Wellbeing in the classroom: How an evolutionary perspective on human musicality can inform music education

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Abstract

Group singing is a common feature of classroom-based music education, and has often been proposed to have benefits that extend beyond acquisition of music skills, primarily in academic achievement. However, potential social and emotional well-being benefits have been under-represented in these discussions. This article proposes that an evolutionary lens provides a helpful framework for understanding how music education can contribute to student well-being. Specifically, group singing may a) create a shared emotional experience which is generally positive; and b) increase group cohesion and pro-social behaviours. It is proposed that, while these changes are generally immediate and short-term, regular participation in group singing may lead to stable, persistent changes in affective style and sociability. The implications for music education are discussed, particularly for improving the social and emotional wellbeing of students.

Key words: music education; singing; wellbeing; emotion; social bonding; evolution.

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Social and emotional wellbeing in the classroom

In recent years, there has been increasing recognition that social-emotional competencies and wellbeing have a significant impact on how students both enjoy school and learn. Schools are places of daily social interaction, and when students feel unable to create bonds with their peers and teachers, they can become disengaged from the school and from learning (Benson, 2006; Blum, Libbey, Bishop, & Bishop, 2004; Klem & Connell, 2004). Disengagement starts in primary school and becomes entrenched in secondary school (Wang & Eccles, 2012; Wang & Fredricks, 2014), is linked to increased risk for mental illness (Wickrama & Vazsonyi, 2011) and anti-social behaviours into adulthood (Henry, Knight, & Thornberry, 2012). Enjoying school and feeling connected, on the other hand, is correlated to both academic attainment and a sense of finding school useful (Denham & Brown, 2010; Neel & Fuligni, 2013). Developing social and emotional competencies for students is therefore a highly protective factor for both the school years and into adulthood (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

There are many initiatives and programs for incorporating social and emotional learning into the classroom. This article suggests that

participation in joint music creation is an understudied method for improving social-emotional wellbeing. From an evolutionary perspective, it has been argued that joint music-making was adaptive precisely because it helped individuals to regulate emotions and strengthen bonds. By understanding music as a positive social-emotional activity, its importance in the classroom is augmented. This paper reviews the evidence on group singing for improving wellbeing. While these benefits are likely to be found in any joint music-making activity, the focus is on singing because a) it is accessible to virtually everyone even without training; b) there is no cost associated with participation; and c) from an evolutionary perspective, it would have been the first and primary mode of collective music-making.

Music education and well-being

Music education has rarely been a focus in interventions aimed at improving student well-being. For example, in a meta-analysis of school-based social and emotional interventions, not one study involved music (Durlak et al., 2011). There are some promising studies, however. For example, a 10-week drumming intervention for 30 boys (all approximately 12 years in age) who were considered at high risk for school disengagement produced improvements in self-esteem, school attendance, cooperative behaviour, and a reduction in anti-social behaviours (Faulkner, Wood, Ivery, & Donovan, 2012). In a study tracking 210 kindergarten/grade 1 children and 149 grade 3 students, extra music lessons in the classroom were found to have a protective effect on self-esteem scores compared to control groups (Rickard et al., 2013). When Eerola and Eerola (2014) studied 735 Finish pupils (years 3 and 6), they found that those enrolled in extended music instruction also reported enhanced quality of school life. In a review, Hallam (2010) summarises research which indicates that students participating in music education talk more to parents and teachers (Broh, 2002), develop a positive self-image (Costa-Giomi, 1999; Marshall, 1977; Whitwell, 1977), and experience improved social adjustment and classroom cohesion (Harland et al., 2000; Spychiger, Patry, Lauper, Zimmermann, & Weber, 1993).

However, there are also studies which indicate no effect. In the same study which found protective effects for self-esteem, there were no effects for improved social competence, contrary to expectation (Rickard et al., 2013). Rickard, Bambrick, and Gill (2012) found no cognitive or psychosocial benefits of music education for wellbeing in a study of 127 boys enrolled at a private boys' school (average age 12.67 years), across 6 months; nor with a follow-up study of 115 students in grades 5 and 6 at a mixed-gender school. This finding dovetails with several studies conducted in schools by Schellenberg, where no psychosocial benefits were realized (Schellenberg, 2004, 2006, 2011). It therefore becomes important to understand the mechanisms by which music engagement may increase well-being. Using an evolutionary framework, this paper reviews the theoretical perspective with a view to suggesting more targeted research into this area.

An evolutionary perspective on music

Music is a universal expression in both individuals (with very few exceptions of individuals with amusia) (Blacking, 1973; Koelsch, 2012; Tomlinson, 2013; Trehub, 2001) and societies, throughout history (Brown & Jordania, 2013; Cross, 2003; Titon & Slobin, 1996). While instruments have been dated back 40,000 years (Zatorre & Salimpoor, 2013; Zhang, Harbottle, Wang, & Kong, 1999), Morley (2014) suggests vocal music could extend between 400,000 – 600,000 years ago. The creativity and emotional content associated with music-making appears to be uniquely human, as animal-generated music lacks improvisation while used to communicate specific information (Tomlinson, 2013; Trehub

& Hannon, 2006). Additionally, the significant cognitive resources required to create, decode, and appreciate music suggests it provides valuable human benefits (Warren, 2008).

There is much debate about what role music-making, and singing in particular, may have had in evolutionary terms. Steven Pinker famously mooted that music is nothing more than a spandrel – a by-product of other cognitive and social functions which provided no evolutionary advantage and is in effect a pleasant but accidental curiosity (Pinker, 1997). Many others have suggested that music and language are closely linked, and that proto-music led to the development of language, that language led to the development of music, or that they co-developed (see Mithen, 2005 for overview). Theories linking music and language tend to agree that the most important evolutionary contribution of music is the development of language.

In recent years, an alternate explanation for music's development has been suggested: that music is neither a spandrel, nor does its importance rest solely on its links with language. Rather, music provided very specific and unique benefits to human evolution, through at least two pathways. Specifically, group singing may have created a shared, overwhelmingly positive emotional experience; and it may have increased group cohesion and pro-social behaviours.

For hominids, developing a shared emotional state may have strengthened the group bond while facilitating group decision-making and prioritising, as emotions serve the purpose of prioritising actions (Carver & Sheier, 1998; Cosmides & Tooby, 2000; Lang & Bradley, 2010; Lang & Davis, 2006). Dunbar (1998) proposes that, for primates, the complexity of the brain is directly correlated to social network size; extended cooperative groups enhanced cortical development in hominids. Through its ability to create a shared emotional experience and increase pro-social behaviours, it has been argued that music also facilitated the development of the modern brain (Cross, 2001; Perlovsky, 2011).

Infant musicality

To supplement analysis of the archaeological record, music's role in human development can also be explored through research conducted with newborns. Infants are innately musical. They have a memory for musical performance (Volkova, Trehub, & Schellenberg, 2006), and can process musical patterns in an adult-like manner (Trehub & Hannon, 2006). This is a distinguishing trait from most non-human animals, and should be appreciated as a highly complex skill despite its universality (Trehub & Hannon, 2006). Infants respond with enthrallment when their mothers sing to them, compared to a less intense response for talking (Nakata & Trehub, 2004). Maternal singing has an immediate and profound impact on an infant's arousal and attention, which is often accompanied by physiological changes (Trehub, 2001).

Trehub (2000) points out that mothers innately know what type of singing infants prefer. She also suggests there are benefits to the mother, including an increased sense of wellbeing. McDermott and Hauser (2005) cite evidence that lullabies have universal qualities across cultures and perhaps even through history. Even infant-directed speech is highly prosodic in nature across cultures, and communicates information through its music-like qualities rather than through the language content (Fernald, 1989). Like infant-directed speech, infant-directed music appears to have pre-determined qualities that are innately understood by mothers and others who interact with infants.

Music plays a central role in the first social contact humans experience, by creating and reinforcing parent-child bonds, across cultures (Malloch, 2000; Schulkin & Raglan, 2014). The experience for both child and parent is highly companionable and rewarding.

Group singing and shared emotional experiences

One of the primary uses of music for modern consumers is emotion arousal and regulation (Juslin & Sloboda, 2010; Juslin & Västfjäll, 2008; Salimpoor, Benovoy, Longo, Cooperstock, & Zatorre, 2009; Schäfer, Sedlmeier, Städtler, & Huron, 2013); positive emotional experiences are also identified as a primary benefit of choir membership (Clift & Hancox, 2010). For most people, music elicits emotions which can be very strong, and are sometimes accompanied by physiological arousal, such as chills, increased heart rate, and skin temperature, (Rickard, 2004; Roy, Mailhot, Gosselin, Paquette, & Peretz, 2009; Sammler, Grigutsch, Fritz, & Koelsch, 2007). In addition to the important implications for personal well-being, the link between music and emotion is interesting from an evolutionary perspective for several reasons. First, there is the role that emotions play in decision-making and attentional processes. Second, music's ability to increase positive affect and reduce negative affect may promote pro-social behaviours. Third, the ability to correctly "read" another's emotional state enhances theory-of-mind skills. And finally, facilitating a shared emotional state has implications for the establishment of co-operative groups.

Emotion serves as a psychological motivation for thought or action (Lang & Bradley, 2010; Lang & Davis, 2006). Carver and Sheier (1998) are more specific, identifying emotions as a response to an event that has the capacity to effect goal attainment. Emotions are understood to reduce chaos between competing brain functions by drawing attention to what requires immediate attention, while subsuming attention on less pressing matters (Cosmides & Tooby, 2000). For early hominids, survival may have depended on the ability of the group to share a sense of panic at the approach of a predator, for example. This panic needed to override individual cognitive assessments such as a sense of hunger or a desire to sleep.

Alerting a group to the presence of a predator is a basic survival practice, and is common amongst social animal species, and may even operate across species (Griffin, Savani, Hausmanis, & Lefebvre, 2005; Manser, 2001; Rainey, Zuberbühler, & Slater, 2004; Schmidt, Lee, Ostfeld, & Sieving, 2008). However, it may be that finding ways to share more subtle emotions gave hominid groups an increased sense of social cohesion and an ability to entrain, leading to more sophisticated social and cultural expressions. Cross (2003) suggests that the co-creation of music is a uniquely human trait, and that when early hominid groups made music they also created a shared emotional state. Because emotions serve an attentional function for thought or action, sharing an emotional state may have been pivotal in ensuring group cooperation.

Sharing emotions across the group may have increased empathic responses and helped to develop theory-of-mind abilities (Singer, 2006). There is evidence that decoding music structures and decoding emotion in prosodic phrases is linked, and may also improve the 'reading' of another's emotional state (Thompson, Marin, & Stewart, 2013). The affective messaging of music may have supported these skills to develop in early hominid groups.

Recent research into music anhedonia may also support this analysis. For the majority of people, music activates the reward circuitry of the brain, leading to a pleasure-inducing dopamine release (Menon & Levitin, 2005). Research conducted by Mas-Herrero, Zatorre, Rodriguez-Fornells, and Marco-Pallares (2014) demonstrated that some individuals do not experience activation of their neural reward network in response to music; however, the network was activated in response to a financial stimulus, indicating that the reward network was not damaged. Additionally, the music anhedonics were able to correctly identify the emotion being expressed in the music, despite being unable to experience it.

Clark, Downey, and Warren (2014) argue that music-specific anhedonia which leaves intact the ability to decipher music's emotional content implies that there are music-specific brain reward mechanisms. This in turn implies a biological imperative for music, as there are for other biologically critical functions such as are triggered by food or sex. The authors hypothesise that music's utility is embedded in this emotional response: music is a way of encoding emotions in order to share them with a community. The process of decoding music's emotional text is the same used in decoding emotions in others, and which support the development of theory-of-mind skills. Music is affective messaging.

Emotion is known to spread from person to person, through direct contact (Decety & Ickes, 2011), indirect contact (Coviello et al., 2014), and through music listening (Juslin & Västfjäll, 2008). Successful emotional transfer from person to person is a key indicator of empathy, which is also linked to developing robust theory-of-mind abilities. Sharing the emotions of another is considered a primary factor in the cognitive, affective, and behavioural development of early hominids (Decety & Ickes, 2011). Because music is known to both induce and enhance emotional experiences, it is possible that corporate music experiences would serve the same function, creating a shared emotional experience.

People often experience emotion contagion when listening to music. For example, many athletes use music to put themselves in a mood state which will encourage peak performance (Bishop, Karageorghis, & Loizou, 2007; Lane, Davis, & Devonport, 2011). Adolescents regularly use music as an effective mood regulator (Saarikallio & Erkkilä, 2007). Vuoskoski and Eerola (2012) demonstrate that sad music can transfer a sad emotion state to a listener, particularly if the piece has relevance to the listener. They also found that listeners high in trait empathy were more likely to adopt the sad emotion state, which indicates that an emotional response to music is at least in part a social response.

Music is often used to manipulate emotions in public spaces (Garlin & Owen, 2006; Morrison, Gan, Dubelaar, & Oppewal, 2011; Spence & Shankar, 2010) and public events (Steinberg, 2004; Street, 2013). However, little empirical research has been conducted into whether music may augment emotion contagion amongst individuals. A study with 50 university students found that intentional music listening with a friend or partner increased reports of positive mood states, but not negative states, compared to listening alone (Liljeström, Juslin, & Västfjäll, 2013). However, these findings appear to contradict the findings of an earlier study, which found that 14 members of an orchestra experienced more intense emotional response (as measured by self-report and skin conductance) when listening alone than when listening as a group (Egermann et al., 2011). While both studies focussed on how social context affects emotional responses to music listening, the size differences of the groups (two and 14), the differences in group relationships (a close friend/partner and a larger social/work group), the lab-based nature of the studies, and the focus on listening to rather than creating music may limit their relevance to the current discussion.

Due to the strong links between music and emotions, and the use of group singing in pre-historic and traditional cultures, a positive shared emotional state is likely to be one of the primary benefits of these experiences. Group singing may have provided a rewarding way to create a shared emotional experience. Enjoyable, and therefore repeated, musical experiences would have aided the development of the necessary empathic skills needed for sharing emotions more generally. There is likely therefore to be both short-term and long-term effects: while participation in group singing may lead to a short-term positive emotional state, repeatedly engaging in group singing may lead to persistent long-term changes, including developing a more stable positive affective state and reduction of negative emotional states such as stress or anxiety. A positive affective style is associated

with overall thriving (Lyubomirsky, King, & Diener, 2005) and improved health (Pressman & Cohen, 2005) and may create a positive spiral towards overall improved wellbeing (Fredrickson & Joiner, 2002). Positive emotion states are argued to be evolutionarily adaptive, through the benefits of health, improved fertility, creativity, improved planning, more successful mating, and improved sociability (Diener, Kanazawa, Suh, & Oishi, 2014).

Group singing, group cohesion and pro-social behaviours

Music engagement is also strongly linked with social bonding. For example, a range of studies demonstrate that background music can have a positive impact on social interactions, including increasing a sense of 'liking' in initial meetings (Stratton & Zalanowski, 1984b), increasing verbal exchange in social settings (Stratton & Zalanowski, 1984a), and increasing the positive assessment of an individual during an initial meeting (Ortiz, 1997). More recently, Loersch and Arbuckle (2013) demonstrated that music listening enhanced a sense of in-group membership.

Social bonding is reported as one of the primary benefits of choir membership. In a survey of 600 English choral singers (Clift et al., 2007), and a follow-up study of 1124 choir members across England, Australia and Germany (Clift & Hancox, 2010), choir members identified social support as one of six generative mechanisms to improved wellbeing and health (also mentioned was positive affect, focused attention, deep breathing, cognitive stimulation, and regular commitment). This was described both in general terms of participating in a social experience, as well as comments reflecting the focused, unified discipline of co-creating a piece of music. Recent research indicates that singing groups bond faster than other, non-musical social groups (Pearce, Launay, & Dunbar, 2015), which supports the theory that music co-creation has unique social bonding properties.

The impacts of choir membership have been studied on marginalised groups who struggle with making social connections. In a unique longitudinal study looking at the effects of choir membership on older adults (Cohen et al., 2006, 2007), the researchers found that their control group (engaged in self-selected activities) trended towards reduced participation in social events, while the choir members trended towards increased participation. The authors also reported fewer doctor visits, reduced medication, fewer falls, and improved health in the choir cohort compared to the control group.

von Lob, Camic, and Clift (2010) interviewed English members of non-audition singing groups who had also experienced adverse life events, to understand whether and how membership assisted with coping. The social support provided by the singing group was a primary factor, encompassing both building significant relationships within the choir as well as sharing in the collective experience of music making.

A systematic review into the effects of group singing on well-being and health (S. Clift, Nicol, Raisbeck, Whitmore, & Morrison, 2010) indicates that singing programs for individuals with dementia increase social behaviours, encourage participation, and reduce anxiety and agitation. Dingle, Brander, Ballantyne, and Baker (2012) examined the effects of choir membership for adults experiencing a range of disadvantage (chronic mental health problems, physical disabilities and intellectual disability) in a 12-month longitudinal study which coincided with the choir's start-up. A positive social impact was one of three primary benefits identified by the choir members (along with personal impact and personal function). Members identified a strong social connection within the choir, but also with audiences during performances. Several members also mentioned that these effects were apparent in their life separate from the choir; they were more easily able to engage in pro-social behaviours as a matter of course.

Joint music creation may promote pro-social behaviours by promoting empathic responses (Kirschner & Tomasello, 2010; Rabinowitch, Cross, & Burnard, 2013; Sevdalis & Raab, 2014), thereby promoting increased theory-of-mind abilities (Livingstone & Thompson, 2009). Theory-of-mind abilities rely on both affective and cognitive assessments, and empathic abilities have a demonstrable correlation to theory-of-mind skills (Shamay-Tsoory, Tomer, Berger, Goldsher, & Aharon-Peretz, 2005). There is evidence that musical engagement generally, and group singing activities in particular, can promote oxytocin release (Chanda & Levitin, 2013; Grape, Sandgren, Hansson, Ericson, & Theorell, 2002; Kreutz, 2014). Oxytocin is a hormone associated with strong feelings of love and connection, reduced stress, and increased trust amongst individuals (Gimpl & Fahrenholz, 2001; Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005). Additional studies indicate that group singing also increases the release of endorphins, another hormone implicated in the bonding process, as measured by increased tolerance for pain (Dunbar, Kaskatis, MacDonald, & Barra, 2012; Weinstein, Launay, Pearce, Dunbar, & Stewart, 2015).

While there is some evidence of a link between music and increased pro-social behaviours, the research into this area is limited and exploratory. People high in trait empathy are more responsive to the emotional content in music (Egermann & McAdams, 2013; Vuoskoski & Eerola, 2012). Rabinowitch et al. (2013) found that primary school children who participated in a musical group across the school year showed higher emotional empathy scores than children in the control group. Similarly, Kirschner and Tomasello (2010) found that 4-year-old children who participated in a one-off musical play-based game demonstrated increased pro-social behaviours compared to children who participated in the same game without the musical components.

Implications

Taking an evolutionary perspective on human musicality facilitates an examination of everyday, non-professional, accessible musicality. Music-making has traditionally been an activity that is engaged in by all community members, most often through group singing. While there have been several possible explanations proposed pertaining to music's persistence and value across time, these ideas have not been systematically tested. There are many implications for further research which in turn may inform music education delivery.

First, it may be that level of engagement, rather than level of proficiency, is the most important factor for realizing benefits. This possibility has already been mooted, including the development of a tool for measuring strength of engagement (Chin & Rickard, 2011, 2012). If engagement is the key to increasing well-being, there are implications for how music education is delivered in schools. A British study found that students associate engaging with music outside of school to be for enjoyment and to increase positive moods, while music engagement at school was associated with learning – and therefore less pleasurable (Lamont, Hargreaves, Marshall, & Tarrant, 2003). Because well-being benefits are manifested when the music choice is favoured, both selection of music and how instruction is delivered become important considerations. There are already indications that music education is widening in scope to include both improving technical expertise and to provide opportunities for enjoyable, everyday musical experiences (MacDonald, 2013). This is a positive trend for increasing well-being benefits, which are common in community music settings but often missing from music education.

Second, it would be beneficial to examine other possible benefits of music engagement other than mood regulation – particularly the social benefits. There are already some indications that

co-creating music has social benefits for children, disadvantaged populations, and older adults. These studies are exploratory and inconclusive; there is the opportunity to systematically test these theories and build up a robust body of knowledge for the social benefits of music-making. Schools are an excellent place to examine such questions. There are also implications for how music education is delivered in order to encourage group cohesion. If a core evolutionary function of music is to increase social bonding, then the focus for instructors may expand from a goal of excellence in production to including promotion of positive group interactions. Classroom-based music instruction is well-placed to address issues of social isolation, particularly for students who are unable to afford formal music instruction. However, it is important to match how lessons are facilitated to the intended goal.

Third, there is a need to increase the level of research conducted with populations that are co-creating music but without technical expertise. At the moment the vast majority of research is conducted with either trained musicians or music listening. If evolutionary theories of music utility are correct, it is important to include untrained groups co-creating music in the research portfolio. This under-studied group can illuminate ways that everyday, untrained music making may affect individuals and groups. It may well be that music education can fill a gap in promoting active music making into adulthood by untrained, non-musicians, leading to many individual and social benefits.

Fourth, if evolutionary theories are correct, benefits accrue over time. It would therefore be useful to develop more longitudinal studies that track possible changes over time. These should incorporate both individual and group experiences.

Finally, it is likely that there are very specific cognitive benefits which have been hypothesized but are yet to be explored (Cross, 2008; Perlovsky, 2011). Specifically, it has not been tested whether music co-creation may increase cognitive flexibility. Cognitive flexibility is a style of fluid cognitive processing that successfully pairs concepts and ideas that are generally not associated, resulting in creative or insightful thinking. This process is in contrast to applying an inflexible and rule-bound application of information, also known as entrenched thinking (Walker, Liston, Hobson, & Stickgold, 2002). It is already established that high levels of positive affect and low levels of negative affect are positively correlated with increased cognitive flexibility (De Dreu, Baas, & Nijstad, 2008; Isen, 1987; Isen, Daubman, & Nowicki, 1987; Subramaniam, Kounios, Parrish, Jung-Beeman, & Beeman, 2009). There are also indications that positive, empathic social interactions also positively influence cognitive flexibility (Andreasen & Ramchandran, 2012; Ybarra et al., 2008, 2010). It is therefore logical to hypothesise that, if music co-creation improves affective state and increases a sense of social connection, it may also facilitate cognitive flexibility. There is already an understanding that musical creativity relies on high levels of cognitive flexibility (Charyton & Snelbecker, 2007); it is possible that it may be a virtuous cycle, in which music engagement increases cognitive flexibility, which in turn increases music engagement through increased creative expression, and so on. A school-based study conducted by Schellenberg, Nakata, Hunter, and Tamoto (2007) reported that schoolchildren drew for longer periods of time and their drawings were judged as more creative after singing familiar children's songs. This was compared to efforts in a range of listening experiments; creativity and effort was independently judged as highest in the singing intervention, followed by listening to familiar children's songs, listening to upbeat classical music, and lowest when listening to ponderous classical music. This effect indicates that positive music interactions may influence cognitive flexibility, the cognitive process that facilitates creativity.

An evolutionary lens placed over music engagement is useful to illuminate gaps in the current research literature concerning the utility of music co-creation, which has significant implications for music education. Possible avenues for future exploration include an increased focus on untrained music creation, longitudinal studies, and a focus on unexplored affective, social, and cognitive benefits.

Compliance with ethical standards

The authors declare that they have no conflicts of interest. This article does not contain any studies with human participants or animals performed by any of the authors.

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