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Abstract

The aim of the present research was to consider what particular features were significant predictors of whether music is present in a given situation, as well as what factors influenced a person's judgments about the music. Applying Mehrabian and Russell's (1974) Pleasure-Arousal-Dominance model to everyday experiences of music, 569 people reported on their activity for the previous day via the Day Reconstruction Method (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). Data concerning each event included the activity and location, and characterization of the experience using the Pleasure-Arousal-Dominance measure. Moreover, for those events where music was present, participants also indicated how they heard the music and made four judgments about the music. Results indicated that the location, activity, and the person's perception of dominance were significant predictors of the presence of music during everyday activities and that person's judgments about the music. Contrary to prior research that has considered predominantly situational pleasure and arousal variables, the present results demonstrate that dominance is arguably the important variable in contextualized music listening.

Keywords: music listening; dominance; control; context; day reconstruction method; Pleasure-Arousal-Dominance model

Running head: Pleasure, arousal, dominance

Pleasure, arousal, dominance, and judgments about music in everyday life

In present-day western society, music listening occurs in a variety of contexts, and for many different reasons (Greasley & Lamont, 2011; Juslin, Liljeström, Västfjäll, Barradas, & Silva, 2008; Komulainen, Karukka, & Hakkila, 2010; Krause, North, & Hewitt, 2015; North, Hargreaves, & Hargreaves, 2004; Watson & Mandryk, 2012). With mobile devices, personal computers, and the Internet, opportunities for interacting with music have never before been so varied (North et al., 2004; O'Hara & Brown, 2006), allowing people to expand the places, times and ways in which they experience music (Heye & Lamont, 2010; Juslin et al., 2008; Sloboda, Lamont, & Greasley, 2009). Even in public places, people can control what they hear, using headphones and mobile devices to create private environments (Bull, 2007; Skånland, 2011). Thus, mobile devices might offer listeners an altered sense of dominance over their auditory environment. In short, given technological developments in how individuals listen to music, it is important to consider the level of choice and control a person has over the music that he or she experiences in everyday life, and the present research attempts this in the context of Mehrabian and Russell's (1974) model of environmental psychology.

Mehrabian and Russell (1974) asserted that people's interpretation of and interaction with their contextual surroundings result from variations in three factors, namely pleasure, arousal, and dominance (hereafter, the 'PAD dimensions'). Pleasure-displeasure refers to a valenced feeling state; arousal refers to the extent to which one feels stimulated, alert, or active in an environment; and dominance refers to the extent to which one controls one's environment (Andersson, Kristensson, Wästlund, & Gustafsson, 2012; Hines & Mehrabian, 1979). The contention of the present research is that the PAD model might also provide a useful means of conceptualizing everyday

music listening experiences, which have been the subject of previous data collection but little theoretical consideration.

The main objective of the present, exploratory research is to consider what particular features are significant predictors of whether music is present in a given situation, and what factors influence a person's judgments about the music. There are many elements that might contribute to whether or not music is experienced in any particular situation, as well as a person's response to any such music. These elements concern the individual listener in question (such as his or her musical identity, level of music education, and general level of interest in music) as well as the context (such as the location and the activity in which the person is involved). As such, this raises several questions, such as what particular features are significant predictors of whether music is present in a given situation; and what factors determine a person's judgments of the music in terms of how much they like the music, consider it to be arousing, perceive that they have choice over the music, and are engaged with the music?

Previous research & hypotheses

Listener variables. Previous research indicates that demographic characteristics of listeners, the extent to which their identity is based on music, and their degree of engagement with music are all potentially relevant features pertaining to individuals' music interactions. Demographic characteristics such as age and sex have been shown to relate to people's everyday experiences with music. For example, while adults are more likely to access music via CD or radio, adolescents are more likely to use YouTube (Nielsen Company, 2012; Smith, 2012) and other digital music services such as Spotify and iTunes (Komulainen et al., 2010). Those aged under 30 years are also statistically

more likely to download music from illegal sources, and use smartphones, dedicated portable digital music players, and computers to listen to music, while people aged over 30 years report statistically higher incidences of downloading music from legal sources and listening via the radio and CDs (Avdeeff, 2012). North and Hargreaves (2008) reviewed evidence showing that technology adoption and music piracy are more common among groups that can be defined in terms of income and sex. Males are also more likely than females to report listening to music and watching videos online as well as downloading music on a weekly basis (Jones, Johnson-Yale, Millermaier, & Pérez, 2009). Since age and sex are related to the use of digital music technology, which is itself related to in situ experiences of music, age and sex may also predict the likelihood that music is experienced in everyday life (hypotheses 1a and 1b). Additionally, because global differences exist regarding the uses of music and music tastes (North & Davidson, 2013), where a person resides may potentially influence the presence of music in everyday situations (hypothesis 1c).

Additionally, prior research has indicated that people's level of involvement with and interest in music (referred to as music engagement) plays a role in how often they participate in music-related activities (Greasley & Lamont, 2006). More engaged individuals are conscious of their use of music, for instance, in efforts to change their mood (Greasley & Lamont, 2006). Moreover, results from research utilizing the Experience Sampling Method demonstrate that individuals who rated music as more important in their life experience a greater quantity of music (Krause et al., 2015). Music is also a means of defining one's identity, in terms of performing and listening (MacDonald, Hargreaves, & Miell, 2009), specific behaviors such as collecting music (Giles, Pietrzykowski, & Clark, 2007), and how people access music in daily life (Krause & North, 2016). Therefore, it is likely that people who are more engaged with music will

experience more music (hypothesis 2a). Similarly, participants whose identity is based more strongly on music might also experience more music (hypothesis 2b).

Contextual variables. Of particular relevance to Mehrabian and Russell's model of environmental psychology, judgments of music have often been considered in terms of the degree of pleasure and arousal evoked by the music itself, and a more limited amount of research has also considered the listening situation in terms of these same variables. Much of this research has concerned the proposed inverted-U relationship between the degree of pleasure and arousal evoked by music (Huron, 2009; Kellaris, 1992; North & Hargraves, 1997; North & Hargreaves, 1996). Berlyne's (1971) well-known, albeit rather dated, theory proposed that there is an inverted-U relationship between the pleasure and arousal evoked by music, so that moderately-arousing music is liked most. Whether such a pattern holds in everyday music listening situations is questionable, however, due to the influence of the arousal-based goals that one might have in a particular context (e.g. the goal of achieving a high state of arousal while exercising in a gym). Indeed, regarding situationally-based arousal goals, music selections can reflect an attempt to optimize arousal evoked by the situation in question (Hargreaves & North, 2010; North & Hargreaves, 1996, 2000). For example, people prefer high-arousal music for aerobic exercise as opposed to low-arousal music for guided relaxation (North & Hargreaves, 1996). Contrary to lab-based research on Berlyne's (1971) theory, this arousal-optimization strategy does not equate to an arousal-moderation strategy. With the growing use of portable music listening technology, the opportunity to use arousal-based strategies in everyday listening in different contexts is growing (Krause et al., 2014).

However, previous research on music has tended to ignore the dominance dimension and, similarly, research on the Mehrabian and Russell (1974) model has debated the importance of this factor, partly because of research using just the pleasure and arousal dimensions (e.g. Desmet, 2010; Donovan, Rossiter, Marcoolyn, & Nesdale, 1994; Mattila & Wirtz, 2001). For instance, Russell and Pratt (1980) essentially created a two-dimensional model using just pleasure and arousal. However, more recent work including dominance has concluded that the three-dimensional model is superior to the two-dimensional model: dominance has demonstrated cross-cultural validity and reliability and the three domains together have been shown to account for 27–37% of the variance in approach-avoidance behaviors (Yani-de-Soriano & Foxall, 2006). Although situations that provoke pleasure and dominance are most preferred (Mehrabian, Wihardja, & Ljunggren, 1997), people are not always in control of the music they encounter in everyday life. However, recent technological innovations (e.g. mobile listening) mean that dominance may now be an important variable in explaining in situ musical preferences, as digitization has massively increased the degree of choice and control that one has (and typically exercises) over a given music listening episode.

In addition, control and choice have been implicated in findings concerning everyday music listening. For instance, under high levels of choice and control, participants have reported music functions including enjoyment, relaxation, and facilitated concentration, whereas under low levels of choice and control, there were more instances of music having weaker effects or effects such as irritation (Greasley & Lamont, 2011). Moreover, work by Sloboda (2005; Sloboda & O'Neill, 2001) showed that music experienced under conditions of choice was associated with positive emotional change, whereas unchosen music experienced in public was met with ambivalence or even disliked. Additionally, a body of more general psychological

research supports the notion that control might be important in determining positive outcomes: control, and the perception of control, has been demonstrated to mediate various aspects of health and well-being, such as reactions to stress and pain (Chanda & Levitin, 2013; Lachman & Weaver, 1998; Lee, Ford, & Gramotnev, 2009; Mitchell, MacDonald, & Knussen, 2008); and a person's own, preferred music has been found to significantly increase his/her perceived control over painful stimuli and reduce anxiety (Mitchell & MacDonald, 2006; Mitchell et al., 2008). Moreover, self-selected music has been shown to be more effective than experimenter-provided music in patient recovery post-surgery (Chanda & Levitin, 2013).

Therefore, with regard to the PAD domains, we suspect that the presence of music during an episode will be related to an individual's perception of dominance because it reflects a person's degree of control over the situation (which of course includes the ability to choose to listen to music) (hypothesis 3). Moreover, it is hypothesized that the person's judgments concerning the music will be related to the environmental PAD ratings, such that the environmental arousal rating will relate to how arousing the music is perceived to be, that the pleasantness of the environment will relate to how much the music is liked, and that the perception of dominance in a particular situation will relate to having control over their listening (hypothesis 4). Additionally, if the model holds for responding to music as it has in retail settings (e.g. Yani-de-Soriano & Foxall, 2006), dominance may also be related to judgments of pleasure and arousal (hypothesis 5).

A number of contextual elements that are not easily captured by Mehrabian and Russell's PAD dimensions may also relate to everyday judgments of music. These include time of day, where a person is, what the person is doing, and how the music is heard. For instance, prior research notes that the likelihood of experiencing music

varies as a function of time of day and day of the week (Krause et al., 2015) as well as location (Krause et al., 2014). Although most listening occurs at home, the increasing prevalence of mobile devices is influencing how people encounter music in public spaces (Krause et al., 2014). Therefore, it is predicted that time of day and where the individual is during the day will influence the presence of and perception of music in everyday life (hypotheses 6 and 7). Moreover, for situations in which music is present, prior research has demonstrated that devices affording users more personalized control (e.g. a mobile mp3 player as compared to the radio) are accompanied by more positive responses to the music heard, including improved mood and positive perceived consequences (such as motivation) (Krause et al., 2015). Therefore, it is expected that the device on which music is heard will contribute to a person's judgments of the music: specifically, devices affording personalized control (e.g. an mp3 player) should be associated with high ratings concerning choice, liking, and engagement (hypothesis 8).

Method

Participants

Participants were recruited via advertising on the author's website and social media, the university's student research participation program, and dedicated online research participation websites. Participation was voluntary although, as an incentive, community participants were eligible to enter a prize draw for a gift card and student participants were eligible to receive coursework credit through the research participation scheme of the School hosting the data collection.

569 individuals who resided in Australia and the United States (71.90% Australia, 28.10% US) completed the online questionnaire. (Note that another 59 individuals completed the questionnaire, but were excluded from analyses because they

did not reside in Australia or the US.) The sample was predominantly female (75.70%), ages ranged from 18–78 years (M = 28.66, Mdn = 23, SD = 13.20), and 44.80% of the sample had a university qualification. The majority of participants reported that music was important in their lives (M = 5.83, Mdn = 6, SD = 1.28 on a seven-point scale). Similarly, the sample listened to an average of 3.46 hours of music daily (Mdn = 3, SD = 2.76) demonstrating high music engagement. As per Krause et al. (2015) and North and Hargreaves (1995), participants' levels of musical education and training were coded into one of three levels by three judges: 43.90% of the sample were rated as "low" (those with no to little experience), 45.30% as "moderate" (playing an instrument recreationally), and 10.70% as "high" (proficiency on an instrument as well as professional musicians, teachers, or having studied music at university).

Design and procedure

Background information. Individuals reported their sex, age, occupation, nationality, and country of residence. They then rated separately the importance of music in their lives (hereafter the "music importance rating") on a seven-point scale (1 = *not at all*, 7 = *extremely*), reported how many hours they listened to music on an average day, and wrote open-ended responses regarding their level of music education, as three measures of musical engagement. Participants then completed Krause and North's (2016) identity statements, which asked them to state respectively the extent to which each of "Music", "Music technology", "Technology", and "Cloud-based technology" "is central to my identity" on seven-point Likert scales (1 = *not at all*, 7 = *completely*). A music-technology identity score for each participant resulted from a principal components analysis, which indicated that one factor accounted for 59.81% of the total

variance (see Table 1). Cronbach's alpha for the music-technology identity was .77 for the present data, consistent with prior reliability figures (.76 by Krause & North, 2016).

-Table 1-

Day Reconstruction Method. The present work employed the Day Reconstruction Method (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004), which asks participants to reconstruct their previous day as a series of episodes via a structured questionnaire, thereby providing an assessment of the entire day (Kahneman et al., 2004). Following the Day Reconstruction Method protocol, participants reconstructed the previous day as a series of episodes. There was space to list ten episodes for the morning (from waking until lunch), afternoon (from lunch until dinner), and evening (from dinner until going to bed), with directions that stated it was not necessary to use all of the spaces.

For each episode, respondents indicated an approximate start and end time, and selected the location and activity from two respective lists of options (see Table 2). Derived from prior research utilizing the Day Reconstruction Method and Experience Sampling Method (Kahneman, et al., 2004; Krause et al., 2015; North et al. 2004), the options represented a wide range of activities and locations common to everyday experiences. Participants completed Mehrabian and Russell's (1974) Pleasure-Arousal-Dominance scale for the particular situation in question, which uses six items for each dimension, each of which is measured using seven-point semantic differential scales. For example, respondents are asked to mark how they feel in terms of being happy versus unhappy (pleasure scale), stimulated versus relaxed (arousal scale), and autonomous versus guided (dominance scale). The six responses for each dimension were averaged to create mean pleasure, arousal, and dominance scores; and due to the

scale's presentation, feeling more pleasure, arousal, and dominance is indicated by a lower mean score. Cronbach's alpha for the pleasure, arousal, and dominance scales was .97, .88, and .90 respectively.

Participants also responded 'yes' or 'no' to whether music was present during the episode. If participants were exposed to music during the episode in question, they completed a subsequent series of questions regarding that music. This involved selecting the listening device from a list of options, and rating (on 1-7 scales, anchored by *none/dislike very much* and *total/like very much*) how much choice they had in what was heard, how well liked the music was, how engaged with the music they were, and how arousing they considered the music to be (defined as "loud/fast/energizing").

Participants accessed the questionnaire online. Individuals first read the participant information sheet and indicated their consent prior to gaining access to the questionnaire, and, when finished, were redirected to a debriefing webpage. The length of time taken to complete the survey varied depending on the number of episodes a person entered: however, informal discussions with participants after completion indicated a typical completion time of 45 minutes.

Results

Data analysis protocol

A hierarchical structure whereby episodes were nested within participants was used when performing generalized linear mixed method (GLMM) analyses. This structure accounted for the fact that individual participants (for which their background characteristics remain stable) completed multiple episodes (for which the listening experience and environment changes). Moreover, as this research explored two categories of variables, in order to address the hypotheses, a two-step GLMM protocol

was performed. Firstly the listener background characteristics (namely, gender, age, country of residence, university degree, music importance rating, music hours, music education rating, and music identity score) were included as predictor variables in order to determine which variables to include as covariates in a second GLMM analysis. Thus, the second GLMM analysis included the significant participant background variables and all of the episode variables (namely, day of week, time of day, location, activity, pleasure, arousal, and dominance).

Predicting the presence of music in everyday situations

Overall, the sample provided data on a total of 6413 episodes (1575 episodes from US-based participants, and 4838 from Australia-based participants). Individual participants entered between 1 and 30 episodes, completing an average of 11.34 episodes each (*Mdn* = 11, *SD* = 7.06). The reported frequencies of the locations, activities, and devices involved in the everyday episodes reported on are shown in Table 2. Music was involved in 2,311 episodes (36.00%) overall.

-Table 2-

The GLMM analysis that considered which variables distinguished episodes in which music was or was not present was significant (see Table 3 for details).

Listener variables. Significant predictors concerning the participant included the music importance rating, average listening hours, and music education level: these variables were positively related such that higher ratings were associated with a greater likelihood of music being present in a particular episode. However, a person's age and

sex were not significant predictors of whether music was present in a given episode. Country of residence was significant, such that Australian residents were more likely to hear music in a given episode than were US residents.

Contextual variables. With regard to time of day, the pattern of results indicated that individuals were significantly less likely to hear music as the day progressed from morning to afternoon to evening. Both location and activity were significant predictors also of the likelihood of music being present in a given episode. Activities in which music was commonly encountered included volunteering and worshipping (see Table 4). With regard to location, episodes taking place in a car were significantly more likely to involve music than when at work, walking, and shopping (Table 4). Finally, episodes in which participants gave higher environmental arousal and dominance ratings were more likely to involve music.

-Tables 3 and 4-

Predicting judgments about music

Four GLMM analyses ($\alpha = .0125$) investigated the factors that predict respectively (a) ratings of how much a person likes the music heard in a given situation; (b) ratings of how arousing a person considers the music to be; (c) ratings of how much choice a person has in listening to music; and (d) how engaged a person is with the music (how central the music was to the activity). Again, the two-step GLMM analysis protocol was used (note that the device used to play the music was included as an additional predictor variable in the second analyses). The four analyses were significant; results are presented in Tables 4 and 5 and discussed below.

-Table 5-

Listener variables. Listener variables, including measures of music engagement and university degree were significant predictors. Specifically, music listening hours and the music importance rating were related positively to liking for the music heard. The music importance rating was also positively related to engagement ratings. Moreover, individuals with a university degree considered the music to be less arousing and rated their engagement with the music as lower than those with a degree. However, no participant background variables were significant in predicting music choice ratings.

Contextual variables. Location, activity, and listening device were significant predictors in all four analyses concerning the ratings of liking, arousal, choice, and engagement. As seen in Table 4 concerning locations, high liking ratings occurred for music heard while worshipping and at home; the music experienced at home, in the car, and while walking were associated with higher choice ratings than the overall average; and high estimated means indicated high music engagement in the car and at home. Regarding activities, volunteering and commuting had high liking ratings; exercising was associated with the highest estimated mean music arousal rating; choice ratings were higher than average while commuting and volunteering; and higher than average engagement ratings were associated with worshipping, exercising, and listening to music. One device, mobile mp3 players, was associated with the highest liking, arousal, choice, and engagement ratings.

Regarding Mehrabian and Russell's model, the pleasure ratings assigned to the situation were also positively related to liking and engagement. The environmental arousal rating was positively related to ratings of arousal assigned to the music. The

rating of environmental dominance was positively related to ratings to liking for the music, arousal assigned to the music, how much choice a person had, and also the level of engagement with the music.

Discussion

In summary, the present research considered the relationship between people's everyday music listening experiences and characteristics pertaining to both the individual listener and to the context. While age and sex were not indicative of the presence of music (contrary to hypotheses 1a and 1b), country of residence was related to the presence of music (hypothesis 1c). While previous research has found that people's use of music differs by where they live (e.g. North & Davidson, 2013), it is not immediately clear why more music was present in Australia in the present study. (One speculative possibility is that Australia's avoidance of the harsh economic downturn experienced elsewhere towards the end of the first decade of the 21st century meant that consumers have better access to the latest portable music technology.) Consistent with prior research (e.g. Greasley & Lamont, 2006; Krause et al., 2005), listener characteristics, including how important people consider music to be in their life and their music identity, were important in explaining the presence of music (supporting hypotheses 2a and 2b). However, in addition to their positive relationship to the presence of music, music engagement variables were also related to people's judgments about music in daily life. Thus, while previous research has highlighted differences in technology use based on age and sex, it appears that in order to understand everyday music listening, it may be more important to consider people's engagement with music.

Importantly, the results provided strong evidence concerning the role of contextual features in everyday music listening episodes. The time of day, the location,

and activity predicted whether music was present in the episode in question (supporting hypothesis 6). Location and activity also predicted how the music was perceived when it was present (supporting hypothesis 7). Activity as a significant predictor was not wholly unexpected as there are normative expectations for the music that is heard in certain circumstances that go beyond simply the arousal-evoking connotations of those circumstances. The device involved in hearing the music was similarly related to how the listener experienced the music (supporting hypothesis 8). These findings are consistent with prior results from Experience Sampling Method studies (e.g. Krause et al., 2014, 2015; North, et al., 2004) and suggest a strong link between the constructs of pleasure and control. Moreover, they reiterate the importance of considering the broader context in which a listener experiences music.

Notably, the present study makes a significant contribution to studying everyday music interactions by applying Mehrabian and Russell's theory to everyday listening. The most striking aspect of the present results concerns the role of Mehrabian and Russell's dominance dimension. Dominance apparently has a wide-reaching influence on people's everyday experiences with music: it was a significant predictor of the presence of music in everyday situations (hypothesis 3) and how the music was perceived (hypothesis 4). This contrasts with prior research, which has focused on the pleasure and arousal dimensions only (e.g. Desmet, 2010; Donovan, et al., 1994; Russell & Pratt, 1980). These findings demonstrate that the consideration of one's experience with everyday music should include the dominance dimension. Previous work identified preferred situations as ones that provoke pleasure and dominance (Mehrabian, et al., 1997), whereas in the present study, the situations in which the listeners felt more dominant were associated with more positive judgments of the music, both in terms of liking and engagement (hypothesis 5). Moreover, the role of

dominance is particularly notable because the growing proliferation of digital music technology means that the ability to control one's auditory environment has increased: dominance may be an increasingly relevant aspect of in situ responses to music in coming years.

Nonetheless, the pleasure and arousal dimensions were also useful predictors of judgments in the present study. Environmental arousal was a significant predictor of the presence of music and of ratings of how arousing the music was itself (H4). However, environmental arousal was not a significant predictor of participant's liking for or engagement with the music, inconsistent with the arguments of Berlyne and others. In contrast, environmental pleasure was a significant predictor of ratings of liking for the music (H4), engagement with the music, and having choice over the music heard.

Device versus dominance

One of the main issues considered in the literature review was the potential importance of the dominance component. Therefore, it is interesting to overview some aspects of the data that appear to support this possibility. The importance of dominance relative to other predictor variables can be assessed via the eta-squared values pertaining to each (see Tables 3 and 5). The eta-squared values for device, location, and activity accounted for the largest relative percentages of variance in the outcome variables. However, it would be simplistic to conclude from this that device, location, and activity are more important than dominance. First, 'device' is not a theoretical construct, and the listening devices used during daily life change over time. Arguably the main dimension along which devices differ concerns the level of personalized control they inherently offer users: mobile mp3 players, for instance, allow for a high degree of

personal control over listening, in contrast to the radio or music heard broadcasted over loudspeakers while in a public place. Thus, inherent to the listening device, as a predictor variable, is the notion of control, or dominance.

The deviation contrasts concerning device shown in Table 4 provide some support for this argument. They indicate a clear contrast between the results concerning mobile mp3 players and smartphones (i.e. devices offering users high levels of personalized control) and those concerning radio and television (i.e. devices offering low levels of personalized control). The mobile devices resulted in ratings that were significantly higher than the overall mean in the case of choice, liking, and engagement, while television and radio resulted in significantly lower ratings than the overall mean. Broadcasted recorded music that was heard in public (representing little or no control over the music encountered) gave rise to significantly lower ratings for liking, arousal, choice, and engagement judgments about the music. On this basis, we could go so far as to speculate whether location and activity are proxies for dominance, and future research could explore this issue in more detail.

Limitations and future research

While the research included participants from Australia and the US, recruiting from other countries would allow consideration of any cross-cultural factors. We might expect, for instance, that the functions of music vary according to the position of a culture on dimensions such as individualism-collectivism and masculinity-femininity (Hofstede, 2001). Moreover, while the Day Reconstruction Method has been shown to provide reliable results that are similar to those from studies utilizing the Experience Sampling Method (Kahneman et al., 2004; Stone et al., 2006), it still provides only a snapshot of a person's interactions with music over the course of a single day, is

potentially subject to recall bias, and does not allow causality to be established. Future research might employ diary studies containing qualitative data: this could allow more detailed consideration of (and participants' own input into) the tentative explanations offered here, as well as some insight into the extent to which factors such as dominance are at the forefront of consciousness when listening to music.

Similarly, future research is necessary to refine the application of the Mehrabian and Russell model to music listening. One particularly interesting issue is whether the explanatory power of the three dimensions of pleasure, arousal, and dominance varies across contexts. For instance, dominance might be particularly important in contexts in which this is usually (or expected to be) high, and that arousal is particularly important in contexts where a polarized arousal state is central to those contexts (e.g. while relaxing or exercising, as compared to doing housework or using public transport). The relative impact of pleasure, arousal, and dominance regarding the influence of music on consumer behaviors could also be explored by conceptualizing the latter in terms of approach-avoidance behaviors and how these might be influenced by Mehrabian and Russell's three dimensions: for instance, which of these is most important in persuading a customer to remain within commercial premises such as a store or restaurant? It may also be important to consider the role of individual differences regarding approach-avoidance behaviors. Personality, for instance, has been associated with preference for arousal states (Eysneck, 1981) and responses to music (e.g. Juslin, et al., 2008). Future research could profit from exploration that considers PAD, mood, and everyday listening as well.

Moreover, additional research might attempt to tease out the reasons why people desire to have control over their listening, as it may be that a desire for exerting control over one's listening is related to the broader interpretation of context and relevant to

one's judgments about the music heard. Future research is necessary in order to better conceptualize control in terms of listening and to also explore the nature of its importance in greater detail. In the meantime, the present results indicate that it may be a relevant variable in attempts to explain everyday interactions with music.

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List of Tables

Table 1.

Principal Components Analysis of the Identity Questionnaire Items

Identity statement	Component loading
Music technology is central to my identity.	0.86
Technology is central to my identity.	0.82
Web-based cloud technology is central to my identity.	0.71
Music is central to my identity.	0.69
Eigenvalue	2.39
% of variance	59.81

Table 2.

Overall Frequencies Reported Across the Responses

	Variable	Frequency	Percent
Day of the week	Monday	1197	18.7
	Tuesday	1557	24.3
	Wednesday	1138	17.8
	Sunday	978	15.3
	Thursday	825	12.9
	Saturday	370	5.8
	Friday	345	5.4
	Total	6410	100
Location	At home	3442	54.9
	In a car	792	12.6
	Other	544	8.7
	At work	534	8.5
	At a friend's house	236	3.8
	Walking	182	2.9
	Public transportation	154	2.5
	Restaurant	139	2.2
	Shopping	118	1.9
	At the gym	61	1
	Pub / club	38	0.6
	Religious worship	26	0.4
	At a concert	9	0.1
	Total	6275	100
Activity[1]	Commuting	865	13.6
	Eating	805	12.6
	Working	567	8.9
	Computer / internet/ email	485	7.6
	Self-care	452	7.1
	Watching TV	396	6.2

	Nap / resting	374	5.9
	Socializing	331	5.2
	Preparing food	203	3.2
	Listening to music	203	3.2
	Doing housework	195	3.1
	Exercising	182	2.9
	Reading	157	2.5
	Shopping	134	2.1
	Taking care of children	111	1.7
	On the phone	73	1.1
	Outdoor activities	65	1
	Volunteering	49	0.8
	Intimate relations	30	0.5
	Praying / worshiping / meditating	30	0.5
	Other	672	10.5
	Total	6379	100
Device	Radio	556	30.2
	Mobile mp3 player	263	14.3
	Computer - online streaming	185	10
	Computer - own collection	178	9.7
	Mobile telephone	146	7.9
	Stereo - mp3 device	145	7.9
	TV	121	6.6
	In public - recorded music	83	4.5
	Mobile CD player	72	3.9
	In public - live artist/group/ensemble	43	2.3
	Stereo - record	26	1.4
	Tablet	19	1
	Stereo - cassette	4	0.2
	Mobile gaming device	2	0.1
	Mobile cassette player	1	0.1

Total	1844	100

Note. Participants were asked to select the single answer that best applied per episode.

Table 3.

GLMM Analysis Predicting the Presence of Music in an Episode (N = 5570)

Variable	*F*	η^2
Listener variables		
Age	F (1, 5521) = 1.49	.000
Country of residence	F (1, 5521) = 7.75**	.001
Music importance rating	F (1, 5521) = 12.45***	.002
Daily listening amount (hours)	F (1, 5521) = 47.38***	.009
Music education level	F (1, 5521) = 6.24*	.001
Contextual variables		
Day of week	F (6, 5521) = 1.46	.002
Time of day	F (2, 5521) = 19.60***	.007
Location	F (12, 5521) = 22.31***	.046
Activity	F (20, 5521) = 9.11***	.032
Pleasure average	F (1, 5521) = 2.44	.000
Arousal average	F (1, 5521) = 17.38***	.003
Dominance average	F (1, 5521) = 8.77**	.002

Note. Overall model: F (48, 5521) = 18.96, $p < .001$; * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4.
Means, Standard Errors, Confidence Intervals, and Significant Deviation Contrasts of the GLMM Analyses Concerning the Presence of Music and the Ratings Regarding the Music

	Music present? [a]				Choice [b]				Liking [c]			
Variable	M	SE	95% CI		M	SE	95% CI		M	SE	95% CI	
Device												
Mobile mp3 player					5.21	0.19	[4.84, 5.58]	#	5.94	0.14	[5.68, 6.21]	#
Mobile telephone					5.05	0.22	[4.61, 5.48]	#	5.68	0.16	[5.37, 5.98]	#
Mobile gaming device					2.46	1.44	[-0.36, 5.29]		5.28	1.04	[3.24, 7.33]	
Mobile CD player					4.70	0.28	[4.15, 5.24]	#	5.65	0.20	[5.26, 6.04]	
Tablet					4.72	0.43	[3.89, 5.56]		5.64	0.31	[5.03, 6.24]	
Radio					2.69	0.18	[2.33, 3.05]	$	4.35	0.13	[4.10, 4.61]	$
TV					2.04	0.25	[1.55, 2.52]	$	3.83	0.18	[3.48, 4.18]	$
Computer -own collection					5.10	0.22	[4.67, 5.53]	#	5.77	0.16	[5.47, 6.08]	#
Computer- online streaming					4.64	0.22	[4.20, 5.07]	#	5.50	0.16	[5.19, 5.81]	
Stereo - mp3 device					4.54	0.22	[4.11, 4.98]	#	5.50	0.16	[5.19, 5.81]	
Stereo - cassette					6.54	0.83	[4.90, 8.17]	#	7.07	0.61	[5.89, 8.26]	#
Stereo - record					4.57	0.40	[3.79, 5.35]		5.78	0.27	[5.25, 6.32]	
In public - live					3.43	0.30	[2.83, 4.02]	$	4.77	0.22	[4.34, 5.19]	$
In public - recorded					1.58	0.26	[1.07, 2.10]	$	4.14	0.19	[3.77, 4.52]	$
Location												
At home	0.32	0.02	[0.28, 0.36]	$	5.19	0.17	[4.86, 5.52]	#	5.82	0.12	[5.86, 6.05]	#
At a friend's house	0.25	0.04	[0.18, 0.34]	$	4.06	0.31	[3.45, 4.67]		5.02	0.22	[4.59, 5.46]	
At work	0.27	0.04	[0.21, 0.35]	$	3.95	0.27	[3.41, 4.48]		5.27	0.20	[4.88, 5.66]	
In a car	0.79	0.03	[0.73, 0.85]	#	5.18	0.23	[4.73, 5.63]	#	5.64	0.17	[5.31, 5.96]	#
Other	0.17	0.02	[0.13, 0.22]	$	4.08	0.25	[3.58, 4.57]		5.43	0.18	[5.08, 5.79]	
Public transportation	0.30	0.06	[0.21, 0.42]		4.60	0.32	[3.97, 5.23]		5.24	0.23	[4.79, 5.69]	
Walking	0.29	0.05	[0.21, 0.38]	$	4.82	0.31	[4.22, 5.43]	#	5.37	0.22	[4.93, 5.81]	
Restaurant	0.43	0.06	[0.32, 0.54]		3.69	0.37	[2.97, 4.41]		5.04	0.27	[4.51, 5.57]	
Pub/ club	0.61	0.10	[0.41, 0.77]	#	4.06	0.52	[3.05, 5.07]		5.04	0.37	[4.45, 5.64]	
At the gym	0.51	0.09	[0.34, 0.69]		4.38	0.42	3.56, 5.19]		5.04	0.30	[3.84, 5.64]	

Shopping	0.21	0.07	[0.11, 0.38]	$	3.79	0.61	[2.59, 4.98]		4.65	0.41	[3.84, 5.47]	
Religious worship	0.40	0.13	[0.18, 0.66]		3.20	0.83	[1.57, 4.84]		6.32	0.62	[5.11, 7.53]	
At a concert	0.65	0.21	[0.23, 0.92]		2.18	0.75	[0.71, 3.65]	$	5.67	0.54	[4.60, 6.73]	
Activity												
Commuting	0.44	0.04	[0.34, 0.52]		4.71	0.23	[4.25, 5.16]	#	5.84	0.17	[5.51, 6.16]	#
Shopping	0.32	0.08	[0.19, 0.50]		3.71	0.49	[2.74, 4.67]		5.24	0.35	[4.56, 5.93]	
Working	0.39	0.05	[0.31, 0.48]		4.43	0.28	[3.87, 4.98]		5.53	0.20	[5.13, 5.93]	
Volunteering	0.76	0.09	[0.56, 0.89]	#	5.07	0.43	[4.23, 5.91]	#	5.89	0.32	[5.27, 6.52]	
Exercising	0.43	0.06	[0.32, 0.55]		4.38	0.32	[3.75, 5.01]		5.64	0.24	[5.18, 6.10]	
Self-care	0.30	0.04	[0.23, 0.38]	$	4.37	0.27	[3.85, 4.90]		5.43	0.19	[5.06, 5.81]	
Doing housework	0.45	0.06	[0.34, 0.56]		4.50	0.29	[3.92, 5.07]		5.41	0.21	[5.00, 5.82]	
Taking care of children	0.29	0.06	[0.18, 0.42]		3.58	0.46	[2.68, 4.48]		5.45	0.33	[4.80, 6.09]	
Preparing food	0.33	0.05	[0.24, 0.44]		3.82	0.31	[3.20, 4.43]		5.52	0.22	[5.08, 5.95]	
Eating	0.24	0.03	[0.18, 0.30]	$	4.02	0.24	[3.54, 4.49]		5.31	0.17	[4.97, 5.65]	
Socializing	0.33	0.04	[0.25, 0.41]		3.89	0.27	[3.37, 4.42]		5.40	0.19	[5.03, 5.78]	
Nap/resting	0.21	0.04	[0.14, 0.29]	$	3.29	0.34	[2.63, 3.96]	$	4.74	0.24	[4.26, 5.22]	$
Outdoor activities	0.33	0.08	[0.20, 0.50]		4.41	0.47	[3.48, 5.33]		5.51	0.34	[4.84, 6.19]	
Intimate relations	0.23	0.09	[0.10, 0.46]		2.40	0.73	[0.96, 3.84]	$	4.00	0.53	[2.95, 5.04]	$
Watching TV	0.24	0.04	[0.17, 0.32]	$	3.66	0.32	[3.02, 4.29]		5.48	0.23	[5.03, 5.94]	
Reading	0.28	0.05	[0.19, 0.40]	$	5.01	0.36	[4.30, 5.71]	#	5.68	0.26	[5.17, 6.18]	
Listening to music	0.97	0.01	[0.93, 0.99]	#	4.72	0.24	[4.25, 5.18]	#	5.74	0.17	[5.40, 6.07]	#
On the phone	0.13	0.05	[0.06, 0.26]	$	3.08	0.62	[1.86, 4.31]		3.79	0.45	[2.90, 4.67]	$
Computer/ internet/ email	0.47	0.05	[0.38, 0.56]	#	4.29	0.25	[3.80, 4.78]		5.40	0.18	[5.05, 5.75]	
Praying/ worshipping/ meditating	0.63	0.12	[0.39, 0.82]	#	4.04	0.70	[2.67, 5.42]		5.75	0.51	[4.75, 6.75]	
Other	0.29	0.03	[0.23, 0.36]	$	4.54	0.24	[4.07, 5.00]	#	5.62	0.17	[5.28, 5.95]	$

(Table continued)

	Engaged [d]				Arousal [e]			
Variable	M	SE	95% CI		M	SE	95% CI	
Device								
Mobile mp3 player	5.01	0.17	[4.67, 5.35]	#	4.94	0.16	[4.62, 5.26]	
Mobile telephone	4.85	0.20	[4.46, 5.24]		4.54	0.19	[4.17, 4.91]	

Mobile gaming device	6.46	1.27	[3.98, 8.95]		6.64	1.24	[4.21, 9.06]	
Mobile CD player	4.62	0.25	[4.13, 5.11]		4.77	0.24	[4.30, 5.24]	
Tablet	4.36	0.39	[3.60, 5.13]		4.81	0.37	[4.08, 5.53]	
Radio	3.40	0.17	[3.07, 3.72]	$	3.73	0.16	[3.42, 4.03]	$
TV	3.50	0.23	[3.06, 3.94]	$	3.56	0.21	[3.14, 3.98]	$
Computer -own collection	4.85	0.20	[4.46, 5.24]		4.85	0.19	[4.48, 5.22]	
Computer- online streaming	4.45	0.20	[4.06, 4.84]		4.41	0.19	[4.04, 4.78]	
Stereo - mp3 device	4.49	0.20	[4.10, 4.89]		4.64	0.19	[4.27, 5.02]	
Stereo - cassette	5.04	0.77	[3.54, 6.55]		4.75	0.73	[3.33, 6.17]	
Stereo - record	5.13	0.35	[4.45, 5.82]		5.38	0.34	[4.72, 6.03]	#
In public - live	4.66	0.28	[4.11, 5.21]		4.15	0.26	[3.64, 4.66]	
In public - recorded	3.52	0.24	[3.05, 3.99]	$	3.87	0.23	[3.42, 4.31]	$
Location								
At home	5.02	0.15	[4.74, 5.31]	#	4.82	0.14	[4.54, 5.10]	
At a friend's house	4.30	0.28	[3.75, 4.85]		4.06	0.27	[3.53, 4.58]	$
At work	4.62	0.24	[4.14, 5.09]		4.74	0.23	[4.29, 5.20]	
In a car	5.19	0.21	[4.79, 5.60]	#	4.98	0.20	[4.60, 5.37]	#
Other	4.79	0.23	[4.35, 5.23]		4.87	0.21	[4.45, 5.29]	
Public transportation	4.69	0.29	[4.13, 5.26]		4.38	0.27	[3.84, 4.92]	
Walking	4.88	0.28	[4.33, 5.43]		4.75	0.27	[4.23, 5.28]	
Restaurant	3.95	0.34	[3.29, 5.15]	$	3.97	0.32	[3.34, 4.60]	$
Pub/ club	4.22	0.47	[3.30, 5.15]		4.56	0.45	[3.68, 5.44]	
At the gym	4.83	0.38	[4.08, 5.57]		4.78	0.36	[4.08, 5.49]	
Shopping	3.67	0.56	[2.58, 4.76]		3.20	0.53	[2.16, 4.23]	$
Religious worship	4.88	0.77	[3.37, 6.38]		5.43	0.73	[4.01, 6.86]	
At a concert	4.72	0.73	[3.29, 6.16]		5.82	0.65	[4.54, 7.10]	#
Activity								
Commuting	4.92	0.21	[4.52, 5.33]	#	4.97	0.20	[4.58, 5.36]	#
Shopping	4.37	0.45	[3.49, 5.26]		4.76	0.43	[3.92, 5.60]	
Working	4.22	0.26	[3.71, 4.72]		4.29	0.24	[3.81, 4.76]	
Volunteering	5.02	0.40	[4.24, 5.80]		5.14	0.37	[4.40, 5.87]	
Exercising	5.24	0.29	[4.67, 5.82]	#	5.39	0.28	[4.85, 5.94]	#

Self-care	4.54	0.24	[4.07, 5.01]		4.64	0.23	[4.19, 5.09]	
Doing housework	4.75	0.27	[4.23, 5.28]		4.87	0.25	[4.37, 5.37]	
Taking care of children	4.49	0.42	[3.67, 5.31]		4.15	0.40	[3.38, 4.93]	
Preparing food	4.40	0.28	[3.85, 4.95]		4.55	0.27	[4.03, 5.08]	
Eating	4.10	0.22	[3.67, 4.53]	$	4.51	0.21	[4.10, 4.92]	
Socializing	4.15	0.24	[3.68, 4.62]	$	4.72	0.23	[4.27, 5.17]	
Nap/resting	4.10	0.31	[3.50, 4.71]		4.15	0.29	[3.57, 4.72]	$
Outdoor activities	5.03	0.43	[4.17, 5.88]		5.36	0.41	[4.55, 6.17]	
Intimate relations	4.08	0.68	[2.75, 5.41]		4.45	0.64	[3.19, 5.71]	
Watching TV	4.86	0.30	[4.28, 5.44]		4.96	0.28	[4.41, 5.52]	
Reading	4.50	0.33	[3.86, 5.13]		4.38	0.31	[3.78, 4.99]	
Listening to music	5.11	0.22	[4.69, 5.53]	#	5.03	0.21	[4.62, 5.43]	#
On the phone	3.89	0.57	[2.77, 5.02]		3.31	0.54	[2.24, 4.37]	$
Computer/ internet/ email	4.31	0.23	[3.87, 4.76]		4.42	0.22	[4.00, 4.85]	
Praying/ worshipping/ meditating	5.71	0.65	[4.44, 6.98]		4.90	0.61	[3.70, 6.10]	
Other	4.73	0.21	[4.31, 5.15]		4.58	0.20	[4.19, 4.98]	

Note. Significant deviation contrasts (the variable against the overall category mean) are noted such that # indicates higher than the mean and $ lower than the mean; SE = Standard error; CI = Confidence interval.

a. Continuous predictors fixed at the following values: age=26.93, Daily listening amount=3.22, Music education level =1.65, Pleasure average =2.92, Arousal average =3.99, Dominance average=3.61.

b. Continuous predictors fixed at the following values: Music importance rating=5.98, Pleasure average=2.78, Arousal average=3.75, Dominance average =3.43.

c. Continuous predictors fixed at the following values: Music importance rating =6.00, Daily listening amount =3.87, Pleasure average =2.78, Arousal average =3.76, Dominance average =3.43.

d. Continuous predictors fixed at the following values: age=26.83, Music importance rating =6.00, Music technology identity score =0.17, Pleasure average =2.78, Arousal average=3.75, Dominance average =3.43.

e. Continuous predictors fixed at the following values: age=26.83, Music importance rating =5.99, Music technology identity score =0.17, Pleasure average =2.78, Arousal average=3.75, Dominance average =3.42.

Table 5.
GLMM Analyses Predicting the Ratings Concerning the Music

	Choice Rating (N = 1607) a		Liking (N = 1602) b		Engaged (N = 1607) c		Arousal (N = 1608) d	
Variable	*F*	η^2	*F*	η^2	*F*	η^2	*F*	η^2
				Listener variables				
Gender	F (1, 1548) = 0.40	.000	NA		NA		NA	
Age	NA		NA		F (1, 1546) = 0.60	.000	F (1, 1547) = 2.24	.001
University degree	NA		NA		F (1, 1546) = 13.77***	.009	F (1, 1547) = 5.88*	.004
Music importance rating	F (1, 1548) = 2.68	.002	F (1, 1543) = 10.05**	.006	F (1, 1546) = 32.13***	.020	F (1, 1547) = 2.16	.001
Daily listening amount (hours)	NA		F (1, 1543) = 4.78*	.003	NA		NA	
Music-technology identity score	NA		NA		F (1, 1546) = 1.80	.001	F (1, 1547) = 3.51	.002
				Contextual variables				
Day of week	F (6, 1548) = 0.68	.003	F (6, 1543) = 0.81	.003	F (6, 1546) = 1.95	.008	F (6, 1547) = 0.74	.003
Time of day	F (2, 1548) = 2.80	.004	F (2, 1543) = 2.98	.004	F (2, 1546) = 0.05	.000	F (2, 1547) = 2.10	.003
Location	F (12, 1548) = 7.35***	.054	F (12, 1543) = 3.60***	.027	F (12, 1546) = 2.55**	.019	F (12, 1547) = 3.08***	.023
Activity	F (20, 1548) = 3.35***	.042	F (20, 1543) = 2.76***	.035	F (20, 1546) = 2.64***	.033	F (20, 1547) = 2.20**	.028
Device	F (13, 1548) = 48.07***	.288	F (13, 1543) = 33.40***	.220	F (13, 1546) = 16.93***	.125	F (13, 1547) = 12.17***	.093
Pleasure average	F (1, 1548) = 0.28	.000	F (1, 1543) = 4.14*	.003	F (1, 1546) = 6.17*	.004	F (1, 1547) = 0.31	.000
Arousal average	F (1, 1548) = 1.04	.001	F (1, 1543) = 2.10	.001	F (1, 1546) = 0.47	.003	F (1, 1547) = 14.77***	.009
Dominance average	F (1, 1548) = 10.00**	.006	F (1, 1543) = 3.94*	.003	F (1, 1546) = 6.68*	.004	F (1, 1547) = 16.25***	.010

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

[a] Overall model: F (58, 1543) = 14.77, $p < .001$

[b] Overall model: F (60, 1546) = 8.29, $p < .001$

c Overall model: F (58, 1548) = 24.71, $p < .001$

[d] Overall model: F (60, 1546) = 10.73, $p < .001$