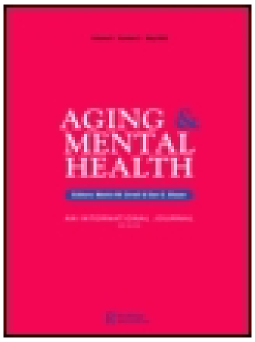

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Musical reward across the lifespan

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ABSTRACT

Music is ubiquitous. Despite the fact that most people find music enjoyable, there are individual differences in the degree to which listeners derive pleasure from music. However, there has been little focus on how musical reward may change across the lifespan. Some theories predict that there would be little change, or even an increase in musical reward across the lifespan, while others suggest that older adults may have decreased capacity for musical reward. Here, we investigated musical reward across the lifespan. Participants consisted of American adults ranging between 20-85 years old ($n = 20$ participants in each 10-year age bin). Participants in Study 1 completed the Barcelona Music Reward Questionnaire (BMRQ), which is a multi-dimensional assessment of musical reward. We found a negative correlation between age and BMRQ scores, suggesting decreases in musical reward across the lifespan. When investigating which components were driving this effect, we found that the music seeking subscale was the strongest predictor of age. Participants in Study 2 completed the Aesthetic Experiences in Music Scale (AES-M), which focuses on intense emotional responses to music. In contrast to the BMRQ, we found no relationship between age and scores on the AES-M, suggesting that strong emotional responses to music are consistent across the lifespan. These results have implications for the use of music as a therapeutic tool in older adults. In addition, this work points to the importance of considering age when investigating reward for music and suggests that the ways individuals experience music may change across the lifespan.

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Aging; emotion; music; musical anhedonia; reward

Music is a ubiquitous and emotionally evocative stimulus. Most people regard music as an important component of their everyday lives (Krause, North, & Hewitt, 2015) and choose to listen to music because they enjoy it (Sanflippo, Spiro, Molina-Solana, & Lamont, 2020). Despite the fact that most people enjoy music, there are individual differences in the degree to which listeners derive pleasure from music. On one end of the spectrum is a small percentage of the population (around 3-5% of healthy adults) who have "musical anhedonia," or a selective lack of pleasure from music (Belfi, Evans, Heskje, Bruss, & Tranel, 2017; Martínez-Molina, Mas-Herrero, Rodríguez-Fornells, Zatorre, & Marco-Pallarés, 2016; Mas-Herrero, Marco-Pallares, Lorenzo-Seva, Zatorre, & Rodriguez-Fornells, 2013, Mas-Herrero, Zatorre, Rodriguez-Fornells, & Marco-Pallarés, 2014). At the other end, some individuals have highly hedonic responses to music (sometimes called "hyperhedonic;" Martínez-Molina et al., 2016). While recent years have seen a rapid growth in work investigating individual differences in musical reward, there has been little focus on how musical reward may vary across the lifespan.

Previous work suggests that there are age-related changes in emotional processes more generally, with older adults displaying more positive emotional well-being, emotional stability, and emotional complexity with age (Carstensen et al., 2011). A prevailing theory, the Socioemotional Selectivity Theory (Carstensen, 2006), posits that this positivity bias is motivation-based. That is, as individuals get older, time horizons are shrinking; this results in increased motivation to invest more effort into positive, meaningful relationships and to become more selective in how they expend their energy. Moreover, individuals report more reward from those selective, meaningful relationships with age (Carstensen, 2006).

In addition to the aforementioned work suggesting that older adults display greater positive emotions overall, research investigating musical activities during healthy aging also suggests that older adults may, on the whole, display high levels of musical reward. For example, participating in musical activities is associated with improved quality of life in older adults (Fraser et al., 2015; Hays, Bright, & Minichiello, 2002; Särkämö, 2018). While these improvements could be attributed to the aspects of musical performance and social engagement associated with musical activities, other work has indicated that even music *listening* alone is associated with positive outcomes. That is, increased music listening in older adults has been associated with higher engagement in other social and cognitive activities and greater overall health-related outcomes (Kaufmann, Montross-Thomas, & Griser, 2018).

While the work described above predicts high levels of musical reward across the lifespan, considering music in the context of predictive coding accounts may suggest the opposite. It has long been proposed that musical reward, and emotional responses to music more broadly, are the result of predictive processes (Huron, 2006; Meyer, 1956). Listeners implicitly learn musical structure (Rohrmeier & Rebuschat, 2012; Rohrmeier & Widdess, 2017), leading

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them to establish expectations about what is likely to occur next in a piece of music (Pearce & Wiggins, 2012). This work suggests that the balance between the fulfilment and violation of such expectations is what ultimately leads to musical reward (Koelsch, Vuust, & Friston, 2019). There has been recent evidence for this suggestion, showing that sequences of musical chords can generate reward prediction errors associated with activity in the nucleus accumbens (Gold, Pearce, Mas-Herrero, Dagher, & Zatorre, 2019). Similarly, a body of work has indicated that individual differences in musical reward are associated with differences in connectivity between auditory and reward regions of the brain (for review see Belfi & Loui, 2020).

If experiencing reward from music requires an ability to predict what comes next, it may then be that older adults have a reduced capacity for musical reward. Prior work using economic reward tasks has indicated that older adults have abnormal reward prediction, such that they show reduced reward prediction error responses (Chowdhury et al., 2013; Eppinger, Schuck, Nystrom, & Cohen, 2013; Samanez-Larkin, Worthy, Mata, McClure, & Knutson, 2014). In addition to age-related changes in the reward system, there are also age-related changes in basic auditory perception, which has been frequently studied in the domain of speech and language (Peelle, 2018). Perhaps due to these sensory deficits, older adults appear to have reduced musical perceptual abilities (Halpern, Bartlett, & Dowling, 1995). For example, healthy older adults rate consonant chords as less pleasant and dissonant chords as more pleasant than younger adults (Bones & Plack, 2015). Similarly, there is evidence for age-related declines in emotion recognition from music (Sutcliffe, Rendell, Henry, Bailey, & Ruffman, 2017) and recognition memory for musical melodies (Deffler & Halpern, 2011; Narme, Peretz, Strub, & Ergis, 2016). This combination of reduced sensitivity to rewards, as well as reductions in both basic and higher-level auditory and music perception, may result in reduced musical reward as individuals age.

In sum, prior evidence suggests two competing hypotheses: First, increased overall positivity in older adulthood suggests that musical reward would increase over the lifespan; alternatively, age-related changes in predictive processes and auditory perception could suggest decreases in musical reward with age. The present study sought to inform these opposing predictions by investigating musical reward across the lifespan. Online participants responded to two questionnaires measuring different aspects of musical reward. One group of participants (Study 1) completed the Barcelona Music Reward Questionnaire (BMRQ; Mas-Herrero et al., 2013), which is the standard measure for assessing individual differences in musical reward. This questionnaire focuses on motivational, emotional, and social aspects of musical reward. In a second study, we also sought to investigate the possibility that certain components of musical reward change across the lifespan but not others. Prior work has indicated age-related changes in certain aspects of music cognition (for example, ability to recognize newly-learned melodies decreases with age), but not others (e.g. noticing differences between two musical melodies; Halpern & Bartlett, 2002). To assess this possibility within the realm of musical reward, a second group of participants (Study 2) completed the Aesthetic Experiences in Scale in Music, which focuses primarily on strong emotional and physiological (e.g. musical chills) responses to music. Overall, the present work sought to investigate whether there are age-related associations with musical reward, and if so, what aspects of musical reward differ across the lifespan.

Study 1 – Barcelona Music Reward Questionnaire

Methods

Participants

Participants completed the Barcelona Music Reward Questionnaire (BMRQ; (Mas-Herrero et al., 2013). Participants were recruited online using Prolific, an online platform for recruiting participants for experiments (Palan & Schitter, 2018; Peer, Brandimarte, Samat, & Acquisti, 2017). Participation was restricted to participants in the United States who are native English speakers and had at least a 90% approval rate on Prolific. Our goal was to recruit participants with evenly distributed ages between 20-85 years of age using a stratified sampling method. Twenty participants were recruited in each of the following 10-year age bins: 20-29, 30-39, 40-49, 50-59, and 60-69 years old. Additionally, due to the relatively small number of participants above age 70 who complete online studies, we did not limit the highest age bin to a 10-year range, but instead recruited 30 participants age 70 and older. Therefore, we recruited a total of 130 participants.

Our target sample size was determined by an a priori power analysis conducted using G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007). As there is little prior work investigating age-related changes in musical reward, we assumed a moderate effect size ($f^2=0.15$) for our power analysis. Using this effect size, we conducted a power analysis for a linear multiple regression model with 5 predictors (the five subscales of the BMRQ). This indicated that a sample of 89 participants would be sufficiently powerful (at a level of 0.95) to detect an effect of this size. To account for some uncertainty in the real size of our effect, we sought to recruit above this sample size. Of our 130 participants, we removed all participants who did not fully complete the task, as well as those who failed a 'foil' question. This foil question stated: "Please select "Agree" for your answer to this question" and participants were excluded if they did not select "agree." This resulted in a total of 122 participants (69 F, 53 M) who were included in the study. This percentage of rejected participants is typical, as prior work has suggested that approximately 10-12% of participants are 'careless responders' (Meade & Craig, 2012). See Figure 1A for a graphical depiction of the distribution of ages and sexes across age bins.

Materials

The Barcelona Music Reward Questionnaire (BMRQ) was designed to assess individual differences in musical reward and has been validated in an English speaking sample of European and North American participants; this scale has been described in detail elsewhere (Mas-Herrero et al., 2013). Briefly, the BMRQ consists of 20 items that represent one of five subsets of musical reward: emotional evocation (e.g. "I like to listen to music that contains emotion"),

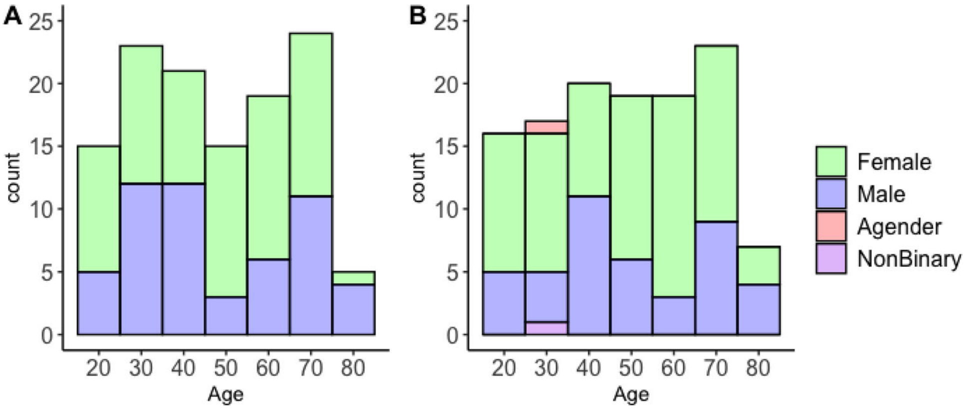

Figure 1. Histograms of sex and age bin distributions for (A) Study 1 (BMRQ) and (B) Study 2 (AES-M). There was no difference in age of participants between the two groups.

sensory-motor (e.g. "Music often makes me dance"), mood regulation (e.g. "Music calms and relaxes me"), musical seeking (e.g. "I inform myself about music I like"), and social reward (e.g. "When I share music with someone I feel a special connection with that person"). Each item consisted of a sentence, which participants read and rated on a 5-point scale ranging from "Completely disagree" to "Completely agree."

Procedure

All procedures were conducted in compliance with the American Psychological Association Ethical Principles and were approved by the Institutional Review Board at Missouri S&T (IRB approval number 007). First, participants read a general description of the study and gave informed consent by selecting a checkbox indicating their consent. Next, participants completed the BMRQ. Finally, participants completed a brief demographics questionnaire, which asked their age, sex, and total years of formal musical training.

Statistical analysis

All analyses described here were planned in advance. First, we sought to assess whether scores on the BMRQ was significantly correlated with age. We calculated the total BMRQ score for each participant by summing the ratings across each scale item (items 2 and 5 were reverse-coded). We then took these total scores and performed Pearson's correlations between the total BMRQ score and age.

In addition to assessing individual differences in musical reward on a continuous scale, the BMRQ is also commonly used to identify individuals with musical anhedonia, or a selective lack of pleasure in response to music. To this end, we also sought to investigate whether individuals with musical anhedonia differed in age from those who have normal hedonic responses to music. In addition to identifying individuals with musical anhedonia, the BMRQ has been used to classify individuals with "hyperhedonic" responses to music. We categorized participants as having musical anhedonia based on the previously reported cutoff of a total score of 65 or lower on the BMRQ, and those as highly hedonic scoring 87 or above on the BMRQ. This resulted in 22 participants in the anhedonic group (ANH), 75 participants in the hedonic group (HDN), and 25 participants in the highly hedonic group (HHDN). We conducted a one-way ANOVA to test for group differences in age.

In addition to assessing the relationship between age and overall BMRQ scores, we sought to more precisely examine whether age is associated with certain aspects of musical reward more than others. The BMRQ can be divided into five subscales: music seeking, emotional evocation, mood regulation, sensory-motor, and social reward. We conducted a linear regression using the scores on each of these subscales to predict age. Predictors were mean-centered and scaled by 1 SD before being submitted to the model. Finally, we sought to examine whether certain questions on the BMRQ were associated with age. We conducted an additional linear model, this time using the rating on each item of the BMRQ as a predictor of age. Additionally, we repeated all analyses while controlling for years of musical experience, which did not change the results presented here.

Results

The Pearson's correlation between BMRQ and age was significant, indicating a decrease in BMRQ scores as age increased: r=-0.32, $t(120)$=-3.80, $p < 0.001$, 95% CI:[-0.47, −0.15] (Figure 2A). To assess whether individuals classified as "musically anhedonic" differed in age from those with normal or high levels of hedonic responses to music, we conducted a one-way ANOVA. This revealed a significant effect, $F(2,119)=5.74$, $p = 0.004$, $\eta^2=0.08$. Post-hoc pairwise comparisons, after applying Bonferroni corrections for multiple comparisons, indicated that the anhedonic group ($M = 55.95$, SD = 15.71). was significantly older than the highly hedonic group ($M = 39.32$, SD = 13.75, t=-3.32, $p = 0.003$; Figure 2B).

The linear regression investigating the relationship between age and the five BMRQ subscales was significant, $F(5, 116)=4.43$, $p < 0.001$, $R^2_{adj}=0.12$. When examining the individual subscales, the "Music Seeking" subscale was the only significant predictor of age. See Table 1 for the full results of the model and Figure 3 for a graphical depiction of the results

Our last model considered each item on the BMRQ as a predictor. This model was significant, and accounted for substantially more variance than the model using the BMRQ subscales, $F(20, 101)=4.51$, $p < 0.001$, $R^2_{adj}=0.37$. The

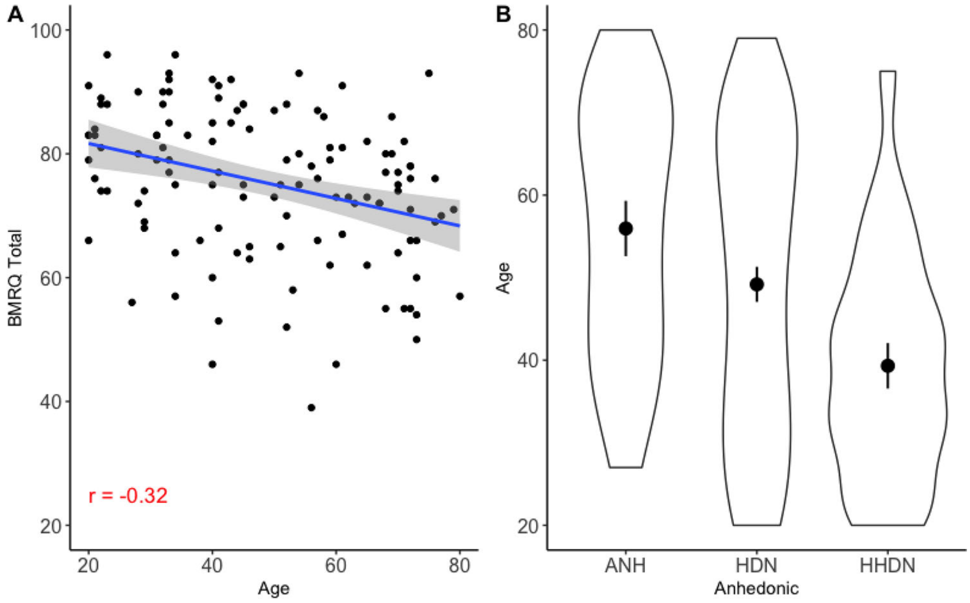

Figure 2. (A) Scatterplot depicting the significant correlation between BMRQ score and age. Gray shading indicates standard error. The y-axis is scaled based on the minimum and maximum scores for the BMRQ: 20 min, 100 max. (B) Violin plot illustrating differences in age among the anhedonic (ANH), hedonic (HDN) and highly hedonic (HHDN) groups. Black dots indicate the mean and error bars indicate standard error of the mean.

Table 1. Results of linear regression with the five subscales of the BMRQ predicting age. The Music Seeking subscale was the only significant predictor of age. $^{***}p < 0.001$.

	β	Standard Error	*t*	*p*	*Sig.*
Music Seeking	−7.14	2.14	−3.33	<0.001	***
Emotional Evocation	−2.56	1.85	−1.38	0.17	
Mood Regulation	1.34	1.99	0.67	0.50	
Sensory-Motor	−1.46	1.77	−0.82	0.41	
Social Reward	2.56	2.00	1.28	0.20	

results of this model indicated that two items on the BMRQ were strongly predictive of age (see Table 2 for the full results of the model).

The two items that were highly predictive of age (Items 10 and 11) are: "Music often makes me dance" and "I'm always looking for new music." We sought to investigate whether these two questions were primarily driving the initial correlation between the total BMRQ score and age. To this end, we re-calculated the total BMRQ score, removing questions 10 and 11. This changed the maximum possible BMRQ score from 100 to 90. We then conducted a second Pearson correlation between these new total BMRQ scores and age. Despite removing the two questions that were most highly predictive of age, there was still a significant correlation, R=-0.27, $t(120)=-3.13$, $p = 0.002$. When comparing this new correlation to the initial correlation between the overall BMRQ score and age, the two did not significantly differ ($z = 0.49$, $p = 0.62$).

Study 2 – Aesthetic Experiences Scale in Music

In Study 1, we found significant relationships between musical reward, as assessed via the BMRQ, and age. In Study 2, we sought to investigate whether this effect was specific to a multi-dimensional measure of musical reward, or if the relationship between age and musical reward could be shown for other aspects of musical emotions. To this end, we investigated the relationship between age and the propensity for experiencing intense emotional responses to music, as measured by the AES-M.

Methods

Participants

Participants completed the Aesthetic Experiences in Music Scale (AES-M; Sachs, Ellis, Schlaug, & Loui, 2016). Participants were recruited in the same manner described above. A total of 125 participants completed the AES-M. After removing participants who did not complete the full questionnaire or pass the foil question, this resulted in a total of 121 participants (77 F, 42 M, 1 agender, 1 nonbinary). See Figure 1B for a graphical depiction of the demographics of the AES-M group. The two groups did not significantly differ in age (BMRQ group mean = 48.35 years, AES-M group mean = 49.75 years; $t(241) = -0.60$, $p = 0.54$, 95% CI:[-5.8, 3.12]) or years of formal musical training (BMRQ group mean = 3.13 years, AES-M group mean = 2.46 years; $t(241)=1.20$, $p = 0.22$, 95% CI:[-0.42, 1.78]).

Materials

The Aesthetic Experiences Scale in Music (AES-M) was designed to measure a person's propensity to have intense emotional responses to music, and has been described in detail elsewhere (Sachs et al., 2016). The AES-M was created initially for a British sample (Sloboda, 1991) and has since been used with US samples (Sachs et al., 2016; Silvia & Nusbaum, 2011). Briefly, the AES-M consists of 15 items that range from more visceral, physical components of emotional responses to music (e.g. feeling chills down your spine, getting goosebumps), and more abstract, cognitive components of an emotional response to music (e.g. feeling touched or moved, feeling a sense of awe and wonder). Each item was presented in the format of: "When listening to music, how often do you … " Participants rated each item on a 7-point scale from "Never/Rarely" to "Nearly Always."

Procedure

The procedure was identical to Study 1 except participants completed the AES-M instead of the BMRQ.

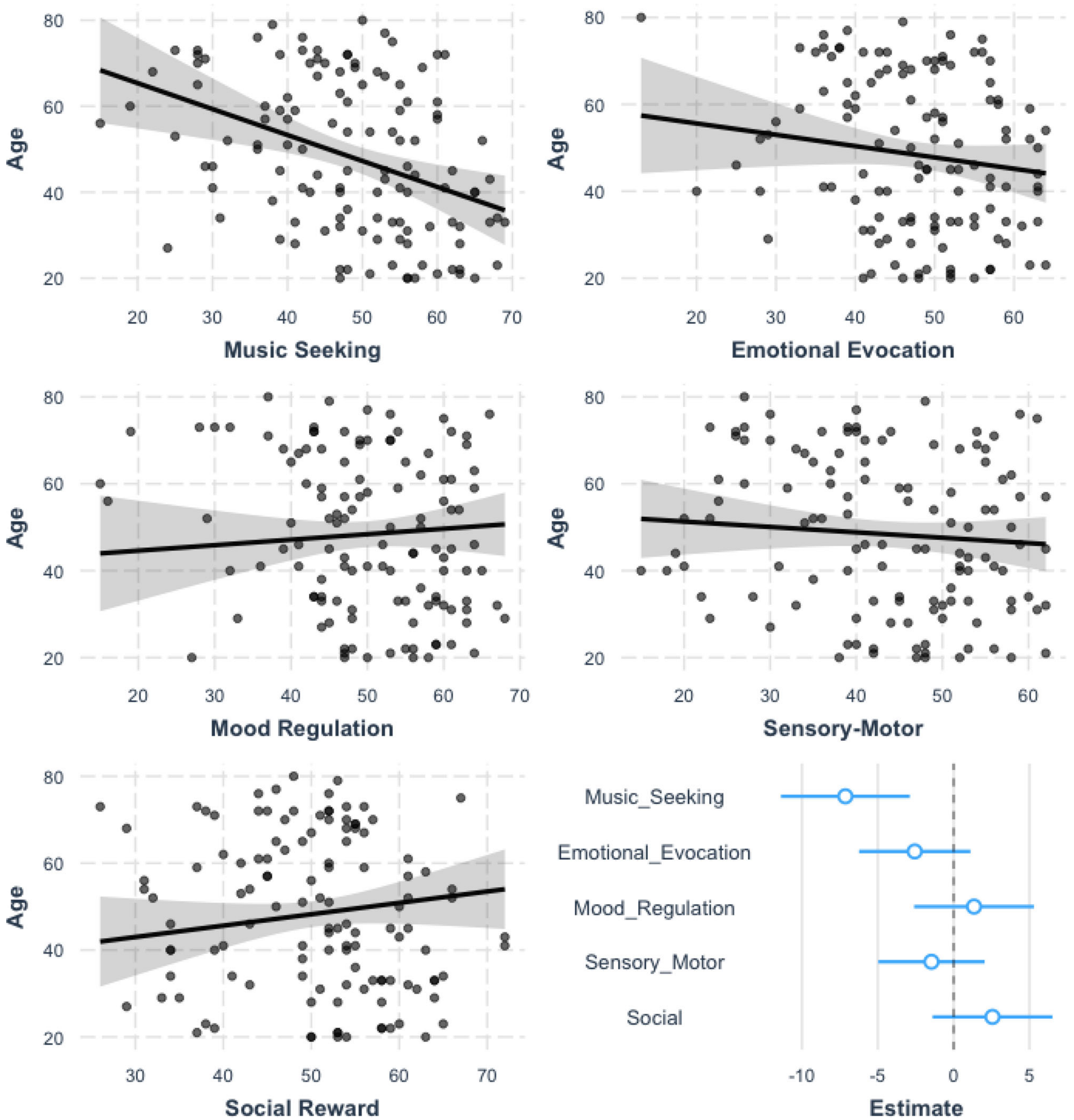

Figure 3. Results from the linear regression predicting Age from the five subscales of the BMRQ. The Music Seeking subscale was the only significant predictor. The lower right panel depicts the beta estimates for each scale, along with the 95% confidence interval for the estimates.

Statistical analysis

We calculated the total AES-M score by summing the ratings for each scale item. We then followed the same analyses as in Study 1. First, we conducted Pearson's correlations between the total AES-M score and age. Next, we conducted a linear regression considering each item on the AES-M as a predictor of age. We repeated all analyses while controlling for years of musical experience, which did not change the results.

Results

In contrast to the BMRQ, overall scores on the AES-M were not significantly correlated with age, r=-0.09, $t(120)=-1.06$, $p = 0.28$, 95% CI:[-0.27, 0.08] (Figure 4). Although there was no significant correlation between overall AES-M scale and age, we sought to investigate whether any particular scale items had a relationship with age. To this end, we conducted a linear regression, using scores for each of the individual 15 AES-M items as predictors of age. This model was not significant, $F(15,105)=1.43$, $p = 0.15$, $R^2_{adj}=0.05$.

Discussion

The present study sought to examine the relationships between age and musical reward. We measured musical reward using two scales – the BMRQ, which assesses various components of musical reward, such as emotion evocation, social reward, and sensory-motor components, and the AES-M, which primarily focuses on intense emotional and physiological responses to music. Our results indicated no significant relationship between physiological or visceral emotional responses to music (as measured by the AES-M) and age, but a significant relationship between age and

Table 2. Results of linear regression with the five subscales of the BMRQ predicting age. The Music Seeking subscale was the only significant predictor of age. $*p < 0.05$, $***p < 0.001$.

	β	Standard Error	*t*	*p*	*Sig.*
Item 1	2.36	1.79	1.32	0.19	
Item 2	0.61	1.97	0.31	0.76	
Item 3	−3.78	1.60	−2.36	0.02	*
Item 4	4.33	2.21	1.96	0.05	
Item 5	−4.13	1.90	−2.18	0.03	*
Item 6	−1.63	1.77	−0.92	0.36	
Item 7	1.76	1.93	0.92	0.36	
Item 8	−1.69	1.83	−0.93	0.36	
Item 9	1.08	1.96	0.55	0.58	
Item 10	−7.67	2.33	−3.29	<0.001	***
Item 11	−7.59	2.01	−3.78	<0.001	***
Item 12	3.94	1.81	2.18	0.03	*
Item 13	1.13	1.68	0.67	0.50	
Item 14	−2.52	2.26	−1.12	0.27	
Item 15	−2.70	2.01	−1.34	0.18	
Item 16	0.83	1.76	0.47	0.64	
Item 17	0.46	1.85	0.25	0.80	
Item 18	−3.68	1.77	−2.08	0.04	*
Item 19	−2.38	2.18	−1.10	0.28	
Item 20	4.04	2.03	1.99	0.04	*

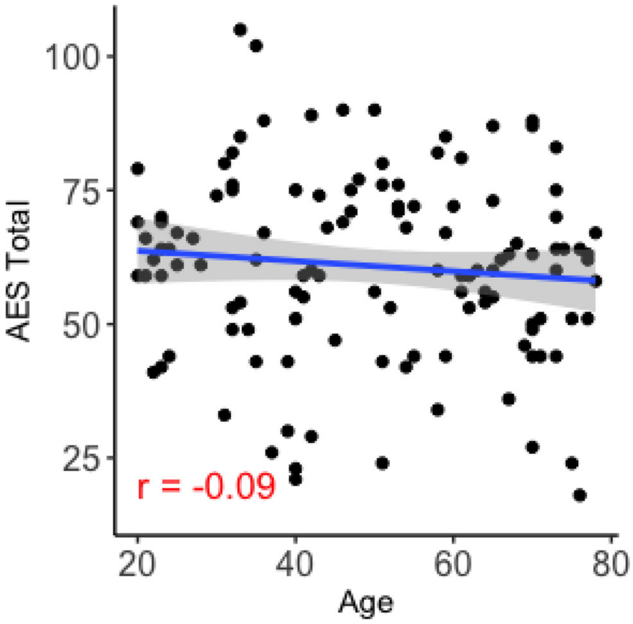

Figure 4. Scatterplot depicting the correlation between total AES-M scores and age. The y-axis is scaled based on the maximum (105) and minimum (15) scores on the AES-M. Gray shading indicates standard error.

other aspects of musical reward (as measured by the BMRQ).

The AES-M measures "aesthetic experiences" in response to music, primarily focusing on strongly emotional or physiological responses such as feeling goosebumps or chills while listening to music. The fact that we saw no relationship between the AES-M scores and age suggests that such responses to music, or at least the perception of such responses, may not change across the lifespan. This finding is consistent with previous work investigating aesthetic preferences for visual art: Prior research found that aesthetic preferences for paintings were maintained over time in individuals with Alzheimer's disease, suggesting that aesthetic responses can be preserved despite declines in memory (Halpern, Ly, Elkin-Frankston, & O'Connor, 2008). While that work indicated that aesthetic *preferences* do not tend to change over time in individuals with memory loss, the present work suggests that aesthetic *emotions* (at least, in response to music) also may not be altered in healthy aging.

In contrast to the lack of relationship between age and aesthetic emotional responses to music, we did see a significant relationship between age and musical reward, as measured by the BMRQ. When looking at the BMRQ subscales, our results indicated that the music seeking subscale was the only subscale that was significantly predictive of age, such that scores on this subscale decreased as age increased. Two scale items showed particularly strong relationships with age: "Music often makes me dance" (item 10) and "I'm always looking for new music" (item 11). The strong negative relationship between item 10 and age may reflect the fact that some older adults may have mobility issues (Lauretani et al., 2003) are therefore less likely to dance (although dance has been shown to improve mobility in older adults, see Hackney et al., 2015). For item 11, previous work has indicated that musical preferences tend to be formed during adolescence and early adulthood (Holbrook & Schindler, 1989). It is therefore possible that older adults are less likely to seek out new music but instead rely on their previously formed musical preferences.

Even after removing the two most strongly correlated items with age from the overall BMRQ scores, there was still a significant correlation between BMRQ score and age. This suggests that despite certain items being more strongly related to age than others, there still is a negative relationship between overall musical reward and age. The finding that older adults show decreased musical reward is in line with prior work suggesting that older adults show abnormal reward prediction error, as musical reward is suggested to be the result of such predictive processes. Furthermore, decreased musical reward across the lifespan could be due to age-related declines in auditory perception. An interesting direction for future research could be to directly assess the relationships between predictive coding, auditory perception, and musical reward across the lifespan.

It is important to consider the current findings as they relate to the positivity effect observed with age. Our findings are in direct contrast to this work, as the current study suggests that there is a negative relationship between musical reward and age. A contrasting model that conceptualizes age-related changes in emotion posits that emotions and cognition become more integrated as individuals age, peaking in midlife and then starting to decline through older adulthood (Labouvie-Vief et al., 2007). This theory, the Dynamic Integration Theory, suggests that the positivity bias is driven by both an increased optimization of emotional well-being and a decline in cognitive differentiation and complexity. This model essentially posits that older adults prioritize positive experiences because positive affect is simply less cognitively demanding and therefore easier to maintain. One could argue that perhaps the cognitive demands of processing musical rewards require an even higher level of cognitive differentiation and complexity, which is why we fail to see a maintenance of positive affect with respect to musical rewards. Moreover, it is important to consider that age is associated with declines in fluid intelligence, multitasking (Kievit et al., 2014) and other cognitive functions such as declines in processing speed, memory, and reasoning Salthouse, 2019). Future work should investigate the age-related effects of music reward processing as it relates to cognitive functioning and cognitive demands.

The present work has important implications for identifying individuals with musical anhedonia. Prior work has established guidelines for what constitutes musical anhedonia. Typically, individuals who score lower than a total score of 65, yet perform normally on a general measure of anhedonia (e.g. the Physical Anhedonia Scale) are considered musically anhedonic. Using this cutoff score, we saw significant differences in age between musically anhedonic and non-anhedonic individuals. This may suggest that the current measurement for musical anhedonia is biased against older adults, such that new norms should be identified for older adults. Detecting older adults with musical anhedonia may be important, as music is frequently used as a therapeutic tool for age-related disorders such as Alzheimer's disease (Guétin et al., 2009; Janata, 2012). Establishing appropriate guidelines and criteria for identifying musical anhedonia in older adulthood could therefore be important in determining who could most benefit from music therapies. Additionally, our results indicate that certain aspects of musical reward decline with age, while others do not. Individuals developing music-based interventions could benefit from focusing on those aspects of musical reward that tend to be preserved across the lifespan.

This work is not without limitations. As we collected a cross-sectional sample of participants, our result could possibly be a cohort effect rather than a true effect of age. Younger adults likely engage with music in different ways than older adults, due to developments in technology for music listening such as streaming services. These tools make new music discovery easier than in the past, which could possibly explain the finding that older adults are less likely to seek out new music. Additionally, we did not collect a measure of general anhedonia, so it is not possible to identify participants in the present sample with true, specific musical anhedonia. Additionally, we did not collect both BMRQ data and AES-M data on the same sample of participants. Finally, we did not collect measures of music perceptual abilities, so we cannot identify whether perceptual abilities are related to increased musical anhedonia across the lifespan.

In sum, the present study presents initial evidence indicating decreases in certain components of musical reward across the lifespan. Older adults consistently report reduced musical reward, in particular, components associated with music seeking behavior. These findings have important implication for the use of music in therapeutic settings and for the diagnostic criteria used to identify individuals with musical anhedonia. Overall, this work points to the importance of considering age when investigating reward for music and suggests that the ways individuals experience music may change across the lifespan.

Acknowledgements

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Disclosure statement

The authors report no conflict of interest.

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