This Is Your Song: Using Participants' Music Preferences to Efficiently Evoke "High-Quality" Nostalgia that Includes Autobiographical Memories

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Abstract

This study tested a new method of evoking nostalgia, including the autobiographical memories that often accompany nostalgic experiences. One hundred and seventy-five participants entered three songs that made them feel nostalgic into the internet music site, Pandora, to create a personalized "station" of seven similar songs. Fifty-nine percent of Pandora-selected songs were rated *moderately high* to *very high* in evoking nostalgia. Participants reported an autobiographical memory for 72% of the Pandora-selected songs. In short, Pandora evoked a high "quantity" of nostalgia and autobiographical memories. Furthermore, the nostalgia evoked was "high-quality" because it had all the hypothesized characteristics. Specifically, nostalgia was significantly predicted by how *autobiographically salient* the song was, how *familiar* the song was, how *meaningful* the song was, how much *positive affect* the song evoked, how *arousing* the song was, how much the song was *liked*, and how much *negative affect* the song evoked.

Keywords: nostalgia, music, autobiographical memories, Pandora, mixed emotions

This Is Your Song: Using Participants' Music Preferences to Efficiently Evoke "High-Quality" Nostalgia that Includes Autobiographical Memories

Almost everyone has experienced the unexpected tang of nostalgia (Wildschut, Sedikides, Arndt, & Routledge, 2006). Nostalgic experiences are characterized by autobiographical memories that feel self-relevant and personally meaningful, filled with warm, positively-toned feelings about our friends, romantic partners, family, or childhood (Hepper, Ritchie, Sedikides, & Wildschut, 2012; Hepper et al., 2014; Holak & Havlena, 1992; Wildschut et al., 2006). Though positive feelings are at the forefront, negative feelings may also be present (Barrett, Grimm, Robins, Wildschut, Sedikides, Janata, 2010; Wildschut et al., 2006), often as a longing for someone or something in the past, or grieving for something gone (Hepper et al., 2012; Hepper et al., 2014).

Music as a Trigger for Nostalgia

Music is undoubtedly capable of influencing how we feel. Using an experience sampling method, Juslin, Liljeström, Västfjäll, Barradas, and Silva (2008) found that in 64% of episodes where music was present, the music playing affected how the listener felt. Importantly, nostalgia can be aroused by music (Barrett et al., 2010; Janata, Tomic, & Rakowski, 2007; Kusumi, Matsuda, & Sugimori, 2010; Wildschut et al., 2006). For example, Zentner, Grandjean, and Sherer (2008) used factor analysis to identify nine emotional states prompted by music and found that nostalgia formed one of those factors. Therefore, it is no surprise that researchers have frequently turned to music to evoke emotions, including nostalgia, in their participants.

Typically, researchers have evoked emotions with music in two main ways. In the first method, researchers play popular music from participants' past without considering their personal preferences. The second method simply asks participants to select songs that make them

feel whatever emotion researchers desire. We will discuss both of these methods, their respective shortcomings, and then propose a new method for evoking nostalgia and autobiographical memories that captures the best parts of each one.

Evoking nostalgia and autobiographical memories using random, popular songs from participants' past. When researchers want to evoke nostalgia or autobiographical memories, they have typically played samples of music from a participant's pre-adolescence to young adulthood. Participants listen to popular songs from those years without regard to each individuals' music preferences (see e.g., Barrett et al., 2010; Janata et al., 2007). This approach is based on the idea that autobiographical memories formed in pre-adolescence through early adulthood tend to be particularly salient (Rubin, Rahhal, & Poon, 1998), and music from that time is linked to emotions that can last into our later years (Schulkind, Hennis, & Rubin, 1999).

However, evoking nostalgia with this approach has had limited success. Although participants are often familiar with songs from their past (Schulkind et al., 1999), they do not reliably prompt nostalgia or autobiographical memories. For example, Barrett et al. (2010) played songs that were on the Billboard Top-100 Pop, Hip-Hop, and R&B lists when each participant was between 7 and 19 years old. Although participants often found these songs to be familiar, only 26% of those songs were rated as being at least *somewhat nostalgic*. Notably, even this low rate was obtained by using a rather lenient definition of "nostalgia" (a rating of 3 – 5 on a 5-point Likert scale).

Similarly, researchers have used this approach to prompt autobiographical memories. Using a technique almost identical to the one already described, Janata et al. (2007) found that only 29% of songs elicited autobiographical memories from participants, although participants frequently found the songs to be familiar. As Barrett et al. (2010) conclude, music-evoked

nostalgia is largely idiosyncratic and there are no particular songs that consistently elicit nostalgia across individuals. Given this difficulty, a method of selecting songs more closely suited to each individuals' tastes may create higher rates of both nostalgia and autobiographical associations.

Evoking nostalgia using participants' musical preferences. A second approach to evoking nostalgia with music is intuitively appealing: Simply ask participants what music they find nostalgic and play those songs. Similar studies have used this approach to examine how sadness or a "chills" response can be elicited using participants' music selections (Salimpoor, Benovoy, Longo, Cooperstock & Zatorre, 2009; Vuoskoski & Eerola, 2012). Although this approach may be effective for some kinds of emotion research, there are reasons to think it may not be well-suited to nostalgia.

First, asking participants to select their own nostalgic songs may introduce unwanted biases. For example, participants asked to select nostalgic songs may choose songs that are congruent with their current mood (cf. Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). In this case, participants turn to their thoughts at the time (e.g., "I can't stop thinking about the songs my ex and I used to listen to") and select songs that reflect their immediate feelings, but do not represent their nostalgic experiences in general. In addition, asking participants to choose their own nostalgic songs may prompt them to select songs that represent their prototypical view of nostalgia. Thus, participants may ask themselves what nostalgia most closely represents (e.g., "I get most nostalgic at Christmas so I'll select holiday songs") and select songs that, again, are not indicative of their nostalgic experiences overall. Although both of these examples are nostalgic, they are constrained by factors that are probably unwanted by researchers.

Furthermore, allowing participants to select their own nostalgic songs may produce less of the "bittersweet" quality that makes nostalgia theoretically interesting. Batcho (2007) found that people who experienced more personally-relevant nostalgia preferred musical lyrics that were purely happy in tone. Conversely, Van den Tol and Edwards (2013) found that people may prefer to listen to sad music, especially after experiencing a psychologically negative event, as a means of understanding and regulating their mood. This suggests that participants who are nostalgia prone may select songs that are uniformly happy, whereas others who have undergone a negative event may select songs that are uniformly sad. Triggering the more complex, mixed affect that is sometimes linked with nostalgia may require unexpected cues that limit these kinds of biases.

The Current Study

The present study has two goals. The first is to examine a novel method of evoking nostalgia and the autobiographical memoires that frequently co-occur with nostalgic experiences. We asked participants to choose songs that made them feel nostalgic and then played songs that were similar to see if those songs also evoked nostalgia and autobiographical memories. To do this, we used the internet music site, Pandora (www.Pandora.com/). Pandora allows users to enter song selections and then selects songs that are similar in genre, year of release, tone, lyrical content, and many other characteristics (see Pandora Media, Inc., 2014 for more details). Because Pandora generates songs that are unexpected (although similar to those selected by participants), we were able to limit participants' biases in the songs they were exposed to while customizing songs for each individual. Because the songs were customized for each participant, we hypothesized this method would evoke a higher quantity of nostalgia (see Barrett et al., 2010) and autobiographical memories (see Janata et al., 2007) than prior methods.

The second goal of this research is to determine the quality of nostalgia elicited by Pandora. If Pandora-selected songs are truly evoking nostalgia, they should also evoke the characteristics that accompany nostalgia. For example, when people find a song nostalgic, the song is usually familiar and it elicits autobiographical associations (Barrett et al., 2010; Janata et al., 2007). Furthermore, nostalgic songs usually feel meaningful and self-relevant, creating positive affect (Hepper et al., 2012; Hepper et al., 2014; Holak & Havlena, 1992; Wildschut et al., 2006), negative affect to a lesser extent (Barrett et al., 2010; Wildschut et al., 2006), and may be arousing (Barrett et al., 2010). Finally, because the experience of nostalgia is mostly a positive experience, participants would be expected to like the songs that evoke nostalgia.

In sum, we hypothesized that Pandora-selected songs will evoke a high "quantity" of nostalgia with its' co-occurring autobiographical memories. Furthermore, we hypothesized that Pandora-selected songs will evoke "high-quality" nostalgia that is strongly predicted by the songs' autobiographical salience, familiarity, meaning, and positive affect. The remaining factors of arousal, liking the song, and negative affect were hypothesized to predict nostalgia to a lesser degree.

Method

Participants

Participants were 175 undergraduate students recruited in the psychology department of a mid-sized west coast public university in exchange for extra credit in their courses. There were 132 women (75%) and 43 men (25%) whose ages ranged from 18 to 52 (M = 23, SD = 5.61). The sample was 68% Caucasian, 20% Hispanic/Latino, 7% other or mixed, 3% African American, and 2% Asian. Ninety-three percent of participants indicated that English was their

native language, and 97% indicated that they grew up either completely or partially in the United States.

Materials and Procedure

Part one. Participants completed part one either online (65%) or in paper format (35%) in a classroom for extra credit[1]. In part one, participants completed the consent form, a demographics form, and then listed three songs that made them feel nostalgic. Nostalgia was defined in large, bold letters as "a wistful or sentimental longing for the past, and typically involves a particular time or place with some personal association." Participants were also asked to provide two alternate nostalgic songs in the event that one of their first three choices could not be located in Pandora's database. These songs were used to create a "station" on Pandora that generated similar songs.

Part two. Part two was completed entirely online. The three nostalgic songs named by participants in part one were used to create a new "station" on Pandora. Because we explicitly wanted to avoid the biases that may accompany these songs, participants did not listen to their self-selected songs; rather, these songs were only used to create a station tailored for each individual. Participants were instructed to listen to seven Pandora-selected songs for a minimum of 1-min each, but were invited to listen longer if they wished (total listening time to the seven songs, $M = 13.81$ min, $SD = 5.35$)[2]. While listening to each song, a Google Docs form was also onscreen. Participants used the Google Doc to report the name and artist of each song (information displayed onscreen while the song was playing) and their song ratings. Participants rated each song on several dimensions using a 7-point Likert scale (1 = *low/none*, 7 = *high*): how *nostalgic* they found each song to be, how *familiar* they were with each song, how much they *liked* each song, how *arousing* each song was, how *meaningful* they found each song to be, how

much *positive emotion* each song made them feel, how much *negative emotion* each song made them feel, and how *autobiographically salient* each song was to them.

In addition, participants were asked to report any autobiographical memories associated with each song. They were first prompted with, "I associate this song with people (past or present): (select all that apply)" and given the options: *Friend(s)*, *Romantic Partner(s)*, *Parent(s)*, *Sibling(s)*, *No One*, and *Other* followed by a space to write in their association. They were then asked, "I associate this song with a certain time or place: (select all that apply)" and given the options: *School*, *Work*, *Vacation*, *Specific Event*, *Specific City/Location*, *None* and *Other* followed by a space to write in their association. A total of 1224 ratings of Pandora-selected songs were gathered.

Results

Pandora's Ability to Evoke Nostalgia

The Pandora-selected songs were effective in evoking nostalgia. Fifty-nine percent of the new songs were rated *moderately high* to *very high* (5 – 7 on a 7-point Likert scale) in evoking nostalgia. This method was significantly more effective in generating nostalgia than having participants randomly listen to songs that were popular in their past (see Barrett et al., 2010), χ^2 (1, N = 7942) = 531.21, p < .001. Notably, Pandora-selected songs evoked nostalgia more effectively even though we used a more stringent definition of "nostalgia" (5 – 7 on a 7-point Likert scale) than Barrett et al. (2010) (3 – 5 on a 5-point Likert scale). Examining ratings by participant, 99% (173/175) rated at least one of their Pandora-selected songs 5 or higher for nostalgia, indicating that for nearly every participant Pandora generated at least one song that was *moderately high* in nostalgia.

Factors Associated with Participants' Nostalgic Experiences

We used multiple regression to determine how well the predicted variables (i.e., autobiographical salience, familiarity, meaning, positive affect, negative affect, arousal, and liking the song) accounted for nostalgia (see Table 1). The model was significant, $R = .856$, $F(7,1216) = 475.68$, $p < .001$, $R^2 = .73$, with all variables contributing to a significant degree. As predicted, the strongest factors were autobiographical salience ($\beta = .375$, $p < .001$), familiarity ($\beta = .217$, $p < .001$), meaning ($\beta = .145$, $p < .001$), and positive affect ($\beta = .145$, $p < .001$). The remaining factors contributed to nostalgia to a smaller, but statistically significant, degree: arousal ($\beta = .088$, $p < .001$), liking the song ($\beta = .053$, $p < .05$) and negative affect ($\beta = .036$, $p < .05$) (see Table 1).

Autobiographical memories. Autobiographical salience was the strongest predictor of nostalgia ($\beta = .375$, $p < .001$). Furthermore, for all the songs selected by Pandora (N = 1224), participants reported an autobiographical memory for 72% of them. Therefore, we examined what autobiographical memories were elicited.

Associations to people and time or place. For associations to people, *Friend(s)* was selected 24% of the time, *Romantic Partner(s)* 20% of the time, and *Family* 18%. *Family* was broken down into 9% for *Parent(s)*, 3% for *Sibling(s)*, and 6% for a combination of the two. Because participants could select multiple memories elicited by each song, a combination of checked boxes also occurred. Endorsements of *Friend(s)* and *Romantic Partner(s)* were selected together 15% of the time and *Friend(s)* and *Family* were selected together 14% of the time.

For associations involving time or place, *Specific Event* was selected 30% of the time, *School* 19% of the time, *Specific City/Location* 12% of the time, *Vacation* 3% of the time, and *Work* 1%. As before, some participants selected more than one box. This happened primarily in conjunction with the *Specific Event* category (e.g., a participant selecting both *Specific Event* and

School); this occurred 17% of the time. For the write-in option, 3% named a specific person and 11% named a specific time or place.

Autobiographical memories evoked by songs high and low in nostalgia. We further examined the autobiographical memories elicited by songs that were rated high in evoking nostalgia. Songs rated 5 or higher on nostalgia (on a 7-point Likert scale) elicited an autobiographical memory 54% of the time. For associations to people, *Friend(s)* was selected 22% of the time, *Romantic Partner(s)* 20% of the time, and *Family* 12%. *Family* was broken down into 9% for *Parent(s)*, and 3% for *Sibling(s)*. When looking at memories involving time or place, *Specific Event* was selected 34% of the time, *School* 19% of the time, and *Specific City/Location* 11% of the time. For the write-in option, 3% named a specific person and 12% named a specific time or place.

Furthermore, we examined the autobiographical memories elicited by songs that were low in evoking nostalgia. Songs rated 3 or lower on nostalgia (on a 7-point Likert scale) elicited an autobiographical memory 9% of the time. For associations to people, *Friend(s)* was selected 33% of the time, *Romantic Partner(s)* 28% of the time, and *Family* 18% of the time. *Family* was broken down into 10% for *Parent(s)*, 3% for *Sibling(s)*, and 5% for a combination of the two. When looking at memories involving time or place, *Specific Event* was selected 15% of the time, *School* 15% of the time, and *Specific City/Location* 13% of the time. For the write-in option, 2% named a specific person and 12% named a specific time or place.

To examine these differences in another way, we performed a t-test to look at nostalgia ratings for songs when no memory was reported (i.e., *No One* was selected for associations to people and *None* was selected for time or place) versus nostalgia ratings when a memory was reported. Mean nostalgia ratings were significantly lower for songs that did not evoke an

autobiographical memory (M = 2.43, SD = 1.24) compared to songs that did evoke an autobiographical memory (M = 5.52, SD = 1.04), $t(1222) = 29.83$, $p < .001$.

Negative affect. Nostalgia is sometimes described as a bittersweet feeling involving positive and negative affect. Whereas positive affect was a robust predictor of nostalgia, negative affect was a much smaller predictor, although statistically significant (see Table 1). Seventy-three percent of Pandora-selected songs elicited higher positive affect than negative affect, 13% elicited positive and negative affect equally, and 14% elicited more negative affect than positive affect.

To better understand the role of negative affect in nostalgia, this factor was examined more closely. Negative affect had small, but significant, positive correlations with meaning (r = .15, $p < .001$), autobiographical salience (r = .14, $p < .001$), and nostalgia (r = .07, $p < .05$). Negative affect was negatively correlated with positive affect (r = -.31, $p < .001$), but the effect was relatively small (see Table 2).

A multiple regression model using those four variables to predict negative affect was also significant, R = .537, $F(4,1223) = 123.20$, $p < .001$, R^2 = .29, with each predictor contributing significantly to the model: meaning (β = .346, $p < .001$), autobiographical salience (β = .165, $p < .001$), positive affect (β = -.668, $p < .001$), and nostalgia (β = .106, $p < .02$). Notably, nostalgia remained significant in this model, indicating once again the presence of bittersweet feelings triggered by the Pandora-selected songs.

Mixed affect. The frequency of mixed affect was also examined more closely. A song was judged as evoking "mixed affect" if a participant rated it at 3 or above (on a 7-point Likert scale) for both positive and negative affect. This occurred for 28% of the songs Pandora selected. We examined the autobiographical memories elicited by songs that evoked mixed affect. For

associations to people, *Friend(s)* was selected 16% of the time, *Romantic Partner(s)* 29%, and *Family* 18% of the time. Songs associated with *Romantic Partner(s)* evoked mixed affect significantly more than songs associated with either *Friend(s)* or *Family*, χ^2 (1, N = 348) = 7.53, $p < .001$.

To better understand this finding, we used ANOVA to compare the means of nostalgia and negative affect when different associated memories were selected. Songs with multiple memory associations were rated higher in nostalgia (M = 6.02; SD = 1.3) and songs where *No One* was selected for an associated memory were rated significantly lower in nostalgia (M = 2.73; SD = 1.83), $F(7,1188) = 117.53$, $p < .001$. There were no significant differences in the mean nostalgia ratings for songs associated with *Friend(s)*, *Family*, or *Romantic Partner(s)*, but negative affect was significantly higher when associated with *Romantic Partner(s)* (M = 3.44; SD = 2.07) than with any other group: *Friends* (M = 1.84; SD = 1.3), *Parents* (M = 2.56; SD = 1.85), *Siblings* (M = 2.03; SD = 1.45), multiple *Family* endorsements (M = 2.16; SD = 1.78), general multiple endorsements (M = 2.39; SD = 1.71), or selection of *No One* (M = 2.12; SD = 1.58), $F(7,1188) = 12.72$, $p < .001$.

Discussion

This study looked at how well nostalgia and its' co-occurring autobiographical memories were evoked by music when individual music preferences were taken into account. Nostalgia and the autobiographical memoires that frequently accompany nostalgic experiences are highly personal and related to the self, so we first asked participants to identify three songs that made them feel nostalgic. The website Pandora then used these songs to generate seven songs that were similar to the songs participants identified.

Pandora-selected Songs Evoked a High "Quantity" of Nostalgia

Fifty-nine percent of the Pandora-selected songs were rated *moderately high* to *very high* (5 – 7 on a 7-point Likert scale) in evoking nostalgia. In contrast, when participants randomly listened to songs that were popular in their past, only 26% of those songs were rated as being at least *somewhat nostalgic* (3 – 5 on a 5-point Likert scale; Barrett et al., 2010). Even though the present study used a more stringent definition of nostalgia, our method was more than twice as effective in evoking nostalgia.

Pandora-selected Songs Evoked "High-Quality" Nostalgia

The nostalgia evoked by Pandora-selected songs was predicted by all the hypothesized factors. As expected, strong predictors were autobiographical salience, familiarity, meaningfulness, and how much positive affect they evoked. Also as expected, nostalgia was predicted to a smaller degree by how liked a song was, how arousing it was, and how much negative affect it evoked. Combined, these factors accounted for $R^2 = .73$ of the variance in nostalgia.

Autobiographical associations. Autobiographical salience is a key feature of nostalgia (Hepper et al., 2012; Hepper et al., 2014; Holak & Havlena, 1992; Wildschut et al., 2006). Importantly, this factor was the strongest predictor of nostalgia ($\beta = .375$, $p < .001$) and participants reported an autobiographical memory for 72% of the songs selected by Pandora. In contrast, when participants randomly listened to songs that were popular in their past, autobiographical memories were only evoked 29% of the time (Janata et al., 2007).

Furthermore, as expected, we found that when songs elicited an autobiographical memory, they were rated as significantly more nostalgic than songs that didn't elicit a memory. Specifically, songs rated high in nostalgia (i.e., 5 or higher on a 7-point Likert scale) prompted

an autobiographical memory 54% of the time. In contrast, songs rated low in nostalgia (3 or lower on a 7-point Likert scale) only prompted an autobiographical memory 9% of the time.

Positive and negative affect. Consistent with previous researchers, we found that nostalgia was primarily a positive experience tinged with negative affect (Barrett et al., 2010; Wildschut et al., 2006). Positive affect was a strong predictor of nostalgia ($\beta = .145$, $p < .001$) and negative affect was a weak, but significant, predictor ($\beta = .04$, $p < .05$). It is noteworthy that, although negative affect had a significant negative correlation with positive affect, the correlation was relatively small ($r = -.31$, $p < .05$).

Twenty-eight percent of Pandora-selected songs evoked mixed affect (i.e., participants rated the songs 3 or higher on 7-point Likert scale for positive and negative affect). Interestingly, these mixed affect songs evoked significantly more negative affect when the associated memory was about *Romantic Partner(s)* as compared to *Friend(s)* or *Family* ($p < .001$). Furthermore, songs that evoked memories of romantic partners were associated with more mixed affect in general, and more negative affect in particular ($p < .001$).

Meaning. We asked participants how meaningful they found each song (cf. Batcho, 2007) and discovered that it was a significant contributor to nostalgia ($\beta = .145$, $p < .001$). To our knowledge, this is the first time this variable has been introduced into a regression a model to predict nostalgia. Importantly, meaning was not subsumed by autobiographical salience even though they were highly correlated ($r = .73$, $p < .001$).

It is interesting to note that meaning was the strongest predictor of negative affect ($\beta = .346$, $p < .001$). This may help to explain why, even though nostalgia is often tinged with sadness, it is still primarily a positive experience (Barrett et al., 2010). It is possible that the

negative affect is experienced as being meaningful and, therefore, is not entirely unwanted (cf. Van den Tol & Edwards, 2013).

In Closing

The method described to evoke nostalgia and autobiographical memories produces a high "quantity" of nostalgia that is also "high-quality." We suggest that future researchers use similar, targeted approaches to evoke nostalgia or autobiographical memories with music. Furthermore, we propose that researchers include the variable of "meaning" when exploring participants' experience of nostalgia. "Meaning" may be helpful in understanding why nostalgia can evoke negative affect that participants, at least partly, want to experience.

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Footnotes

[1] Surveys completed on paper and online for part one were examined for any differences in demographic factors. No significant differences were found and all data were collapsed into one data set.

[2] Participants listened to seven songs because after that, Pandora plays a commercial. Although Pandora does offer a pay service that removes this limitation, we utilized their free service for this study. Due to the proprietary nature of Pandora, participants could only be timed from when they started listening to the seven Pandora-selected songs to when they finished listening to those songs (i.e., we could not determine how long participants listened to each song). Submissions with low completion times (under 7 min), technical errors, or other failure to follow instructions were excluded. Data from five participants were excluded for such issues.

Table 1

Multiple regression model predicting nostalgia with the hypothesized factors

	Nostalgia Evoked from Pandora-Selected Songs			
Variable	*β*	*SE B*	*t*	*p*
Autobiographical Salience	.38	.02	15.76	< .001
Familiarity	.22	.02	10.64	< .001
Positive Affect	.15	.03	5.95	< .001
Meaning	.15	.03	5.60	< .001
Arousal	.09	.03	3.91	< .001
Liking	.05	.03	2.04	< .05
Negative Affect	.04	.02	2.05	< .05
R^2	.73			
F	475.68, $p < .001$			

Note. N = 1224, df = 7,1216

Table 2

Correlations among nostalgia and the hypothesized factors

	1	2	3	4	5	6	7
1. Nostalgia	-						
2. Familiarity	.68***	-					
3. Liking	.68***	.63***	-				
4. Arousal	.65***	.55***	.70***	-			
5. Meaning	.72***	.55***	.71***	.63***	-		
6. Positive Affect	.63***	.53***	.68***	.62***	.59***	-	
7. Negative Affect	.07*	.01	-.03	.01	.15***	-.31***	-
8. Autobiographical	.78***	.60***	.62***	.60***	.73***	.55***	.14***

Note. Pandora-selected songs N = 1224, * $p < .05$, ** $p < .01$, *** $p < .001$