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Music practice and participation for psychological well-being: A review of how music influences positive emotion, engagement, relationships, meaning, and accomplishment

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Abstract

In "Flourish," Martin Seligman maintained that the elements of well-being consist of "PERMA: positive emotion, engagement, relationships, meaning, and accomplishment." Although the question of what constitutes human flourishing or psychological well-being has remained a topic of continued debate among scholars, it has recently been argued in the literature that a paradigmatic or prototypical case of human psychological well-being would largely manifest most or all of the aforementioned PERMA factors. Further, in "A Neuroscientific Perspective on Music Therapy," Stefan Koelsch also suggested that "Music therapy can have effects that improve the psychological and physiological health of individuals," so it seems plausible that engaging in practices of music can positively contribute to one living a more optimally flourishing life with greater psychological well-being. However, recent studies on music practice and participation have not yet been reviewed and integrated under the PERMA framework from positive psychology to further explore and explicate this possibility. This article therefore contributes to extant work by reviewing recent research on psychological well-being and music to offer support for the claim that music practice and participation can positively contribute to one living a flourishing life by positively influencing their emotions, engagement, relationships, meaning, and accomplishment.

Keywords

accomplishment, emotion, flow, meaning, music, positive psychology, relationships, well-being

In "Flourish: Positive Psychology and Positive Interventions," Martin Seligman (2010) discussed the important point that even "though we have spent so much effort in pharmacology and in psychotherapy developing interventions that relieve misery, such interventions are not the same as interventions that produce *well-being*" (p. 233). In light of this predicament in the fields of psychological and mental health, Seligman (2010) argued for the development of a "positive psychology" that is focused on "the concept of well-being" and "aims to develop

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interventions that build the enabling conditions of life," which characteristically consists of "PERMA: positive emotion, engagement, relationships, meaning, and accomplishment" (pp. 233–236; see also Croom, 2012a, p. 1; Seligman, 2011, p. 24). Although the question of what constitutes human flourishing or psychological well-being has remained a topic of long and continued debate among scholars (see also Aristotle, 2011; McMahon, 2006; Peterson & Seligman, 2004) it has recently been argued in the literature that a paradigmatic or prototypical case of human psychological well-being would largely manifest most or all of the five factors of positive emotion, engagement, relationships, meaning, and accomplishment. For example, in two studies recently published in *Increasing psychological well-being in clinical and educational settings*, Rashid et al. (2014) drew upon the conception of "Well-being and Resilience ... as the integration of positive emotions, engagement, positive relationships, meaning and accomplishment (PERMA)" to propose a new program of strength-based interventions for children and adolescents (pp. 162–165) and Noble and McGrath (2014) similarly drew upon the PERMA model to propose a new program of positive education aimed at helping students develop their "Social and emotional competencies," including "Positive emotions," "Positive relationships," "Positive purpose," and "Optimal learning environments that facilitate achievement" (p. 139; see also Noble & McGrath, 2008; Seligman, Ernst, Gillham, Reivich, & Linkins, 2009; Slavin, Schindler, Chibnall, Fendell, & Shoss, 2012). Evidently then this methodological approach to investigating psychological well-being by investigating its common characteristics of positive emotions, engagement, relationships, meaning, and accomplishments is a common and promising one to adopt from the literature for the purpose of investigating whether music practice and participation can contribute to one living a flourishing life with greater psychological well-being.

In "A Neuroscientific Perspective on Music Therapy," Koelsch (2009) further proposed that "Music therapy can have effects that improve the psychological and physiological health of individuals" (p. 374) and explained that the therapeutic effects of music are often due to the modulation of attention, emotion, cognition, behavior, communication, and perception that occurs when participants engage in musical activity (p. 375). Therefore since recent studies from the literature on music offer empirical support for its therapeutic effectiveness, the proposal that music practice and participation can positively contribute to one living a more optimally flourishing life with greater psychological well-being is arguably a plausible one worth investigating. However, recent studies from the literature on music practice and participation have not yet been reviewed and integrated under the PERMA framework from the literature on positive psychology to further explore and explicate the possibility that music practice and participation can positively contribute to one living a more optimally flourishing life with greater psychological well-being. This article therefore contributes to extant work on the psychology of music and well-being by reviewing the recent literature on psychological well-being and music practice and participation in order to offer support for the claim that music practice and participation can positively contribute to one living a flourishing life with increased psychological well-being by positively influencing emotions, engagement, relationships, meaning, and accomplishment.

In order to appropriately begin the analysis of whether music practice and participation can positively contribute to one living a more optimally flourishing life with greater psychological well-being, the next section (Section 2) will first review the recent literature on music and positive emotion to further clarify how music can function as a useful means for positively influencing the emotions, and in so doing, positively influencing the first characteristic component of psychological well-being (the PERMA factor P for positive emotion).

Flourishing with music and positive emotion

In "Flourish," Seligman (2010) maintained that the elements of well-being consist of positive emotion, engagement, relationships, meaning, and accomplishment (p. 236; see also Seligman, 2011, p. 24) and so the first element of well-being to be considered here is positive emotions. Positive emotions have been considered by scholars to constitute an important element of psychological well-being – with Fredrickson (2006) for instance proposing that "pleasant affective states appear to be critical ingredients within the recipe for human flourishing" (p. 57) – and several recent studies have investigated how positive emotions may contribute in this way. In "Building a Neuroscience of Pleasure and Well-Being," for example, Berridge and Kringelbach (2011) explained that well-being characteristically consists of "at least two crucial ingredients: positive affect or pleasure (hedonia) and a sense of meaningfulness or engagement in life (eudaimonia)" (p. 1) and accordingly suggested that "happiness springs not from any single component but from the interplay of higher pleasures, positive appraisals of life meaning and social connectedness, all combined and merged by interaction between the brain's default networks and pleasure networks" (pp. 19–21).[1] In other research investigating whether there is a systematic relationship in participants ($n = 198$) between affective priming and life satisfaction, Robinson and Von Hippel (2006) proposed that "the memory organization of positive and negative thoughts influences life satisfaction," since they found that the participants low in life satisfaction displayed relatively larger negative (compared to positive) affective priming effects whereas the participants high in life satisfaction displayed relatively larger positive (compared to negative) affective priming effects (pp. 194–195). In another study investigating whether there is a systematic relationship in participants ($n = 438$) between their subjective evaluations of positive affect, negative affect, and life satisfaction, Busseri, Choma, and Sadava (2012) found that higher levels of present subjective well-being were aligned with greater positive psychological, physical, and interpersonal functioning (p. 1). Indeed, in "The Role of Passion in Sustainable Psychological Well-Being," Vallerand (2012) makes the important point that during engagement in an activity that takes place on a regular and repeated basis, one begins to cultivate positive emotions and "passion [that] contributes to sustained psychological well-being while preventing the experience of negative affect, psychological conflict, and ill-being" (p. 1; see also Tang, Kelley, Hicks, & Harmon-Jones, 2013). It is clearly evident then that several studies have recently suggested that positive emotions constitute an important element to psychological well-being.

In recent work aiming to clarify the underlying mechanisms involved in music-evoked emotions, Juslin (2013) for instance suggests that various mechanisms through which music might arouse emotions, either singularly or in combination, include (i) brain stem reflexes, (ii) rhythmic entrainment, (iii) evaluative conditioning, (iv) emotional contagion, (v) visual imagery, (vi) episodic memory, (vii) musical expectancy, and (viii) aesthetic judgment. Since sound perception has survival value for humans partly because of its capacity to activate various emotion induction "mechanisms," or "information-processing devices at different levels of the brain, which utilize distinct types of information to guide future behavior," Juslin (2013) correctly points out that "the emotions represent an extension of the perceptual process that enables us to infer not only the identity and location of an object, but also its potential consequences or '*affordances*'" (p. 240, emphasis added; see also Krueger, 2014). Indeed, as Krueger (2014) recently argues in "Affordances and the Musically Extended Mind," "musical affordances – via soliciting different forms of entrainment – enhance the functionality of various endogenous, emotion-granting regulative processes, drawing novel experiences out of us with an expanded complexity and phenomenal character" (p. 1; for further fascinating discussion on musical

embodiment and affordances, see Harrison & Loui, 2014; Hutka, Bidelman, & Moreno, 2013; Keebler, Wiltshire, Smith, Fiore, & Bedwell, 2014; Maes, Leman, Palmer, & Wanderley, 2014; Reybrouck, 2001, 2005, 2012; Schäfer, Fachner, & Smukalla, 2013).

To briefly review the information-processing components involved in music-evoked emotions, Juslin (2013) suggests that (i) *brain stem reflexes* refer to processes in which case music-induced emotions are due to "one or more fundamental acoustic characteristics of the music [that] are taken by the brain stem to signal a potentially important and urgent event that needs attention," with brain stem reflexes largely involving the inferior colliculus, the reticulospinal tract of the reticular formation, and the intralaminar nuclei of the thalamus (pp. 241–243); (ii) *rhythmic entrainment* refers to processes in which music-induced emotions are due to "a powerful, external rhythm in the music [that] influences some internal bodily rhythm of the listener (e.g., heart rate), such that the latter rhythm adjusts toward and eventually 'locks in' to a common periodicity," with rhythmic entrainment largely involving networks of multiple oscillators in the cerebellum and the sensori-motor regions (pp. 241–243); (iii) *evaluative conditioning* refers to processes in which case music-induced emotions are caused by a "stimulus [that] has often been paired with other positive or negative stimuli," with evaluative conditioning largely involving the lateral nucleus of the amygdala, and the interpositus nucleus of the cerebellum (pp. 241–243); (iv) *emotional contagion* refers to processes in which music-induced emotions are due to when a "listener perceives the emotional expression of the music, and then 'mimics' this expression internally," with emotional contagion largely involving mirror neurons in the premotor regions, right inferior frontal regions, and the basal ganglia (pp. 241–243); (v) *visual imagery* refers to processes in which case music-induced emotions are due to when a listener "conjures up inner images (e.g., of a beautiful landscape) while listening to the music," with visual imagery largely involving spatially mapped regions of the occipital cortex, the visual association cortex, and (for image generation) left temporo-occipital regions (pp. 242–243); (vi) *episodic memory* refers to processes in which case music-induced emotions are due to when a listener "evokes a personal memory of a specific event in the listener's life," with episodic memory largely involving the medial temporal lobe, especially the hippocampus, and the dorsal medial prefrontal cortex (pp. 242–243); and (vii) *musical expectancy* refers to processes in which case music-induced emotions are due to when "a specific feature of the music violates, delays, or confirms the listener's expectations about the continuation of the music," with musical expectancy largely involving the left perisylvian cortex, Broca's area, the dorsal region of the anterior cingulate cortex, and the orbital fronto-lateral cortex (pp. 242–243). Juslin (2013) further suggests that (viii) "Once an 'aesthetic attitude' has been adopted, perceptual and cognitive analyses of the music will proceed, which provide inputs to the *aesthetic judgment process*" (p. 243) in which case "the listener's aesthetic criteria have been brought to bear on the music" (p. 248). Since philosophers have recently been arguing that "acts of "musicking" grant [us] access to novel emotional experiences otherwise inaccessible" (Krueger, 2014, p. 1), recent empirical work of the kind briefly reviewed here, which seeks to clarify the underlying mechanisms involved in music-evoked emotions, may help us better understand the bodily basis underlying such rich aesthetic possibilities (for further discussion on the underlying mechanisms involved in music-evoked emotions, see Juslin, 2013; Juslin & Vastfjall, 2008; Koelsch, 2010).

Now, since positive emotions can contribute to psychological well-being, music practice and participation can also contribute to psychological well-being since engaging with music can contribute to positive emotions. And several studies have in fact suggested that music practice and participation can contribute to positive emotions. In "The Functions of Music for Affect Regulation," for example, Van Goethem and Sloboda (2011) investigated whether music could

be used to regulate affect in participants (n = 44) and reported finding that "music plays a major role in creating happiness and relaxation" (p. 208) and that "music listening is a frequently used affect regulation tactic with a high success level and large range of goals and strategies" (p. 225) including "distraction, introspection, and active coping" (p. 208). In a recent review of the literature on the use of music therapy for the treatment of patients diagnosed with chronic pain, Koenig et al. (2013) reported that music "has a spontaneous and fast-acting effect on emotions" along with "the capacity to elicit and modulate emotions of all valences (happiness, sadness, anxiety, anger, disgust) and intensities (including chill and thrill experiences)" (p. 152). DeMarco, Alexander, Nehrenz, and Gallagher (2012) also investigated whether music listening could influence the stress and anxiety levels of participants (n = 14) undergoing cosmetic surgery and found that "patients waiting for surgery benefit emotionally from hearing music," since the participants that listened to music reported 18% less anxiety than other participants that did not (p. 44). In other recent studies, Sergeant and Mongrain (2011) investigated whether exercises involving uplifting music could be used to improve the well-being of participants (n = 772) and reported finding that the participants in the uplifting music condition experienced "greater increases in happiness over time than participants in the control condition" (p. 260). Hwang and Oh (2013) investigated the effects of music therapy interventions on the depression, anxiety, anger, and stress levels of participants (n = 36) with alcohol dependence and found that music therapies involving singing, music listening, and playing instruments were all effective in reducing subject scores in depression, anxiety, anger, and stress in the participants (p. 136), and Laukka (2007) investigated the everyday use of music in participants (n = 500) living in Sweden and reported finding that "the participants reported using a variety of listening strategies related to emotional functions (e.g., pleasure, mood regulation, and relaxation) and issues of identity, belonging, and agency," and that "listening to music is a frequent source of positive emotions for older adults" (p. 215). Resultantly, since positive emotions can contribute to psychological well-being (see also Berridge & Kringelbach, 2011; Busseri et al., 2012; Fredrickson, 2006; Robinson & Von Hippel, 2006; Seligman, 2010, 2011; Tang et al., 2013; Vallerand, 2012), and since several studies have indeed suggested that music practice and participation can contribute to positive emotions (see also DeMarco et al., 2012; Hwang & Oh, 2013; Koenig et al., 2013; Laukka, 2007; Sergeant & Mongrain, 2011; Van Goethem & Sloboda, 2011), there are good grounds for maintaining that music practice and participation can positively contribute to psychological well-being.

This section has reviewed the recent literature on music and positive emotion to further clarify how music can function as a useful means for positively influencing emotions. In order to further continue the analysis of whether music practice and participation can positively contribute to one living a more optimally flourishing life with greater psychological well-being, the next section (Section 3) will proceed to review the recent literature on music and engagement (or "flow" experiences) to further clarify how music can function as a useful means for positively influencing engagement, and in so doing, positively influencing the second characteristic component of psychological well-being (the PERMA factor E for engagement).

Flourishing with music and engagement

Given that psychological well-being is considered to consist of positive emotion, engagement, relationships, meaning, and accomplishment, the second element of well-being to be examined here is engagement or flow experience (see also Seligman, 2010, p. 236, 2011, p. 24). The "engaged life," Seligman (2011) maintains, "is about flow: being one with the music, time stopping, and the loss of self-consciousness during an absorbing activity" (p. 11) and Rich (2013)

similarly asserts that "a good life is one characterized by complete absorption in what one does," and that "A life worth living then, seems to involve flow" (p. 43; see also Nakamura & Csikszentmihalyi, 2002, p. 89). Thus engagement or flow experience has been considered by scholars to constitute an important element of psychological well-being, and several recent studies have investigated how engagement or flow experience may contribute in this way. In the literature "flow" experience has been characterized as a "state of optimal experience that people report when they are intensely involved in doing something that is fun to do" (Csikszentmihalyi, 2000, p. 381), "the experience of complete absorption in the present moment" (Nakamura & Csikszentmihalyi, 2009, p. 195), and as "a state of mind characterized by focused concentration and elevated enjoyment during intrinsically interesting activities" (Strati, Shernoff, & Kackar, 2011, p. 1050). Flow experiences have been considered to characteristically occur under conditions of "perceived challenges, or opportunities for action, that stretch (neither overmatching nor underutilizing) existing skills; a sense that one is engaging challenges at a level appropriate to one's capacities," or conditions of "clear proximal goals and immediate feedback about the progress that is being made" (Nakamura & Csikszentmihalyi, 2002, p. 90) and characteristic features of flow experience have been considered to include "intense and focused concentration on what one is doing in the present moment," the "merging of action and awareness," the "loss of reflective self-consciousness (i.e., loss of awareness of oneself as a social actor)," "a sense that one can control one's actions; that is, a sense that one can in principle deal with the situation because one knows how to respond to whatever happens next," a "distortion of temporal experience (typically, a sense that time has passed faster than normal)," and "experience of the activity as intrinsically rewarding, such that often the end goal is just an excuse for the process" (p. 90; see also Carli, Delle Fave, & Massimini, 1988; Csikszentmihalyi, 1975, 1990; Engeser, 2012, p. 3; Nakamura, 1988; Nakamura & Csikszentmihalyi, 2002; Shernoff & Csikszentmihalyi, 2009; Wells, 1988). In "Absorption as a Therapeutic Agent," Hymer (1984) suggested that "absorption," "engagement," or "flow experience" consists in "the temporary loss of self through immersion in an object that eventuates in self-enhancement" (p. 93) and accounted for the potentially therapeutic functions of absorption in flow by suggesting that "the patient who enters into the absorptive experience has attained a degree of separation-individuation, so that temporary, harmonious union with an object becomes a positive growth enhancing experience rather than a pathological regression" (p. 95).

In order to situate the phenomenology of flow experience on empirical grounds, Dietrich (2004) first explains in "Neurocognitive Mechanisms Underlying the Experience of Flow" that information processing involves both explicit and implicit cognitive systems, such that information processing involving "the explicit system is associated with the higher cognitive functions of the frontal lobe and medial temporal lobe structures and has evolved to increase cognitive flexibility" whereas information processing involving "the implicit system is associated with the skill-based knowledge supported primarily by the basal ganglia and has the advantage of being more efficient" (p. 746). Dietrich (2004) then proposed that flow experiences involve "a state of transient hypofrontality that enables the temporary suppression of the analytical and meta-conscious capacities of the explicit system" (p. 746). Importantly, Dietrich (2004) also mentioned the "sensory-motor integration skills that seem to typify flow such as athletic performance, writing, and free-jazz improvisation," since previously relevant learning by an agent of "a highly practiced skill," such as free-jazz improvisation, is presumably a prerequisite for the relevant flow experiences of that agent since this acquired musical skill is taken to be "represented in the implicit system's knowledge base" and "implemented without interference from the explicit system" during occasions of flow experience (p. 746). Indeed, this suggestion is consistent with results from an important study conducted by Ericsson, Krampe, and Tesch-Römer (1993) that

investigated the role of deliberate practice in participants (n = 30) during their acquisition of musical skill, since they reported that "in the domain of music, we showed that individual differences in adult levels of performance were correlated with the past and current amount of deliberate practice at a given age," and that consequently, "expert performance is the result of an extended process of skill acquisition mediated by large, but not excessive daily amounts of deliberate practice" (p. 363). In other words, in order for a highly practiced musical skill like improvised saxophone performance to become represented in the implicit system of a musical agent's knowledge base, and thus capable of being implemented by a musical agent without interference from their explicit system during occasions of flow experience, a sufficient amount of musical skill must first be acquired by that musical agent through a substantive (though not excessive) amount of deliberate musical practice and the accumulation of the relevant sensory-motor integration that it results in (see also Croom, 2012b, pp. 98–101, 2014; De Manzano, Theorell, Harmat, & Ullen, 2010; Dietrich, 2004; Ericsson et al., 1993). Indeed, Strati et al. (2011) have suggested that "flow experiences are valuable for learning and development because they provide an orientation of engagement and skill-building that carries into the future," and that "because flow states are enjoyable, they motivate individuals to continue developing skills and raising challenges to reenter flow" (p. 1058). Strati et al. (2011) have accordingly proposed that "flow experiences thereby enhance the quality of life, add to the complexity of the developing self, and facilitate talent development in youth" (p. 1058). Nakamura and Csikszentmihalyi (2009) have similarly suggested that "experiencing flow encourages a person to persist in and return to an activity because of the experiential rewards it premises, and thereby fosters the growth of skills over time" (p. 199) and that "because the self grows through flow experiences, we also might expect time spent in flow to predict self-esteem" (p. 199). It is clearly evident then that several studies have recently suggested that engagement or flow experience constitute an important element to psychological well-being.

Importantly, since engagement or flow experience can contribute to psychological well-being, music practice and participation can also be instrumental to psychological well-being, since music practice and participation can contribute to engagement or flow experience. And several studies have in fact suggested that music practice and participation can contribute to engagement or flow experience. For example, in a study investigating the effects of self-selected background music on flow and shooting performance in participants (n = 3) playing netball, Pates, Karageorghis, Fryer, and Maynard (2003) reported finding that the "participants indicated that the intervention helped them to control both the emotions and cognitions that impacted upon their performance," that "all three participants exhibited improvements in performance during the intervention," and that "two of the three participants also showed increases in flow during the intervention, which suggests that in some players, flow may be induced using music interventions" (pp. 415, 424). In another study aiming to evaluate the potentially therapeutic benefits of patients becoming absorbed in music and other activities, Hymer (1984) reported that "patients who become absorbed in animate and/or inanimate objects are better able to cope with a variety of problems and experience a heightened sense of well-being" (p. 93) and that "in such instances, boredom, anxiety or 'busy work' give way to immersion in an object that allows for the strengthening of the self through the temporary suspension of critical faculties" (p. 102). Hymer (1984) accordingly proposed that patients "can use absorptive experiences as means to allay anxiety by temporarily curtailing self-absorptive obsessive thinking through immersion in objects outside the self such as music" (p. 102). In "The Psychophysiology of Flow During Piano Playing," De Manzano et al. (2010) further investigated the relationship between subjective flow reports and psychophysiological measures in participants (n = 21) experienced in piano playing, and reported finding that flow

experience "arises through an interaction between positive affect and high attention" (p. 301) and that "flow measures show increased flow to be related to decreased HP [heart period] and RSA [respiratory sinus arrhythmia], increased LF/HF ratio, total power, and RD [respiratory depth]" which "suggests that during a physically and cognitively demanding task, an increased activation of the sympathetic branch of the autonomic nervous system in combination with deep breathing and activation of the ZM [zygomaticus major] might potentially be used as an indicator of effortless attention and flow" (p. 306; cf. Peifer, 2012, p. 142). Schuler (2012) even argues that

> flow experience is not just a hedonic feeling that enhances an individual's quality of life; it is also an optimal functional state that can lead to peak performance in sports or music and can be a matter of life and death in life-threatening situations. From an evolutionary point of view, flow has a high adaptive value. (p. 133)

As a result, since engagement or flow can contribute to psychological well-being (see also Carli et al., 1988; Croom, 2012b, 2014; Csikszentmihalyi, 1975, 1990, 2000; De Manzano et al., 2010; Dietrich, 2004; Engeser, 2012; Ericsson et al., 1993; Hymer, 1984; Nakamura, 1988; Nakamura & Csikszentmihalyi, 2002, 2009; Rich, 2013; Seligman, 2010, 2011; Shernoff & Csikszentmihalyi, 2009; Strati et al., 2011; Wells, 1988), and since several studies have indeed suggested that music practice and participation can contribute to engagement or flow experience (see also Bakker, 2005; De Manzano et al., 2010; Dietrich, 2004; Hatfield, Cacioppo, & Rapson, 1994; Hymer, 1984; Pates et al., 2003; Peifer, 2012; Rogatko, 2009; Schuler, 2012), there are good grounds for asserting that music practice and participation can positively contribute to psychological well-being.

This section has reviewed the recent literature on music and engagement or flow experiences to further clarify how music can function as a useful means for positively influencing engagement or flow experiences. In order to further continue the analysis of whether music practice and participation can positively contribute to one living a more optimally flourishing life with greater psychological well-being, the next section (Section 4) will proceed to review the recent literature on music and relationships to further clarify how music can function as a useful means for positively influencing relationships, and in so doing, positively influencing the third characteristic component of psychological well-being (the PERMA factor R for relationships).

Flourishing with music and relationships

Given that psychological well-being is considered to consist of positive emotion, engagement, relationships, meaning, and accomplishment, the third element of well-being to be considered here is (positive) relationships (see also Seligman, 2010, p. 236, 2011, p. 24). In a philosophical analysis focusing on Aristotle and friendship, for instance, Cooper (1977b) suggested that "we value, and are right to value, friendship so highly because it is only in and through intimate friendship that we can come to know ourselves and to regard our lives constantly as worth living" (p. 313; see also Aristotle, 2011; Cooper, 1977a), so positive relationships have been considered by scholars to constitute an important element of psychological well-being, and several recent studies have investigated how positive relationships may contribute in this way. For example, Hicks and King (2009) investigated positive affect and social relatedness as sources of information for meaning in life judgments in participants ($n = 150$) and reported finding that "individuals with strong social bonds (i.e., those low on loneliness) judged their meaning in life

to be high regardless of mood induction condition" and that "social relationships are clearly an important contributor to meaning in life" (p. 479; see also Hicks & King, 2007). Baumeister and Leary (1995) also reviewed the empirical literature to investigate whether people need to form and maintain strong, stable interpersonal relationships, and reported that "existing evidence supports the hypothesis that the need to belong is a powerful, fundamental, and extremely pervasive motivation" and that "lack of attachments is linked to a variety of ill effects on health, adjustment, and well-being" (p. 497). In other recent research, Noble and McGrath (2012) have further proposed that "social skills that enhance cooperation and underpin positive relationships appear to be especially important for resilience and wellbeing" (p. 21). Berridge and Kringelbach (2011) have suggested that "in humans, at least, the social pleasures are often as pleasurable as the basic sensory pleasures" (p. 4) and Roffey (2012) has proposed that "we often experience positive feelings in interactions with friends that boost our resilience, confidence and a positive sense of self" and that "friendship is therefore critical for our psychological health" (pp. 7–8; see also Bornstein, Davidson, Keyes, & Moore, 2003; Cove, Eiseman, & Popkin, 2005; National Crime Prevention, 1999; Zins, Bloodworth, Weissberg, & Walberg, 2004). It is clearly evident then that several studies have recently suggested that positive relationships constitute an important element to psychological well-being.

Importantly, since positive relationships can contribute to psychological well-being, music practice and participation can also contribute to psychological well-being since music practice and participation can contribute to positive relationships. Several studies have indeed suggested that music practice and participation can contribute to positive relationships. For instance, in a study investigating the musical rituals of participants (n = 760) in Kenya, the Philippines, New Zealand, and Germany, Boer and Abubakar (2014) reported that their "developmental analyses show that musical family rituals are consistently and strongly related to family cohesion across developmental stages," that "across cultures music listening in families and in peer groups contributes to family and peer cohesion, respectively," and that "the direct contribution of music in peer groups on well-being appears across cultural contexts" (p. 1). In another study investigating the function and significance of music for participants (n = 52) in Australia, Hays and Minichiello (2005) found that music "contributes to positive ageing by providing ways for people to maintain positive self-esteem, feel competent, independent, and avoid feelings of isolation or loneliness" (p. 437). In other recent research, Procter (2011) investigated the specific contribution of music therapy to the generation of social capital and proposed that "making music with others offers experience of loose social networks within which people have the opportunity to experience trust and reciprocity" (p. 246). Schiepe-Tiska and Engeser (2012) reviewed the literature on flow experience in groups and pointed out that "the main reasons for enjoying rock dancing, besides body movement and involvement with the music, were involvement with the partner and a feeling of togetherness" (p. 97; see also Csikszentmihalyi, 1975) and Schäfer, Sedlmeier, Stadtler, and Huron (2013) reviewed the literature on the functions of music and pointed out that "people listen to music to regulate arousal and mood, to achieve self-awareness, and as an expression of social relatedness" (p. 1). Moreover, in "From Social Contact to Social Cohesion," Koelsch (2013) reviewed the literature on the social functions of music and further suggested that "when playing music in a group, individuals have contact with other individuals, engage in social cognition, participate in co-pathy (the social function of empathy), communicate, coordinate their actions, and cooperate with each other, leading to increased social cohesion," that "engagement in these functions fulfills basic human needs and is of vital importance for the individual," and that "the ability of music to increase social cohesion and strengthen interindividual attachments was probably an important function of music in human evolution" (p. 204). In another study

investigating whether long-term repeated participation in musical group interaction by participants (n = 23) could enhance their emotional empathy, Rabinowitch, Cross, and Burnard (2013) found that children participating in musical group interaction "showed higher emotional empathy scores after the study compared to its beginning, and higher scores than control children at the end of the study" (p. 1), which suggests that "music may be beneficial in yet another way, promoting empathy when experienced as group interaction" (p. 11). Furthermore, in a study investigating the impact of music festival attendance by participants (n = 10) on their psychological and social well-being, Packer and Ballantyne (2011) reported finding that: (i) "the social facet of the music festival experience emerged very strongly from the focus group discussion as an integral part of the experience"; (ii) "the social facet of the music festival experience contributed to social well-being, particularly in relation to the 'Social Integration', 'Social Acceptance' and 'Social Actualization' components"; (iii) "Music is a powerful means of creating such a sense of belonging"; and that several participants mentioned that (iv) "being with like-minded people was an important aspect of the music festival experience" (p. 7). Finally, in another study investigating the perceptions of the psychological and social benefits associated with the attendance of participants (n = 441) at a music festival in Australia, Ballantyne, Ballantyne, and Packer (2014) reported finding that "the music experience provides the common ground on which both the social experience and the festival experience are built, and facilitates a sense of connection among participants" which has "the potential to influence psychological, social and subjective well-being" (p. 67). Resultantly, since positive relationships can contribute to psychological well-being (see also Aristotle, 2011; Baumeister & Leary, 1995; Berridge & Kringelbach, 2011; Bornstein et al., 2003; Cooper, 1977a, 1977b; Cove et al., 2005; Hicks & King, 2007, 2009; National Crime Prevention, 1999; Noble & McGrath, 2012; Prilleltensky & Prilleltensky, 2006; Roffey, 2012; Seligman, 2010, 2011; Zins et al., 2004), and since several studies have indeed suggested that music practice and participation can contribute to positive relationships (see also Ballantyne et al., 2014; Boer & Abubakar, 2014; Csikszentmihalyi, 1975; Hays & Minichiello, 2005; Koelsch, 2013; Packer & Ballantyne, 2011; Procter, 2011; Rabinowitch et al., 2013; Schäfer, Sedlmeier et al., 2013; Schiepe-Tiska & Engeser, 2012) there is a firm basis for maintaining that music practice and participation can positively contribute to psychological well-being.

This section has reviewed the recent literature on music and relationships to further clarify how music can function as a useful means for positively influencing relationships. In order to further continue the analysis of whether music practice and participation can positively contribute to one living a more optimally flourishing life with greater psychological well-being, the next section (Section 5) will proceed to review the recent literature on music and meaning or purpose to further clarify how music can function as a useful means for positively influencing one's sense of meaning or purpose, and in so doing, positively influencing the fourth characteristic component of psychological well-being (the PERMA factor M for meaning).

Flourishing with music and meaning

Given that psychological well-being is considered to consist of positive emotion, engagement, relationships, meaning, and accomplishment, the fourth element of well-being to be considered here is meaning (see also Seligman, 2010, p. 236, 2011, p. 24). De Muijnck (2013) for one has recently suggested that "experiencing life as meaningful seems to be a major component of human well-being, and a major source of motivation for human action" (p. 1291), so having meaning or purpose in life has been considered by scholars to constitute an important element of psychological well-being, and several recent studies have investigated how having meaning

or purpose may contribute in this way. For example, in a study investigating the variety of needs that humans aim to fulfill in order to consider their lives meaningful, Crescioni and Baumeister (2013) reported that "when individuals talk of finding meaning in their lives ... they seek to interpret their own actions and experiences in terms of an existentially meaningful life story," with "such stories depict[ing] actions and decisions as following from important, stable values and contributing to the fulfillment of one or more crucial goals" (p. 3). In another study investigating whether positive factors (including purpose in life, reasons for living, and coping styles) mediated the relationship between stressful life events and suicidal behaviors among participants (n = 416) in college, Wang, Lightsey, Pietruszka, Uruk, and Wells (2007) reported that "both purpose in life and reasons for living had inverse effects on depression, the higher the purpose in life and reasons for living, the lower the depression, and the lower the relationship between depression and suicidal ideation/behavior," and that accordingly, "purpose in life and reasons for living were found to be important predictors of suicide and may reduce the likelihood of suicidal thoughts and behaviors" (p. 202). Moreover, in other recently published work, Bronk, Hill, Lapsley, Talib, and Finch (2009) investigated the relationship among purpose, hope, and life satisfaction among participants (n = 806) and found that "having identified a purpose in life is associated with greater life satisfaction in adolescence, emerging adulthood, and adulthood" (p. 506), Chamberlain and Zika (1992) investigated religiosity as a predictor of meaning in life in a sample of participants (n = 188) and found that "the relationship between life satisfaction and religiosity may well be mediated by meaningfulness" (p. 415), and Byron and Miller-Perrin (2009) investigated the relationship between faith, life purpose, and well-being in participants (n = 103) and found that "faith and life purpose contribute to the development of well-being and may be important characteristics to foster in order to enhance one's personal sense of well-being," and that their "results indicated that life purpose completely mediated the relationship between faith and well-being," which suggests that "the impact of faith on well-being can be explained by life purpose" (p. 68). In another study investigating the structure, levels, and correlates of the presence of meaning in life, and the search for meaning, within four life stage groups (emerging adulthood, young adulthood, middle-age adulthood, and older adulthood) from a sample of participants (n = 8,756) using the internet, Steger, Oishi, and Kashdan (2009) reported finding that, "not only do most people report that they are more likely to feel their lives are meaningful than not, but the more meaning in life people reported, the greater well-being they experienced, at all life stages" (p. 48). It is clearly evident then that several studies have recently suggested that having a sense of meaning or purpose in life constitutes an important element to psychological well-being.

Importantly, since meaning can contribute to psychological well-being, music practice and participation can also contribute to psychological well-being since music practice and participation can contribute to meaning. Several studies have in fact indicated that music practice and participation can contribute to meaning. In "Music and Identity," for example, Frith (1996) argued that "identity is mobile, a process not a thing, a becoming not a being," and that "music, like identity, is both performance and story, describes the social in the individual and the individual in the social, the mind in the body and the body in the mind" (p. 109). In "The Pleasant Life, the Engaged Life, and the Meaningful Life," Sirgy and Wu (2011) further explained that "the person who lives a meaningful life is one that serves what is larger and more worthwhile than just the self's pleasures and desires" (p. 176) and in a study investigating the significance and function of music for participants (n = 52) in Australia, Hays and Minichiello (2005) found that "music provides people with ways of understanding and developing their self-identity; connecting with others; maintaining well-being; and experiencing and expressing spirituality" (p. 437). In other recent research on the musical experiences of participants at live music

events, Lamont (2011) reported from her study of participants ($n = 46$) that one "was linking his own sense of identity as an authentic music fan to a premeditated experience which evoked a state of euphoria, comparing himself with his friends and others who are not 'true' fans" (p. 238) and Packer and Ballantyne (2011) further reported from their study of participants ($n = 10$) that "the festival experience not only contributes to a transitory state of subjective well-being, but can also become part of the way a person defines themselves" and thereby "becomes an 'emotional framework' within which people construct their 'Identity'" that is "likely to have a lasting influence on psychological well-being (e.g., 'Purpose In Life' and 'Self-Acceptance')" (p. 164). Karlsen and Brandstrom (2008) similarly investigated how musical events can influence the identity of participants ($n = 39$) of a music festival and found that music festivals "provide a variety of settings that allow a type of construction of meaning that has impact on the audience's actions and understanding of themselves," and that consequently, "festivals might have significance for development of parallel and contradictory identities, allowing the individual to cultivate the many expressions of self-identity" (p. 364). In "Well-Being in Later Life through Music," Hays (2005) also investigated the function and significance of music in participants ($n = 54$) over the age of 60, and reported finding that "the experience of music was individualistic and intensely personal for most of the informants and had personal meaning that related to perceptions of identity, self-expression and personal well-being" (p. 28). Hays (2005) reported that:

> The data revealed that music was an important part of many informant's lives and through music they often gave meaning to life experiences. Music provided ways for defining and redefining their self-identity, knowing and understanding emotions, and maintaining personal well-being. The data confirmed that most of the participants used music as a symbol for defining their own sense of self and identity. Music was a symbolic representation of who the participants were and how they might like to be perceived by others. (p. 29)

Hays (2005) also informatively reported on how musical participation significantly influenced the well-being of the older participants from his study as follows:

> Participants such as Donald, Mildred, Fred and Noreen, who were in their mid nineties, all believed their well-being and good health was largely attributed to their interest and involvement in music. Music provided the participants with ways of being interested and motivated in life. For example, Mildred described music in her life as giving her "meaningfulness" and felt that she had a purpose and that "each day was worth living". This was largely because she plays and practices the piano as often as she can and draws much pleasure from music. (p. 30)

Indeed, Karlsen and Brandstrom (2008) have suggested that "the festival" be usefully conceived of as "a kind of social practice offering possibilities of identity work" since "the festival setting also provided rich material for the emotional, memory and biographical work mentioned by DeNora (2000), needed for defining, developing, changing and thereby constituting the self" (p. 369). Thus, since meaning can contribute to psychological well-being (see also Bronk et al., 2009; Byron & Miller-Perrin, 2009; Chamberlain & Zika, 1992; Crescioni & Baumeister, 2013; De Muijnck, 2013; Seligman, 2010, 2011; Steger et al., 2009; Wang et al., 2007), and since several studies have indeed suggested that engaging with music can contribute to meaning (see also DeNora, 2000; Frith, 1996; Hays, 2005; Hays & Minichiello, 2005; Karlsen & Brandstrom, 2008; Lamont, 2011; Packer & Ballantyne, 2011; Sirgy & Wu, 2011), there are good grounds for maintaining that engaging with music can positively contribute to psychological well-being.

This section has reviewed the recent literature on music and meaning to further clarify how music can function as a useful means for positively influencing the sense of meaning or purpose. In order to further continue the analysis of whether music practice and participation can positively contribute to one living a more optimally flourishing life with greater psychological well-being, the next section (Section 6) will proceed to review the recent literature on music and personal accomplishments to further clarify how music can function as a useful means for positively influencing personal accomplishments, and in so doing, positively influencing the fifth characteristic component of psychological well-being (the PERMA factor A for accomplishment).

Flourishing with music and accomplishment

Given that psychological well-being is considered to consist of positive emotion, engagement, relationships, meaning, and accomplishment, the fifth element of well-being to be considered here is accomplishment (see also Seligman, 2010, p. 236, 2011, p. 24). Seligman (2010) considered accomplishment to be an important element of positive psychology since "many people are motivated to achieve, to have mastery, to have competence, even if it brings no positive emotion, no engagement, no relationships, and no meaning" (p. 234). In "Achievement and the Meaningfulness of Life," James (2005) similarly argued that, "all other things being equal, a life with some achievements in it is more meaningful than one without any achievements" (p. 429). So accomplishments have been considered by scholars to constitute an important element of psychological well-being, and several recent studies have investigated how accomplishments may contribute in this way. Kaplan and Maehr (1999) investigated the role that achievement goals play in facilitating the psychological well-being of students ($n = 168$) and reported that "pursuing task goals was found to have a significant positive relationship with all indices of well-being, as well as with perceptions of academic efficacy and GPA" (p. 351). Hassanzadeh and Mahdinejad (2013) also investigated the relationship between happiness and achievement motivation among graduate students ($n = 50$) by having them take the Oxford Happiness Questionnaire (OHQ) and Achievement Motivation Questionnaire (AMQ) and found "a significant relationship between happiness and achievement motivation" (p. 53). In another study, Avey, Reichard, Luthans, and Mhatre (2011) conducted a meta-analysis that included 51 independent samples ($n = 12,567$ employees) for the positive core construct of Psychological Capital (PsyCap) – which consists of "the psychological resources of hope, efficacy, resilience, and optimism" (p. 127) – and reported that "the evidence accumulated over the past several years supports that PsyCap [Psychological Capital], as a second-order core factor comprised of hope, optimism, efficacy, and resilience, is significantly and strongly related to employee attitudes generally considered desirable by human resource management," including "job satisfaction, organizational commitment, and psychological well-being at work" and "is negatively related to attitudes considered undesirable, such as employee cynicism, turnover intentions, and employee stress and anxiety" (p. 146). Avey et al. (2011) further reported that "employees' PsyCap was positively related to their generally recognized desirable behaviors, such as organizational citizenship behaviors, and negatively related to their undesirable behaviors, such as deviance" (p. 146). It is clearly evident then that several studies have recently suggested that accomplishments constitute an important element to psychological well-being.

Importantly, since accomplishments can contribute to psychological well-being, music practice and participation can also contribute to psychological well-being since music practice and participation can contribute to accomplishments. A number of studies have in fact suggested that engaging with music can contribute to accomplishments. For instance, in a study

investigating the meaning of the singing experience among participants (n = 673) in high school choir, Hylton (1981) found that "music provides opportunities for achievement in non-competitive situations," that the "gratification gained through music is a byproduct of achievement per se rather than competition," and that "the self-esteem that results from musical accomplishment may contribute greatly to an individual's sense of well-being resulting in feelings of accomplishment, success, and pride" (p. 296). In other research investigating the use of an electronic music program that enables participants (n = 33) suffering from spinal cord injury (SCI) to form musical bands and play songs while performing therapeutic exercises in an occupational therapy program, Lee and Nantais (1996) reported finding that "clients who might not otherwise have socialized spend time working toward a common goal of musical accomplishment and public performances, and this has promoted strong bonds among band members" (p. 367). In "Use of Electronic Music as an Occupational Therapy Modality in Spinal Cord Injury Rehabilitation," Lee and Nantais (1996) further reported that their

> clients have demonstrated increased motivation to participate in their rehabilitation. The quality of music produced has led to requests for public performances. The sense of accomplishment that program participants feel when they master musical selections or receive audience approval encourages community reintegration because this program highlights the abilities of persons with SCI ... The musical accomplishment experienced when a piece is mastered gives clients heightened motivation, self-esteem, and a feeling of creativity. (pp. 362, 367–368)

Additionally, in a study exploring the effectiveness of improvisational music therapy on the communicative behavior of children (n = 11) with autism, Edgerton (1994) found that the improvisational music therapy was effective in improving the communicative behavior of children with autism in musical conditions, and that improvisational music therapy "not only allows for spontaneity and flexibility, but also allows for successful experiences" (pp. 50–52). In another study reviewing the neurocognitive effects of childhood cancer and its treatment, Hiscock, O'Callaghan, Goodwin, and Wheeler (2013) discussed how recent work in the literature has suggested that "music training can improve intelligence, attention, and memory as well as provide a medium for interaction, coping, stress reduction, and improved self-esteem" (p. 93). In a study investigating whether music therapy techniques could be used to improve muscle strength, spasticity, lung capacity, self-esteem, and quality of life (QOL) in children (n = 39) with physical disabilities, Klaphajone et al. (2013) reported finding that "music therapy could improve grip strength, increase lung capacity, reduce muscle spasticity, and increase self-esteem and QOL and did so for the study participants with physical disabilities" and that "it also provided an observable spirit boost and improved self-esteem for the children involved and their caregivers during the musical performances" (p. 23). Finally, in a discussion of how music practice and participation can result in a sense of accomplishment, Croom (2012a) has pointed out that "A well executed and emotionally inspiring musical performance requires not only musical knowledge and technique, but also a performer's confidence and social grace, and the collective manifestation of these features in a single musical act by the performer surely counts as a bona fide accomplishment," and that

> since people often listen to music because they enjoy it, the musician's act of performing a musical work for an audience of listeners is at the same time an act of providing listeners with something that they enjoy. Thus, the musician's ability to competently bring joy and pleasure to others through their musical performances can provide them with another way in which to feel like they have genuinely accomplished something. (pp. 9–10)

Consequently, since accomplishment can contribute to psychological well-being (see also Avey et al., 2011; Hassanzadeh & Mahdinejad, 2013; James, 2005; Kaplan & Maehr, 1999; Seligman, 2010, 2011), and since several studies have indeed suggested that music practice and participation can contribute to accomplishment (see also Croom, 2012a; Edgerton, 1994; Hiscock et al., 2013; Hylton, 1981; Klaphajone et al., 2013; Lee & Nantais, 1996), there are good grounds for maintaining that music practice and participation can positively contribute to psychological well-being.

Everything in moderation: Cautionary notes for optimal musical experiences

As I have argued up to this point, music practice and participation can be productively utilized in our everyday lives for the purpose of promoting psychological well-being or mental health. However, as with all else in life, what is good comes with moderation (Aristotle, 2011). In other words, not just *any kind* and *any amount* of music practice and participation is *optimal* for psychological well-being, for as with any other activity involving exertion from the body, music practice and participation can be carried out in an incorrect manner or to an excessive (and so maladaptive) extent (Zaza, 1998). Some problems associated with music practice and participation are more general and include psychosomatic symptoms associated with performance anxiety as well as injuries resulting from inappropriate practicing techniques, poor posture, and poor physical conditioning (Langendorfer, Hodapp, Kreutz, & Bongard, 2006). Yet other problems associated with music practice and participation are more instrument-specific and include, for example, problems with orofacial musculature especially targeting woodwind players (Fuks & Fadle, 2002) and musculoskeletal pain and problems in the hands and wrists especially targeting pianists (Yoshimura, Paul, Aerts, & Chesky, 2006).

The British Association for Performing Arts Medicine, for example, conducted a study on a large sample of musicians (n = 1,046) and found that 52% of them had problems resulting from technical faults or inappropriate practicing procedures, which included improper performance techniques, excessive practicing without breaks or rest, poor posture, insufficient exercise, and general misuse of the body (Wynn Parry, 2004, p. 47). Kreutz, Ginsborg, and Williamon (2008) further reported that "significant proportions of [the] health problems among music performance students emerge from general dispositions, such as posture [which can affect the spine and upper extremities] and fatigue, and thus are not specific to the instrument played," and therefore suggested that "these [more general] issues should take priority perhaps even over those that are specific to the voice or individual instrument being played" (pp. 3, 11). Accordingly, prior research has usefully suggested that music participants aiming to prevent or downplay potential music-related injuries while maximizing music-related benefits should consider taking both more general as well as more instrument-specific precautionary measures. For example, music participants are advised to pay particular attention to their overall posture while performing and spend an appropriate amount of time warming up, cooling down, and resting at intervals during practice sessions, as well as adopting more instrument-specific precautionary measures, the details of which will depend on the particular musical instrument being used (Kreutz, Ginsborg, & Williamon, 2008; Wynn Parry, 2004). As music departments and conservatories become increasingly aware of the potential risks associated with music practice and participation, special programs concerned with both the prevention and treatment of music-related injuries are increasingly being created (Chesky, Dawson, & Manchester, 2006). Nevertheless, it is advisable for everyone interested in investing a healthy

part of their lives to music practice and participation that they seek further instrument-specific guidance from a trusted and experienced professional. Importantly, note that even here, one can observe that whatever drawbacks one might experience from music practice and participation (e.g., pain in the hands and wrists from piano practice) may be curtailed – and even outweighed – by the many other benefits (e.g., reasons or motivations for increased social relations) that music so readily affords us.

Conclusion

In "Flourish: Positive Psychology and Positive Interventions," Seligman (2010) maintained that the elements of well-being consist of "PERMA: positive emotion, engagement, relationships, meaning, and accomplishment" (p. 236; see also Seligman, 2011, p. 24). Although the question of what constitutes human flourishing or psychological well-being has long remained a hot topic of debate among scholars, it has recently been argued in the literature that a paradigmatic or prototypical case of human psychological well-being would largely manifest most or all of the five factors of positive emotion, engagement, relationships, meaning, and accomplishment. Further, in "A Neuroscientific Perspective on Music Therapy," Koelsch (2009) had also suggested that "music therapy can have effects that improve the psychological and physiological health of individuals" (p. 374), so it seems plausible that music practice and participation can positively contribute to one living a more optimally flourishing life with greater psychological well-being. However, recent studies on music had not yet been reviewed and integrated under the PERMA framework from positive psychology to further explore and explicate this possibility. Therefore, in order to further explore and explicate the possibility that music can be used to contribute to one living a flourishing life with greater psychological well-being, this article reviewed and discussed recent research from music and positive psychology to investigate whether music practice and participation could be used to positively influence emotions, engagement or flow experience, interpersonal relationships, experience of meaning or purpose in life, and the sense of accomplishment. Specifically, Section 2 ("Flourishing with Music and Positive Emotion") drew upon the literature to argue that music can be used to positively influence emotions, Section 3 ("Flourishing with Music and Engagement") drew upon the literature to argue that music can be used to positively influence engagement or flow experience, Section 4 ("Flourishing with Music and Relationships") drew upon the literature to argue that music can be used to positively influence interpersonal relationships, Section 5 ("Flourishing with Music and Meaning") drew upon the literature to argue that music can positively influence the experience of meaning or purpose in life, and Section 6 ("Flourishing with Music and Accomplishment") drew upon the literature to argue that music can be used to positively contribute to the sense of accomplishment. Finally, Section 7 ("Everything in Moderation") drew upon the literature to briefly review several cautionary notes for optimal musical experiences. In this way the present article contributes to the extant literature on music and psychological well-being by showing how music practice and participation can positively influence all five of the PERMA factors, and consequently, that there are empirically supported grounds for the main claim of this article that music practice and participation can positively contribute to one's cultivation of greater psychological well-being and a more flourishing life.

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Note

1. Berridge and Kringelbach (2011) have even proposed that "eudaimonic wellbeing" may differentially correlate with functional activity in the anterior cingulate and in left prefrontal cortex whereas "hedonic wellbeing" may differentially correlate with functional activity in the subgenual cingulate and orbitofrontal cortices (pp. 19–21).

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