlight the temporal and melodic structure of the music. In sum, caregivers lay the foundation for a lifelong musical journey.

Primary caregivers nurture infants in countless ways. In addition to providing life-sustaining care such as nutrition and protection from harm, they provide life-enhancing care such as affection, contingent responsiveness and various kinds of mentoring. The focus here is on musical nurture, which commonly occurs in the context of affectionate and responsive care.

Musical nurture is achieved primarily by one-on-one, or infant-directed, singing and secondarily by exposure to live or recorded music at home or elsewhere (Custodero and Johnson-Green 2003; Ilari 2005). Caregivers around the world sing to infants although there are notable variations in the content of the songs they sing. Caregivers choose songs that are appropriate for the age and emotional state of the infant, and they may adapt their singing to the infant’s responses. The interplay between caregivers and infants in this musical interaction is characterized by repetition, stereotypy, and emotional expressiveness. These features contribute to the memorability and dyadic significance of caregivers’ singing.
and manner of singing (Trehub and Gudmundsdottir 2015; Trehub and Cirelli 2019; Trehub and Trainor 1998). In parts of the world where infants are carried for much of the day (e.g. in slings) and sleep alongside mothers at night, vocal interactions are generally soothing, with lullabies being the songs of choice. Infants in urban environments, especially in North America, experience less physical contact but more face-to-face contact with caregivers, whose predominant manner of interacting with infants is playful. Such caregivers generally sing children’s play songs (i.e. lively, playful songs such as ‘Itsy Bitsy Spider’) rather than lullabies. Those who also sing lullabies tend to reserve them for bedtime routines.

Lullabies, which are characteristically simple and repetitious (Unyk et al. 1992), are readily distinguished from non-lullabies by adults who are unfamiliar with the musical style (i.e. culture) or language (i.e. meaning of lyrics) (Mehr et al. 2018; Trehub et al. 1993a). It remains to be determined whether play songs are comparably recognizable across cultures. Nevertheless, performances directed to infants, whether lullabies or play songs, are readily distinguished from informal, self-directed performances (i.e. no infant present) by listeners who differ in culture, gender or musical training (Trainor 1996; Trehub et al. 1993b, 1997).

The nature of singing to infants

In general, caregivers’ songs to infants are higher pitched, slower, more temporally predictable, and more emotionally expressive than solitary (i.e. self-directed) performances of the same songs (Nakata and Trehub 2011; Trainor 1996; Trainor et al. 1997; Trehub et al. 1997). Moreover, playful renditions of songs are typically higher pitched, faster, louder and more rhythmic than soothing renditions (Cirelli et al. forthcoming). The presence of an infant enhances the expressiveness of songs even when preschool siblings are the singers (Trehub et al. 1994). The singer’s expressiveness is influenced not only by infants’ presence but also by subtle feedback from infants. For example, mothers’ sung renditions are more emotive when the infant is fully in view rather than comparably near but obscured from view (Trehub et al. 2016). The implication is that subtle signs of infant engagement such as eye contact or eye-widening have emotional consequences on the singer and, in turn, on the unfolding performance.

For reasons that are as yet clear, caregivers’ sung performances for infants are highly stereotyped in the sense of being almost identical in pitch level and tempo on different occasions (Bergeson and Trehub 2002). The consequences of such stable performances are magnified by caregivers’ inclination to sing a relatively small number of songs repeatedly rather than sampling more widely from their repertoire of children’s songs (Trehub and Gudmundsdottir 2019).

For the most part, caregivers provide multimodal renditions of songs. Infants who are carried throughout the day commonly experience songs in conjunction with movement from the caregiver’s ongoing activities. Where infants are rocked to sleep in cradles, their face is often covered to minimize visual stimulation (Trehub and Prince 2010). The movement that infants experience during exposure to sound patterns dominates their perception of the auditory rhythms (Phillips-Silver and Trainor 2005).

North American infants experience most of their singing in face-to-face contexts, often without touch, but caregivers’ facial expressions and energetic movements are integral to their performance (Cirelli et al. forthcoming;
Longhi 2009). Face-to-face singing features almost constant smiling, in contrast to the intermittent smiling that characterizes caregivers’ face-to-face speech with infants (Trehub et al. 2016).

**Effects of singing on infant attention**

Infant-directed singing has notable effects on infant attention. For example, infants listen longer to audio-recordings of infant-directed songs than to solo or self-directed recordings of the same songs (Masataka 1999; Trainor 1996), presumably because of the greater positive affect of infant-directed renditions. Just as infants listen longer to happy-sounding speech than to speech with more neutral affect (Singh et al. 2002), they also listen longer to happy-sounding songs than to songs or speech that are less affectively positive (Corbeil et al. 2013). In general, their attention to happy-sounding renditions of speech and song is comparable (Corbeil et al. 2013; Costa-Giomi and Ilari 2014; Trehub et al. 2016; but see Tsang et al. 2017).

With richer or more natural stimuli, such as video-recordings of previous mother–infant interactions, infants exhibit more intense and more sustained attention for their mother’s singing than for her speech (Nakata and Trehub 2004). Greater attention to audio-visual renditions of song over speech is also evident for unfamiliar speakers and singers (Costa-Giomi 2014). In the case of live interactions, infants are more attentive to their mother when she sings play songs rather than lullabies (Cirelli et al. forthcoming), which is line with the greater attention-eliciting properties of happy-sounding vocalizations (Corbeil et al. 2013).

**Effects of singing on infant arousal and mood**

As noted, happy-sounding audio-recordings of speech and singing tend to be equally effective in capturing infant attention (Corbeil et al. 2013; Costa-Giomi and Ilari 2014). However, those comparisons occurred in the context of very brief test trials lasting seconds rather than minutes. More relevant to everyday considerations is whether speech and singing are comparable or differentially effective in maintaining infants’ attention or composure over longer periods.

In one study, 7- to 10-month-old infants were exposed to one of three audio recordings that played continuously until they began to cry: (1) an unfamiliar Turkish play song performed in an infant-directed manner, (2) an infant-directed recitation of the song lyrics or (3) an adult-directed or emotionally neutral recitation of the lyrics (Corbeil et al. 2016). The test environment was anything but friendly, involving a dimly lit room and no toys or people within view. On average, infants remained relatively content (i.e. no crying) for about nine minutes when listening to the infant-directed song. By contrast, the onset of crying occurred after four minutes or so of listening to the recited lyrics whether they were infant- or adult-directed. Although infant-directed or happy-sounding speech is much more effective than adult-directed speech in eliciting infants’ attention (Singh et al. 2002), it turned out to be no more effective in sustaining infants’ composure and averting distress. Moreover, infant-directed singing was clearly superior to either speech register in that regard.

Infant-directed singing can alter infants’ arousal levels even in the absence of overt mood changes. For example, maternal singing (self-selected songs) to 6-month-old infants succeeded in lowering arousal in infants with higher initial levels and raising arousal in those with lower initial levels (Shenfield
et al. 2003). These effects could not be attributed to song type (e.g. soothing vs. playful) because all mothers chose to sing children’s play songs in a lively manner. It is possible, then, infant-directed singing optimizes infant arousal in relation to the circumstances at hand. In a more recent study, mothers were required to repeatedly sing a designated song, ‘Twinkle, Twinkle, Little Star’, to their 8- to 11-month-old infants (Cirelli et al. forthcoming). On alternating trials, they sang the song in a playful or soothing manner. During the soothing renditions, maternal and infant arousal levels decreased in parallel. By contrast, arousal remained stable from the play phase that preceded each trial to the playful singing that followed. In other words, lively play, with or without song, seems to have similar effects on arousal.

If infant-directed singing is effective in modulating the arousal levels of contented infants (Cirelli et al. forthcoming; Shenfield et al. 2003) and maintaining their composure (Corbeil et al. 2016), might it also be effective in lowering the arousal levels of distressed infants? In one study (Ghazban 2013), distress was induced in 10-month-old infants by means of the still-face procedure (Mesman et al. 2009). Specifically, mothers initially played with infants, then became completely unresponsive (adopting a still, inexpressive face), and subsequently resumed their interactions with infants in conjunction with multimodal (face-to-face) singing on some trials and multimodal (face-to-face) speech on others. As expected, arousal levels increased substantially during the still-face episode, as did overt negative behaviour (e.g. negative vocalizations and facial expressions). However, maternal singing was considerably more effective than maternal speech in lowering infants’ elevated arousal levels and ameliorating distress. Moreover, play songs were more effective than lullabies in reducing arousal and distress. The consequences of infant-directed singing for arousal regulation in singers and listeners are likely to enhance caregivers’ well-being and feelings of parenting efficacy while also strengthening reciprocal bonds between caregivers and infants (Fancourt and Perkins 2018a, 2018b; Trehub and Cirelli 2018).

**Social consequences of singing**

Caregivers’ songs have implications beyond the caregiving relationship. For example, 5-month-old infants exhibit greater interest in an unfamiliar woman who previously sang a song from the mother’s repertoire as compared with another woman who sang a different song (Mehr et al. 2016). Moreover, 14-month-old infants offer more help to an unfamiliar woman after she sings a familiar song rather than an unfamiliar song (Cirelli and Trehub 2018). In fact, the mothers of infants who helped the most – retrieving the greatest number of ‘accidentally’ dropped objects – had sung the song most frequently. Infants may evaluate singers of those treasured songs as potentially suitable social partners.

Not long after their first birthday, many infants start producing song fragments, initially adding sound snippets to caregivers’ performances, then participating more fully in duets, and finally becoming solo singers (Trehub and Gudmundsdottir 2015; Gudmundsdottir and Trehub 2019). Early solo singing generally features songs from the caregiver’s repertoire rather than familiar songs linked to well-liked cartoon characters (e.g. Dora). Solitary singing provides infants with a potent tool for emotional self-regulation. Many infants strategically deploy that tool by singing in their crib (Sole 2017), a practice that eases the pain of separation from family members and ensures a calm and pleasurable transition to sleep.
Intuitive didactic aspects of maternal singing

Although caregivers’ performances are geared towards playful or soothing goals, their performances incorporate adjustments that emphasize various aspects of musical structure. For example, mothers intuitively highlight the temporal structure of their songs by increased pulse clarity – for example, much louder strong beats than weak beats (Cirelli et al. forthcoming). In addition, they increase the transparency of the metrical and phrase structure of the music by their patterning of actions and sounds (Longhi 2009). Mothers also enhance the dynamic contrasts between higher and lower pitches, highlighting the shapes or contours of melodies (Nakata and Trehub 2011). Finally, caregivers’ use of a limited song repertoire and their propensity to repeat each song at the same pitch level and tempo (Bergeson and Trehub 2002) contribute to the distinctiveness, memorability and emotional significance of their songs. In this manner, primary caregivers lay the foundation for a life of musical engagement.

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REFERENCES


Nurturing infants with music


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