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<th>Enhancing wellbeing: An emerging model of the adaptive functions of music listening.</th>
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Abstract

Affect regulation is generally considered the most important function of music listening (FML). Yet, models of wellbeing also highlight engagement, relationships, meaning, achievement, and other adaptive functions that music may facilitate. However, there is currently no consensus as to how these adaptive FML co-function within an enhancement system that supports wellbeing. The current study used the collective intelligence methodology, Interactive Management (IM) to address this gap in the literature. Four IM sessions were conducted, two with younger adults ($N = 24$) and two with older adults ($N = 19$). Participants responded to the stimulus question “why do you listen to music?” Each participant then voted for five FML they believed were most significant for enhancing wellbeing. The eight highest ranked functions were entered into Interpretive Structural Modelling software, and relations between pairs of FML were discussed. Four structural models were generated demonstrating potential interdependencies in FML in the context of wellbeing enhancement. Age differences emerged in the FML considered adaptive: younger adults emphasized affect regulation and social connection, whereas older adults emphasized more eudaimonic functions of music (e.g., Transcendence and personal growth). The influence of FML are discussed in reference to key wellbeing and developmental theories.
Research has highlighted the importance of music listening for older adults (Laukka, 2007) and younger adults (Miranda & Gaudreau, 2010; Saarikallio, 2011) in promoting quality of life and managing psychological distress. A review of the literature reveals a wide range of affective, cognitive and social functions of music listening (FML). Affective functions dominate in the literature published to date, with listening to music for mood regulation being reported as the most important function of music (Juslin & Sloboda, 2010). The majority of research in the area focuses on younger adults, with few studies examining the broader relationship between music and wellbeing across the lifespan. Listeners also report listening to music to increase focus and attention and for the cognitive stimulation associated with the analysis of complex compositions (Chamorro-Premuzic & Furnham, 2007; Chin & Rickard, 2012). The social functions of music include establishing social identity (North, Hargreaves, & O’Neill, 2000), social atmosphere (Laukka, 2007) and facilitating social bonding (Huron, 2001). All of these functions are potentially important for understanding the relationship between music listening and wellbeing across the lifespan, however further empirical work and efforts at theory building are needed.

**Wellbeing and music listening**

According to traditional perspectives, the components of subjective wellbeing (SWB) are a greater ratio of positive to negative emotions, and a sense of satisfaction with life (Diener, Eunkook, Lucas, & Smith, 1999). However, eudaimonic perspectives provide a broader definition of wellbeing. For example, the *Authentic Happiness Theory* proposes that there are three routes to wellbeing; through pleasure, meaning, and engagement (Seligman, 2002). The pursuit of engagement and meaning have been found to contribute more to life satisfaction than hedonic pleasure (Peterson, Park, & Seligman, 2005). It is suggested that eudaimonic activities are associated with improved affective functioning in the long term, as well as
increased meaning and transcendence, whereas hedonic activities increase pleasure and positive affect in the short term (Huta & Ryan, 2009). The potential for music to provide routes to wellbeing other than pleasure is supported by two recent qualitative studies (Lamont, 2011; Schafer, Smukalla, & Oelker, 2014), where it was found that, in addition to pleasure, both absorption and transcendence were commonly reported experiences in response to music listening.

Affective functions

Positive psychology interventions, such as practicing kindness, mindfulness, and positive reminiscence have demonstrated that levels of SWB can be increased (Sin & Lyubomirsky, 2009). A large corpus of evidence using qualitative, quantitative and experimental methods also supports the thesis that music listening can induce positive emotions (e.g. Juslin, Liljestrom, Vastfjall, Barradas & Silva, 2008; Salimpoor, Benovoy, Longo, Cooperstock & Zatorre, 2009) and regulate negative affect (Thayer, Newman, & McClain, 1994). As a core component of SWB is affective, it stands to reason that activities that can generate positive emotions, such as music listening, have potentially important implications for increasing wellbeing. According to Fredrickson’s (2004) Broaden and Build Theory of Positive Emotions, regulation of negative affect and the regular cultivation of positive emotional states will enhance wellbeing by increasing resilience and building psychological resources (Cohn, Fredrickson, Brown, Mikels, & Conway, 2009).

Eudaimonic functions

Notably, studies of music and wellbeing have tended to focus on the affective aspects of wellbeing, whereas music’s impact on more eudaimonic dimensions of wellbeing has been neglected. Maslow’s theory of positive psychological functioning was informed by his work on peak experiences (1999). He described these experiences as states of intense positive
affectivity, increased self-realisation and flow-like states of consciousness (Csikszentmihalyi, 2008). He concluded that music was one of the most reliable ways to induce these transformative experiences. Features of these peak experiences are echoed in Gabrielsson’s (2010) analysis of strong experiences with music.

**Social functions**

Individuals may also use music to sustain and reinforce their sense of identity (Hays, 2005; Laiho, 2004). Narrative identity is said to give meaning to people’s lives, leading to psychological growth and increased wellbeing (Haslam, Jetten, & Haslam, 2012; Pennebaker & Seagal, 1999). Eudaimonic accounts of well-being commonly emphasise social relationships (Keyes, 1998; Ryff, 1989). For example, the model of wellbeing developed by Keyes (1998) distinguishes subjective, psychological, and social well-being dimensions. Importantly, research has consistently highlighted how music listening can support social connection and atmosphere. Consistent with the model of wellbeing developed by Keyes, other dimensions of social wellbeing that may be enhanced by music listening include social integration, acceptance and contribution.

Understanding the full range of music listening functions that influence wellbeing requires further investigation. Previous investigations have largely used survey methods to catalogue and analyse FML. Existing taxonomies of music listening behaviours are useful, but do not examine interdependencies between FML, or allow for the development of structural hypotheses in relation to how different functions of music are related in bringing about enhanced psychological functioning. The extent to which the FML are interrelated, or influence each other remains unknown. Addressing this gap in the literature, the current study uses the collective intelligence methodology, Interactive Management (IM), to examine these
interdependencies, specifically, by building consensus models describing how different FML enhance one another in a system of positive influence.

*A lifespan perspective on FML*

The present study will be the first qualitative study to allow direct comparison between younger and older adults in examining group differences in FML. Population demographics have changed over the past century, with increasing numbers of older adults living increasingly longer lives, with implications for models of health, wellbeing and social care across the lifespan (World Health Organization, 2014). The bulk of previous work on the FML has focused on younger adults. We sought to extend this work and focus on both young and older adults. Developmental differences may influence the selection and impact of listening strategies on wellbeing, but we currently know very little about these potential influences. At the same time, there are a variety of theories of lifespan development that may inform our understanding of the relationship between FML and wellbeing in younger and older adults.

For example, Baltes and Baltes (1990) describe selection, optimisation, and compensation (SOC) as life management strategies that contribute to successful ageing and wellbeing. The SOC theory proposes that older adults adapt to age-related decline by selecting environments and experiences in keeping with their abilities, optimising their available resources, and employing compensatory strategies in the face of age-related losses. The Lifespan Theory of Control (Heckhausen & Schulz, 1995) presents another version of this same theoretical idea, specifically, by proposing two forms of control. Primary control allows us to control or regulate the environment to suit our developmental needs. It is argued that declines in biological and psychological functioning associated with ageing reduce an individual’s ability to affect change in the environment, or exercise primary control, thus compensatory and
secondary control strategies become more prominent in advanced age (Baltes & Baltes, 1990; Heckhausen & Schulz, 1995). Therefore, it’s possible that a greater emphasis will be placed on self-regulatory, compensatory or secondary control FML amongst older adults when compared with younger adults. For example, music listening may compensate for decline by facilitating emotion regulation or transcendence in the face of challenges or losses, providing contextual cues that support cognitive activities, or regulating expectations when pursuing goals.

Another theory that may be relevant to understanding the link between FML and wellbeing is Socio-emotional selectivity theory (Cartensen, 1995), which proposes three motives that moderate age-related changes in social interaction: emotion regulation, development and maintenance of self-concept, and information seeking. In old age a limited chronological future directs attention toward the affective dimension of social interaction. By contrast, identity development and information seeking through new social networks are of greater importance for younger adults. As such, we might expect that older adults will focus on the use of music to enhance social connection in close relationships, whereas younger adults might be expected to focus on identity functions and using music in the formation of new social connections and information acquisition related to adaptive success and wellbeing.

Research also suggests that negative affect decreases and emotion regulation improves in old age (Cartensen & Lockenhoff, 2003) and this may be reflected in a stronger emphasis on affect regulation FML amongst older adults. One previous investigation did find a developmental shift in how individuals engage with music listening; specifically, music listening appears to be more frequent in youth, particularly for affect regulation (Lonsdale & North, 2011). Thus, an alternative hypothesis is that the source of enhanced affect regulation in older age derives from more fundamental aspects of personality and emotional
development and there may be less of a requirement to use music to regulate emotion in older adulthood. Similarly, although some studies report a selective preference for positive over negative information, or positivity bias in older adults (Mather, 2005), other studies suggest that the major difference between younger and older adults may be in the reduction in negative affect and relative stability of positive affect in old age (Mroczek, 1998). Therefore, as positive emotion remains important throughout adult development, we do not anticipate less affective FML among older adults in general, but a stronger emphasis on positive relative to negative affordances of music listening in older relative to younger adults.

Finally, like positive emotion, transcendence is a core virtue highlighted by positive psychology (Peterson & Seligman, 2004), and has been reported in music listening experiences (Lamont, 2011; Schafer et al., 2014). It has been suggested that due to a greater awareness of their mortality and an accompanying need to find meaning older adults have a greater sense of transcendence and spend more time seeking it (Piedmont, 1999), so it is possible that listening to music for transcendence and meaning is more common in older adults when compared with younger adults.

Aims

Importantly, we sought to ground our understanding of the link between FML and wellbeing, and age-differences in FML in reports provided directly by younger and older adults. To do so we used the collective intelligence methodology, Interactive Management (IM). The IM process is a system of facilitation and problem solving based on John Warfield’s science of generic design (Warfield & Cárdenas, 1994). The current study represents the first application of IM to understanding the complex system of interdependencies between music listening functions. This study first sought to create a comprehensive list of music listening functions, and to determine which functions are considered most adaptive for wellbeing.
Then, using IM, participants generate consensus-based models explaining how FML interact to bring about enhanced wellbeing. Finally, this study sought to determine whether there were age differences in the FML described by older and younger adults. The results of this exploratory analysis are presented below.

**Method**

**Participants**

Participants were recruited via advertisements in local and national media seeking volunteers to join a discussion group about the benefits of music listening. Male and female English speakers, aged between 18-30 and 60-85 who listen to music and were not resident in a nursing home or care facility were selected to attend a collective intelligence session. Participant characteristics are presented in Table 1.

**Procedure**

IM is a facilitated group design process designed to enhance the collective problem solving ability of groups. Three steps were used in the process.

1. The first step involved idea generation. The current application of IM employed the *nominal group technique* for idea generation (NGT; Delbecq, Van De Ven, & Gustafson, 1975). NGT involves four steps: (i) presentation of a stimulus question to participants, *'Why do you listen to music?'* (ii) silent generation of ideas in writing by each participant working alone; (iii) presentation of ideas by each participant, with recording and posting of the individual ideas on large post-its on the idea wall in front of the group; (iv) serial discussion of the listed ideas by participants for sole purpose of clarifying their meaning (i.e., no evaluation of ideas is allowed at this point).
2. The second step involved a closed voting process in which each participant was asked to select five ideas from the idea wall they believed were most significant for enhancing wellbeing.

3. The third step involves structuring selected ideas using software. *Interpretive structural modelling* (ISM; Warfield & Cárdenas, 1994) is a computer-assisted methodology that helps a group to identify relationships among ideas and to impose structure on those ideas. This structuring work can be considered an activity in ‘mapping perceptions’ of the group members. Participants are given the opportunity to explore connections between ideas in ways that may otherwise go undetected. IM can, thus, provide participants with useful insights into the relationships between ideas and it generates a structural map of those relationships. The five steps of ISM are: (i) identification and clarification of a list of ideas (e.g., using NGT); (ii) identification and clarification of a “relational question” for exploring relationships among the ideas generated in the previous step. In the current study, given our interest in examining the interdependencies between music listening functions in bringing about wellbeing, we focused on enhancement relations, specifically, by asking the following question: “In the context of increasing wellbeing, does FML-A significantly enhance FML-B”; (iii) using the relational question to explore connections between pairs of ideas. The group engaged in discussion about each relational question and a vote was taken to determine the group’s judgement about the relationship. A “yes” vote was entered in the ISM software by the computer operator only if a majority consensus (>70%) was reached, otherwise, a “no” vote is entered; (iv) display and discussion of the structural map based on the group’s judgement; and (v) amendment to the map by the group, if needed.
The three-phase procedure outlined above (idea generation, voting, structural modeling) was completed in one session lasting 2 to 3 hours. Four IM sessions were conducted, two with younger adults, and two with older adults. These sessions were facilitated by the lead author and a co-facilitator who operated the ISM software.
<table>
<thead>
<tr>
<th></th>
<th>Younger Adults</th>
<th></th>
<th>Older Adults</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YA Group 1</td>
<td>YA Group 2</td>
<td>OA Group 1</td>
<td>OA Group 2</td>
</tr>
<tr>
<td></td>
<td>N = 11 (6 male)</td>
<td>N = 14 (2 male)</td>
<td>N = 9 (5 male)</td>
<td>N = 10 (5 male)</td>
</tr>
<tr>
<td>Age range (M, SD)</td>
<td>22-29 years</td>
<td>18-24 years</td>
<td>60-72 years</td>
<td>61-75 years</td>
</tr>
<tr>
<td></td>
<td>((M = 24.91, SD = 2.30))</td>
<td>((M = 20.07, SD = 2.20))</td>
<td>((M = 64.22, SD = 4.26))</td>
<td>((M = 67.50, SD = 4.67))</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Second level</td>
<td>28%</td>
<td>64%</td>
<td>33%</td>
<td>30%</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>36%</td>
<td>36%</td>
<td>33%</td>
<td>20%</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>36%</td>
<td>33%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>91%</td>
<td>79%</td>
<td>67%</td>
<td>80%</td>
</tr>
<tr>
<td>Retired</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>21%</td>
<td>22%</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Hours per day spent</td>
<td>4.36</td>
<td>2.75</td>
<td>3.61</td>
<td>2.08</td>
</tr>
<tr>
<td>listening to music</td>
<td>((SD = 3.20))</td>
<td>((SD = 1.63))</td>
<td>((SD = 3.04))</td>
<td>((SD = 1.96))</td>
</tr>
<tr>
<td>Do you play a musical instrument (including voice)?</td>
<td>Yes</td>
<td>55%</td>
<td>36%</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>Yes, but not anymore</td>
<td>27%</td>
<td>28%</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>18%</td>
<td>36%</td>
<td>33%</td>
</tr>
<tr>
<td>If Yes, or Yes, but not anymore:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of regular practice</td>
<td>4 - 14 years</td>
<td>1-15 years</td>
<td>2-10 years</td>
<td>2-50 years</td>
</tr>
<tr>
<td></td>
<td>((M = 8.11, SD = 3.29))</td>
<td>((M = 8.44, SD = 5.20))</td>
<td>((M = 5.00, SD = 3.55))</td>
<td>((M = 19.25, SD = 21.69))</td>
</tr>
<tr>
<td>Years of formal training</td>
<td>0-9 years</td>
<td>0-13 years</td>
<td>0.5-8 years</td>
<td>0-6 years</td>
</tr>
<tr>
<td></td>
<td>((M = 4.11, SD = 2.84))</td>
<td>((M = 6.00, SD = 4.95))</td>
<td>((M = 3.63, SD = 3.54))</td>
<td>((M = 2.60, SD = 2.70))</td>
</tr>
</tbody>
</table>
Results

Results are divided into three sections. The first describes the four structural models generated during each IM session. The second presents a category analysis of the FML generated by younger and older adults. The third and final section presents a meta-analysis of the top ranked ideas from all sessions, and an overall influence map for each age group.

---INSERT TABLE 1 HERE---

I: Structural models generated by younger and older adult groups

Younger Adults Group 1

Younger adults generated 36 ideas in response to the stimulus question ‘Why do you listen to music?’. The top eight rank-ordered FML decided upon during voting are presented in Table 2 with number of votes in parentheses.

Table 2. Young Adult Group 1 responses to stimulus question 'Why do you listen to music?'

<table>
<thead>
<tr>
<th>Function of Music Listening</th>
<th>Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress Relief (5)</td>
<td>“To relieve stress...If you’re stuck in traffic, you put on music and you feel a bit better” (Female, 24)</td>
</tr>
<tr>
<td>Relaxation (4)</td>
<td>“To relax, I think when you’re listening to music you like, no matter what type, it’s relaxing” (Male, 22)</td>
</tr>
<tr>
<td>Personal Meaning (4)</td>
<td>“Because music gives meaning to me, if I feel alienated it sort of gives me personal meaning” (Male, 24a)</td>
</tr>
<tr>
<td>Emotional Engagement (3)</td>
<td>“I listen to music to really engage with an emotion I’m experiencing” (Female, 26)</td>
</tr>
<tr>
<td>Entertainment (3)</td>
<td>“To be entertained, particularly in terms of live music” (Male, 26)</td>
</tr>
</tbody>
</table>
Personal Space (3)  “It helps kind of create a personal space... even though there’s people all around you” (Female, 24)

Negative Mood Improvement (3)  “I use music a lot to counter negative moods, negative ways of thinking” (Male, 24a)

Persistence (3)  “I always find with music I’ll run faster or work longer ... because I’ll have a rhythm going” (Male, 24b)

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**Figure 1.** Enhancement Structure for Younger Adults Group 1

As can be seen in Figure 1, ‘personal meaning’ and ‘personal space’ emerged as the most influential FML for the first group of young adults. Younger adults argued that listening to music supports the creation of a private, personal space. They reported using this personal space in a number of ways, including protection from distraction, and from unwanted interaction with others. They reasoned that the creation of a personal space enhances emotional engagement, by providing a setting for reinforcing, or intensifying your current

---

1 Structural models generated are to be read from left to right, with relational lines indicating ‘significantly enhances’. When two or more elements appear together in the same box, this indicates a reciprocal relationship between these elements.
feeling. Listeners tended to use music to engage with positive affective states, “so if you’re feeling happy, when you listen to happy music it makes you feel more happy, or really engage with the emotion” (Female, 26).

The private environment afforded by music listening also served to enhance the interrelated functions of relaxation, stress reduction and negative mood improvement. One participant noted, “When I’m listening to music, I can escape sort of, even though there’s people around... I can escape that stress,” (Female, 24). When effective, affect regulation by music listening enhances being entertained by music they argued, because “if you’re releasing stress you’re more susceptible to being entertained’ (Male, 26).

At the third stage of the enhancement structure, it becomes apparent that entertainment, while important for wellbeing, is facilitated by the influence of music on affect. Firstly, the group argued that emotional engagement, whether positive or negative was entertaining, “I suppose any state of heightened feeling would be entertaining” (Female, 22), and that using music to restore emotional balance also enhances the entertaining qualities of music, by creating the ideal affective conditions for entertainment, “well, when you’re at a party and they have background music on, it's to put people at ease....so they can be entertained” (Female, 24).

The younger adults noted that they listened to music because it is a source of personal meaning for them, and also that it gives added meaning to their everyday experiences. They argued that having a source of personal meaning in their lives facilitated affect regulation because finding meaning in adversity through music listening could enhance mood improvement, “if you are aware of meaning in your life it can help with changing moods in certain circumstances”. However, it was argued that affect regulation does not enhance
meaning, “I don’t think feeling less negative in general is gonna make you feel more meaning” (Female, 28).

They also claimed that listening to music helped them to persist with challenges -- physical, menial, and cognitive -- and this was enhanced by music’s ability to create a private, personal space free from distraction. For example, “At the gym I used to go to, I was the only girl who went... all the guys were there doing weights... I just had to ignore them and create a personal space, with my music, and just get on with it, and that really helped me” (Female, 22).

Younger Adults Group 2

The second younger adult group generated 40 ideas in response to the stimulus question.

Table 3. Young Adult Group 2 responses to stimulus question 'Why do you listen to music?'

<table>
<thead>
<tr>
<th>Function of Music Listening</th>
<th>Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>To be sociable (10)</td>
<td>“You can listen to music together and go out dancing, so there’s a social aspect to it” (Female, 19)</td>
</tr>
<tr>
<td>Stress reduction (9)</td>
<td>“When I’ve had a long day, I always listen to music in the shower and leave the stress behind” (Female, 18)</td>
</tr>
<tr>
<td>Reminiscence (8)</td>
<td>“There are certain songs that remind me of home or my family, you know, if you’re feeling homesick” (Female, 19)</td>
</tr>
<tr>
<td>To reduce boredom (7)</td>
<td>“It helps to cure boredom, it kinda occupies your mind for a while” (Male, 20)</td>
</tr>
<tr>
<td>Negative mood improvement (6)</td>
<td>“When I’m in a bad mood listening to music makes me feel better” (Female, 18)</td>
</tr>
</tbody>
</table>
Bonding (5)  “with one friend you can go to a reggae gig and enjoy that together, whereas with my dad, he’d take me to a classical gig and it’s sort of a bonding, mutual appreciation thing” (Female, 24)

To feel happy (5)  “It just makes me feel happy” (Female, 18)

To reduce fear (4)  “If you’re ever scared in the house on your own in the silence you start imagining things, so I always put on music so that you don’t hear noises, or whatever” (Female, 18)

---

Figure 2. Enhancement Structure for Younger Adults Group 2

In this enhancement structure reminiscence is a driver of all other adaptive music listening functions (see figure 2). The conception of reminiscence put forward by this group was quite specific, it is enacted consciously in an effort to remember significant others, for example “if you’re feeling homesick” (Female a, 19). They argued that this form of purposeful reminiscence significantly enhances being sociable “I think reminiscence probably just makes you happy, and then you're more inclined to be sociable because you're happy” (Female b, 19). Another social function of music listening put forward by participants was bonding through shared musical experiences. Reminiscence was also thought to enhance bonding,
because “If you were listening to certain songs to remind you of say when you were at a concert, you’d want to go to another gig again or something” (Female a, 18).

They argued that listening to music to be sociable and bonding through music were interrelated because “if you're being sociable and you have a shared interest in the same kind of music then you're going to be bonding over that” (Female b, 18). Further, they argued that bonding by music listening would reduce boredom. “Well, if you’re bonding with someone then you’re not going to be as bored as [you would be] in an awkward conversation” (Female, 20).

The ideas of bonding and mood improvement were also seen as enhancing each other reciprocally. “In the context of a gig, while you’re there together and sharing the experience... that would improve your mood” (Female, 24), and mood improvement enhances bonding because, “if you're in a bad mood whenever you're in a gig or whatever, as soon as they start playing your mood improves and you can get into it more and actually give in to the experience with other people”

The participants distinguished between the affective uses of music for ‘negative mood improvement’ and ‘to feel happy’. Participants found that music could be used to bring happiness when your mood was neutral, but also when in a bad mood. However, in spite of their distinctiveness as FML they were seen as interrelated, because in listening to music to feel happiness “you are going from a neutral mood to happy, which is an improvement” (Female, 23), and that mood improvement could enhance feeling happy in the context of music listening because “you're mood is improving, when you're mood is improved you become happy, it seems to me they go together.” (Male, 18).

Participants reported using music to provide a sense of security, and to reduce, or avoid feeling fear when home alone. This function of music they reasoned was enhanced by
music’s mood improving and stress reducing benefits, “I think if you're in a good mood, you're bound to be more optimistic, so you hear a noise outside, it's just a cat, but if you're in a bad mood or anxious or something, you'd be more inclined to instantly go for a negative” (Female, 24).

**Older Adults Group 1**

Older adults generated 34 ideas in response to the stimulus question ‘Why do you listen to music’.

**Table 4.** Older Adult Group 1 responses to the stimulus question ‘Why do you listen to music?’

<table>
<thead>
<tr>
<th>Function of Music Listening</th>
<th>Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxation (4)</td>
<td>“For relaxation… I find that having music on sort of calms me, I can feel it in myself” (Female, 62)</td>
</tr>
<tr>
<td>Personal meaning (4)</td>
<td>“It’s just such an important part of my life, it means so much to me, I don’t know how to put it into words” (Female, 62)</td>
</tr>
<tr>
<td>Dance (3)</td>
<td>“Because it makes you get up and dance” (Female, 70)</td>
</tr>
<tr>
<td>Reducing loneliness (3)</td>
<td>“For loneliness… I live on my own, and so the radio is my companion, it feels like there is someone with me when I have the music on” (Female, 70)</td>
</tr>
<tr>
<td>Social Connection (3)</td>
<td>“To feel connected to others… I find music is so universal that it’s such a connection with the rest of the world” (Female, 62)</td>
</tr>
<tr>
<td>Therapeutic benefits (3)</td>
<td>“Because music is therapeutic, it brings the body and the brain to life” (Female, 65)</td>
</tr>
<tr>
<td>Transportation (2)</td>
<td>“Listening to music you can be transported away from the mundane” (Male, 65)</td>
</tr>
<tr>
<td>Stress reduction (2)</td>
<td>“It reduces stress… one time... I was so</td>
</tr>
</tbody>
</table>
angry... so the only thing I had to do was put on a CD to literally lift me out of that type of stress” (Female, 65)

Figure 3. Enhancement Structure for Older Adults Group 1

Older adults agreed that transportation enhanced all other FML in the system (see figure 3). The older adults in this session reported that music had the ability to transport the listener away from the mundane, to transcend everyday experience. They spoke about being ‘uplifted’ and ‘softened’ by the music. Although less highly voted than other functions of music, it was seen as a critical driver of other music listening functions. The older adults argued that this function of music enhanced stress reduction, “absolutely, that's the door, that's the way out...it's [stress reduction] a natural consequence of transportation” (Male, 60).

The inter-related functions of stress reduction, relaxation, dance, reducing loneliness and social connection were seen as enhancing each other reciprocally by older adults. In the idea generation phase, older adults contrasted between stress reduction and relaxation. Music was used to cope with acute stressors, “I was so angry with myself... so the only thing I had to do was put on a CD to literally lift me out of that type of stress” (Female, 65), but also to promote relaxation in non-stressful situations “I just love to have music in the background, it
sort of calms me... I would still consider it to help with the stresses of living, but it’s a different situation” (Female, 62). In spite of this distinction, stress reduction and relaxation were seen as having a reciprocal relationship in the context of music listening, “you know relaxing by its very nature is one where your blood pressure will reduce, stress generally might increase blood pressure, so if you take a physiological marker, then it seems to me that the two are directly related,” (Male, 60).

Relaxation and dance were also seen as enhancing each other reciprocally. Older adults reasoned that relaxation would aid dancing, “you really do have to be in the mood for dancing, and you have to be relaxed” (Female, 62), but that dancing could also enhance relaxation “sometimes if my mood isn't great I put on a bit of music and there I go - dancing, and it lifts my mood, so yes, dancing would definitely enhance my relaxation” (Female, 65). Dance was voted as an important FML, and reducing loneliness was seen as a primary reason to dance, “I go dancing to get out of the house” (Female, 70). This relationship was seen as reciprocal because “if I listen to music I feel less alone, I might then start dancing along to the music” (Female, 65). Reducing loneliness and social connection were also seen as mutually enhancing each other, “sometimes I listen to music for both those reasons at the same time. If I’m feeling lonely, I listen to music to reduce that, and then I feel like I’m more connected with my family, the ones that are back home, and then I feel less lonely” (Female, 62).

In the idea generation phase, the older adults claimed that because of music’s effect on the brain, our emotions, and our bodies it could be seen as having therapeutic properties. During structuring, the group reasoned that music’s therapeutic benefits were derived from the interrelated music listening functions of stress reduction, relaxation, dance, reducing loneliness
and social connection. For example, “Connection to others can be a form of therapy, so connecting with others through music is therapeutic” (Male, 60).

Music was seen as having deep personal meaning for this group of older adults (see table 4). The older adults argued that the therapeutic effects of music enhanced its meaning, “listening to music for therapy can give meaning to your experience, but give meaning to your life as well” (Male, 60). Though this relationship was not seen as reciprocal, because “listening to music as therapy might mean that you need more meaning in your life, and so enhances that, and gives you the meaning”, but, “if you have meaning then you have no need for the music as therapy” (Male, 72). This final reflection highlights the centrality of meaning to these older adults’ conception of wellbeing.

**Older Adults Group 2**

Older adults generated 33 ideas in response to the stimulus question ‘Why do you listen to music’.

**Table 5.** Older Adult Group 2 responses to the stimulus question ‘Why do you listen to music?’

<table>
<thead>
<tr>
<th>Function of Music Listening</th>
<th>Clarification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapeutic benefits (4)</td>
<td>“Music is therapeutic because it promotes balance of the mind, body and soul” (Female, 75)</td>
</tr>
<tr>
<td>Social connection (3)</td>
<td>“For connection...music breaks down social barriers and helps people to connect” (Female, 61)</td>
</tr>
<tr>
<td>Meditative effects (3)</td>
<td>“To aid meditation... listening to music has a kind of meditative effect on me” (Male, 75)</td>
</tr>
<tr>
<td>Critical analysis (3)</td>
<td>“Listening to music, I’d be critical, analysing” (Male, 70)</td>
</tr>
</tbody>
</table>
Strong emotional experience (3)  “It can bring a drama to your life, you can touch parts of your emotional self that you might not otherwise be in touch with” (Male, 66)

Personal growth (3)  “I’ve become more knowledgable listening to music, there’s a sort of self-acceptance of what I can and can’t do, and certainly there’s personal growth in that” (Male, 70)

Novelty (2)  “The excitement of discovering a new musician forms new memories, or new associations with old memories” (Male, 75)

Reminiscence (2)  “It can bring back memories that you associate with the music” (Male, 66)

Figure 4. Enhancement Structure for Older Adults Group 2

Older adults in group 2 considered strong emotional experience to be a critical driver of other FML (see figure 4). These music-related emotions “add drama to life, and it’s a safe drama” (Male, 66). The group spoke of music’s transcendent qualities, acknowledging the contradictory processes of both losing and finding yourself in dramatic emotional experiences in music listening. This strong emotional experience is positioned at the first level of this model, enhancing all succeeding FML across two paths of influence.
The first pathway is through Critical analysis. This idea related to a type of music-focused listening, and the resulting enjoyment of hearing a “bum note” because “it really humanises the artist”. This kind of listening was enhanced by strong emotional experience, by fuelling the desire to understand how the artist’s performance can evoke such feelings. It was argued that critical analysis of this kind can enhance personal growth through self-acceptance (see Table 5).

Along the second path of influence strong emotional experience enhances music’s meditative effects because “you give your full attention to what you’re feeling at that moment, so therefore that could put one into a meditative state” (Female, 70). It was also stated that music has therapeutic benefits because it “promotes balance of the mind, body, and soul” (Female, 75). These therapeutic benefits are enhanced by ‘strong emotional experience’ because, “sadness is there anyway, and this [strong emotional experience] brings it to the surface” (Male, 75), then, “you are free to feel and express emotions in a very safe way in music listening” (Male, 64). The therapeutic and meditative effects of music listening were seen as interrelated. They argued that achieving a greater sense of balance enhances your ability to focus inward, and that music could be therapeutic even for “somebody who may not be the meditative type”, through the therapeutic and meditative power of rhythmic entrainment, “the rhythm can alert your senses…it could give you a new vision” (Female, 70).

They voted that the therapeutic benefits of music could enhance reminiscence, because if you achieve greater emotional and spiritual balance “you may tend to only remember the good things, you may not remember the negative things” (Female, 70). Older adults found “excitement in discovering a different musician” and that the pursuit of new music “forms
new memories, or new associations”. Creating new musical memories and recalling past memories through music listening were seen as enhancing each other reciprocally. “Hearing new styles and genres of music expands the mind, but the music needs a context” (Male, 75). Novel musical experiences become integrated into a network of past musical and personal experiences.

The group reasoned that reminiscence was a positive experience, especially in old age when it can “awaken a youthful energy within you…it can make you express yourself in the way you used to when you were younger” (Female, 70). They reasoned that it could enhance social connection, “Music brings up lovely memories of a particular person that may have passed on, and it would make me feel more connected to those people” (Female, 65). Reminiscence could also enhance personal growth because reflection on “what’s happened in your life... can have a loving effect, you may feel compassion for yourself, and others that are within your memories” (Female, 70).

II: Category analysis of FML generated by younger and older adults

The four sessions generated a total of 138 FML. A separate thematic analysis session including the core research team (J.G and M.H) was used to generate a total of 38 categories on the basis of commonality between functions. These categories were further organised into 9 higher order themes. Namely, (i) affective, (ii) social, (iii) cognitive, and (iv) eudaimonic FML, (v) music facilitated goal-attainment, (vi) everyday music listening, (vii) music-focused listening and 2 ideas which were uncategorised; (viii) music as a sleep aide, and (ix) music listening to create a personal space. Notably, while younger adults generated more affect regulation, reminiscence, goal attainment, and everyday music listening functions,
older adults generated more ideas related to transcendence, positive affect, and social connection (see Figure 5).
Figure 5. Schematic representation of FML generated across four IM sessions. Number of ideas generated in parentheses (younger adults, older adults). Asterisks denote categories that were deemed significant for wellbeing and selected for inclusion in the structuring phase.
A total of 19 categories across these themes were selected for Interpretive Structural Modelling. Patterns of voting reflect perceived importance of FML for wellbeing, and differences were observed at the aggregate level when younger and older adults were compared (see Figure 6). For instance, the relative significance of affect regulation, mood improvement and social connection FML to younger adult wellbeing, versus the value of eudaimonic functions of music for the wellbeing of older adults.

Figure 6. Age group differences in voting patterns for 19 top-ranked categories of FML.
III: Meta-analysis: Influence map of FML

From across 19 of the 38 categories a total of 32 music listening functions appeared in the enhancement structures, with 7 of the 9 higher order themes represented in the 4 models generated by younger and older adults.

A structural meta-analysis of the four models was conducted to develop a higher order influence map of categories of music listening functions for both age groups separately. In order to carry out this meta-analysis, the following scores were computed to estimate the influence of each category of FML in the system of music listening functions.

*Position Score.* Each structural map places ideas in stages (Broome, 1995). Ideas to the far right are assigned the lowest position score (i.e., 1) and those in the leftmost stage are assigned the highest score (i.e., depending on the number of levels in the structure).

*Antecedent and Succedent Score.* The antecedent score is the number of functions lying to the left of a particular FML which enhance it. The succedent score is the number of functions lying to the right of a music listening function in the structure.

*Net Succedent/Antecedent Score.* The net succedent/antecedent (Net SA) score is the succedent score minus the antecedent score. If the Net SA score is positive, it means that the function is a net source of enhancement. If the Net SA score is negative, it means that the function is a net receiver of enhancement (Broome, 1995).

*Influence Score.* The influence score is the sum of the position score and the net SA score.

Influence scores were calculated for each of the 32 FML appearing in the four enhancement structures. Total category influence scores were then calculated by summing the individual element scores, and average category influence scores were then calculated by dividing this summed score by the number of elements in the category.
Based on these results, a model portraying adaptive music listening functions grouping categories based on similarity of influence scores for younger adults and older adults are presented in Figures 7 and 8.

**Figure 7. Younger Adults category influence model**

The meta-analytical model of influence scores in the younger adult sample is presented in Figure 7. FML related to reminiscence, creating a personal space and listening to music because of its personal meaning exert the greatest influence on succeeding music listening functions among young adults. Whereas, music listening functions of security, entertainment and passive music listening are seen as highly dependent on the influence of other categories of FML.

**Figure 8. Older Adults category influence model**
Figure 8 presents the meta-analytic influence model for older adults. Strong emotional experience and transcendence are seen as the most influential FML among older adults. Personal growth and meaning then are considered receivers of enhancement in the context of music listening.

**Discussion**

The current study used the collective intelligence methodology, Interactive Management (IM), to identify, clarify, rank, categorise, and structure relations between the FML as described by younger and older adults. Participants identified a range of affective, cognitive and social FML commonly highlighted in the music listening literature. In addition participants identified some novel categories of FML, including eudaimonic functions and music-facilitated goal attainment. Notably, a total of 38 categories and 9 higher-order category themes of FML were identified. Younger adults identified more FML associated with affect regulation, reminiscence and goal attainment. Conversely, older adults identified more FML related to transcendence and social functions. The top ranked FML for young adults during the IM voting stage were social connection, affect regulation and reminiscence, while the top ranked functions for older adults were personal meaning, therapeutic benefits and affect regulation. Furthermore, analysis of the structural models developed by younger and older adults suggested that the most influential FML for younger adults were reminiscence, creating a personal space, and personal meaning, and the most influential FML for older adults were transcendence and the activation of strong emotional experience. The relevance and importance of specific categories of music listening functions and the logic of their possible interdependencies are discussed in more detail below.
Affective functions

Affect regulation (stress reduction/relaxation) was found to be a common and highly endorsed FML by both older and younger adults in the current study. A wealth of previous studies have noted affect regulation as a core FML (e.g. Juslin & Laukka, 2004; Laukka, 2007), and emphasised the importance of affect regulation for wellbeing (Gross & John, 2003; Lischetzke & Eid, 2003). Music listening may not only regulate affect, but also lead to improved affect regulation abilities over time. A music listening intervention involving group music listening combined with lyric analysis found a significant increase in participants’ emotion regulation skills after the 4 week intervention relative to a control group (Dingle & Fay, 2013).

In the idea generation phase, participants highlighted music’s ability to influence mood. Mood improvement was a highly valued FML for younger adults’ wellbeing (see figure 6), whereas older adults focused more on the use of music to induce positive moods. These findings are consistent with predictions made based on previous studies demonstrating that listening to music for negative mood regulation was more common in younger samples (Lonsdale & North, 2011; Thayer et al., 1994), older adults decreased experience of negative affect, and increased positivity bias (Carstensen, Isaacowitz, & Charles, 1999; Mroczek & Kolarz, 1998).

Furthermore, contrary to reports that affect regulation is the most important function of music listening (Juslin & Sloboda, 2010) results of the current study highlight that affect regulation is considered as a secondary outcome of music listening that is enhanced by other music listening functions, such as transcendence and reminiscence (see figures 7 and 8). The structuring work afforded by the IM methodology in this study contributes to our understanding of how younger and older adults consider musical affect regulation to be
influenced by other functions in the broader context of listening to music to increase wellbeing.

Younger adults generated a greater variety of music listening functions relating to reminiscence. They distinguished between spontaneous, purposeful, positive and less adaptive reminiscing, such as reliving painful memories by listening to ‘break-up’ songs. Older adults described optimising their advanced emotional intelligence (Mayer, Salovey, & Caruso, 2000) to direct musical reminiscence toward the positive. This is in line with the SOC theory (Baltes & Baltes, 1990), as well as both the socio-emotional selectivity theory (Carstensen, 1992) and positivity bias seen in older adults (Mather, 2005). Reminiscence by music listening was deemed important for wellbeing by both age groups. Figure 7 reveals that for younger adults reminiscence is the most influential FML. Whereas older adults structured reminiscence at level four (see figure 8). For older adults reminiscence was enhanced by many FML including affect regulation and transcendence, but importantly reminiscence was seen as influencing personal growth and personal meaning. Webster (2003) describes the functions of reminiscence as being either self or socially focused, and loss or growth oriented. Therefore, reminiscence through music listening may be more growth oriented in old age, and may serve a more self-regulatory purpose in youth. Further studies could explore variation in the functions of reminiscence and FML across the lifespan, and potential implications for wellbeing.

**Social Functions**

Overall, older adults generated significantly more ideas relating to social FML than younger adults; however a greater proportion of younger adults considered social connection through music listening as significant for their wellbeing. A potential explanation can be found by examining the overall influence models in Figures 7 and 8. For younger adults affect
regulation and mood improvement were voted as the most significant categories of adaptive FML. However, Figure 7 also reveals that younger adults considered social connection an important antecedent of affect regulation and mood improvement. In contrast, older adults reasoned that social connection is enhanced by successful affect regulation, suggesting that older adults may be using music to optimise affect regulation abilities (Baltes & Baltes, 1995; Cartensen & Lockenhoff, 2003), possibly in an effort to support or compensate for losses in social activity. This finding highlights the possibility that music may support secondary control strategies in older adults (Heckhausen & Schulz, 1995).

Reducing loneliness was a highly rated FML for older adults in the current study. Social uses of music have been emphasised in the literature (Hargreaves & North, 1999), and Keyes’ (1998) model highlights the importance of social connection for wellbeing. Although rates of social interaction decline from early to later adulthood, the quality of social connections becomes increasingly important as people age (Carstensen, 1992; Srivastava, John, Gosling, & Potter, 2003), and this may be expressed in, and supported by their music listening behaviours. Consistent with expectations derived from Cartensen’s socio-emotional selectivity theory (1995) older adults in the current study described the importance of listening to music to feel connected when separated from significant others (e.g. through bereavement or migration). While younger adults spoke of music’s positive role in social activities and bonding for wellbeing, paradoxically, younger adults also endorsed the use of music to avoid social connection highlighting how music can be used to create a private space that limits social connection. Younger adults provided examples of using music to evade awkward or unwanted interaction in public, and in distracting work environments. Related uses of music have been highlighted by music sociologists (DeNora, 2000). Although information seeking through new social networks is an important social motive in young adulthood (Cartensen, 1995) that can be facilitated by music listening experiences, music
may also provide young adults with respite from this type of interaction. Thus, it may be that young adults are using music to counteract the stresses of their more active social lives, while older adults are using music to compensate for and regulate feelings of social isolation.

Contrary to our expectations, identity development did not emerge as a significant function of music listening for either age group. It’s possible that this particular FML is more important during early adolescence (North, Hargreaves, & O'Neill, 2000; Tarrant, North, & Hargreaves, 2000), and may be less relevant in old age when self-concept is more stable (Carstensen, 1991). In a recent qualitative study identity FML also failed to emerge as a significant feature of adolescent music listening (Papinczak, Dingle, Stoyanov, Hides, & Zelenko, 2015). However, a qualitative study carried out with Australian older adults did report listening to music as a way to understand the self and develop a sense of identity (Hays, 2005).

**Eudaimonic functions**

As predicted, listening to music to experience a sense of transcendence was more common among older adults. In the structuring phase of this study older adults reasoned that affect regulation was a “natural consequence” of transcendence (Male, 60). Transcendence has been associated with a number of benefits including happiness and meaning (Beaumont, 2005), increased life satisfaction in adolescents (Gillham et al., 2011), and reduced loneliness in older adults (Walton, Shultz, Beck, & Walls, 1991).

Music was seen as a potent source of meaning for old and young participants. An analysis of the meta-analytic influence structures (Figures 7 and 8) highlights that for young adults meaning-related FML exert influence over all other adaptive FML. For older adults, music’s meaning is dependent on the achievement of other adaptive music listening goals, including reminiscence. This is consistent with gerontology literature highlighting the importance of
life review in meaning-making (Westerhof, Bohlmeijer, & Webster, 2010). Meaning is central to eudaimonic definitions of wellbeing (Peterson, Park, & Seligman, 2005), and it is argued that, like transcendence, older adults report higher levels of meaning in life (Steger, Oishi, & Kashdan, 2009) and a greater capacity for meaning making (Bluck & Gluck, 2004; Ryff, 1989).

**Goal-Attainment**

In the current study, younger adults generated more ideas than older adults regarding listening to music to facilitate goal-attainment. This was achieved through enhancing motivation, persistence and task enjoyment. Younger adults voted persistence as an important function of music listening for promoting wellbeing. They spoke of music helping them to keep going when exercising or working. Research suggests that persistence at work may support goal-pursuit and competence, both of which have been associated with SWB (Harris, Daniels, & Briner, 2003; Ryan & Deci, 2000). Age differences seen here may reflect the importance of achievement and competence to younger adult wellbeing, in contrast to the stronger eudaimonic FML emphasis in the older adult groups.

**Limitations**

The generalisability of these results is subject to certain limitations. For instance, the participants in this study were self-selected. Thus, it’s possible that these participants hold more positive beliefs regarding music’s relationship with wellbeing than the average music listener.

The logic captured in these models of FML represents the observations and experiences of lay people and may not correspond with the literature on music listening or wellbeing. However, the qualitative models generated in the context of IM sessions can be evaluated
using quantitative modelling techniques grounded in survey-based measurement of the key FML identified by groups. We are currently pursuing this line of investigation, specifically, testing quantitative models grounded in the results of the current study.

Age differences observed in the functions of music listening may be confounded by generational differences in the mode of music consumption (e.g. radio, mp3 player, streaming services). It is assumed that young adult participants predominantly use personal music listening devices. This may have an impact on the resultant listening experience (Krause, North, & Hewitt, 2013), but was not controlled for in the current study.

Conclusion

Older and younger participants believe music has an effect on their wellbeing. Contrary to models of wellbeing that emphasise emotional homeostasis, this study is highlighting the importance of intense emotional experiences, reminiscence and eudaimonic experiences - namely meaning and transcendence - as fundamental drivers of adaptive music listening in the service of enhanced wellbeing.

Developmentally based theories of FML are needed to account for variations observed in music listening across the lifespan. Age differences in FML did not conform precisely with predictions derived from SOC or the Lifespan Theory of Control, perhaps denoting the unsuitability of broader developmental frameworks for the field of music psychology. The socio-emotional selectivity theory did demonstrate some promise in guiding expectations of lifespan differences in uses of music, and this should be explored in greater depth in future research. A developmental frame of reference may help to understand the impact of music on wellbeing at different life stages, and the development of wellbeing broadly speaking. Future
research should also explore the role of individual differences in combination with developmental influences in predicting the selection and adaptivity of music listening behaviours.

Further, participants identified enhancement relationships between independent FML. These interdependencies would be difficult to capture using conventional qualitative methods. Previous research highlighted important FML, but the tendency to isolate discrete functions may have led to a belief that each function is an independent construct, oversimplifying the complexity of music listening behaviours. While the exploratory nature of the current study precluded direct hypotheses being made - the models generated by older and younger adults provide at the very least some proof of principle of interdependencies in FML in enhancing wellbeing.

Music listening is an important leisure activity for both younger and older adults (Hays, 2005; North et al., 2000). Given the ubiquity of music listening understanding its role in wellbeing is warranted and necessary. Greater emphasis on theory building, and efforts to understand mechanisms of action in this area may assist researchers and practitioners to design more effective music listening interventions that can promote wellbeing across the lifespan.

“Jazz has given me a new life, a second chance”, (Female, 70).

**Ethical Approval**

Ethical approval for this project was given by the University’s Research Ethics Committee [ref number 13/MAY/08].

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