Note:
This is an accepted manuscript (pre-print version) of an article published in the *Scandinavian Journal of Psychology* 02 March 2017, available online at: http://onlinelibrary.wiley.com/doi/10.1111/sjop.12352/full.

This paper is not the copy of record and may not exactly replicate the final, authoritative version of the article. Please do not copy or cite without authors permission. The final article is available, upon publication, via its DOI: 10.1111/sjop.12352

You may download the published version directly from the journal (homepage: http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1467-9450).

Published citation:

Krause, A. E., & North, A. C. (2017). How do location and control over the music influence listeners' responses? *Scandinavian Journal of Psychology, 58*, 2, 114-122. doi:10.1111/sjop.12352

Abstract

This study uses Mehrabian and Russell's (1974) Pleasure-Arousal-Dominance (PAD) model to consider how responses to both the music heard and overall in-situ listening experience are influenced by the listener's degree of control over music selected for a particular listening episode and the location in which the listening takes place. Following recruitment via campus advertisements and a university research participation program, 216 individuals completed a background questionnaire and music listening task in a 3 (location) by 2 (experimenter- or participant-selected music) design. After the listening task, participants completed a short questionnaire concerning the music they heard and the overall in-situ listening experience. Results demonstrated that there was a positive relationship between control and liking for the music and episode, whether the former was considered in terms of (i) whether the music was self-selected or experimenter-selected or (ii) overt ratings of perceived control. Furthermore, the location and liking for the music were related to people's judgments of their enjoyment of the overall experience. This research indicates that the PAD model is a useful framework for understanding everyday music listening and supports the contention that, in a musical context, dominance may be operationalized as control over the music.

Keywords: Everyday listening; PAD model; dominance; control; location

How do location and control over the music influence listeners' responses?

Introduction

With mobile devices, personal computers, and the Internet, opportunities for interacting with music in present-day, western society have never before been so varied (North, Hargreaves, & Hargreaves, 2004; O'Hara & Brown, 2006), allowing people to expand the places, times and ways in which they experience music (Heye & Lamont, 2010; Juslin, Liljeström, Västfjäll, Barradas, & Silva, 2008; Krause, North, & Hewitt, 2015; North et al., 2004; Sloboda, Lamont, & Greasley, 2009). Indeed, music is a pervasive part of our lives, often an accompaniment to many everyday activities, such as doing housework, driving, and shopping. However, research concerning music listening has often failed to consider that music is, as Konečni (1982) stated, embedded "in the stream of daily life" (p. 500). As such, music listening happens in varying contexts everyday (DeNora, 2000), though very little research has considered the context, which likely contributes to the listener's experience of the music.

In addition, technological developments, such as mobile devices, have influenced where listening can occur. Mobile devices, for example, can create a private environment (Skånland, 2011); these devices may offer listeners an altered sense of dominance over their auditory environment, as users have the opportunity to control what they hear, even in public places. The increased ability to control what one hears makes it important to consider the level of control a person has over the music that he or she experiences in-situ.

Mehrabian and Russell's PAD Model

The present research addresses contextualized, everyday listening from the perspective of Mehrabian and Russell's (1974) Pleasure-Arousal-Dominance (PAD)

model of environmental psychology, which asserts that people's interactions and interpretation of their contextual surroundings result from variations in three factors, namely pleasure, arousal, and dominance: the model asserts that these should each have a main effect on both liking for the music experienced in-situ and the overall environment; and interact with one another in so doing.

In the context of Mehrabian and Russell's PAD model, pleasure-displeasure refers to a feeling state (such as good or happy); 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). In a given situation, an individual's behavior is influenced by these domains and can be considered in terms of so-called approach and avoidance behaviors. These reflect various specific manifestations of a propensity to stay in and explore an environment versus a propensity to leave and disengage from that environment (Donovan & Rossiter, 1982; Yalch & Spangenberg, 2000). In terms of the PAD dimensions, pleasure increases approach behaviors, while arousal level mediates approach-avoidance behaviors in an inverted-U pattern: approach behaviors are encouraged in environments of moderate arousal levels while extremely high or low levels of arousal are avoided (Donovan & Rossiter, 1982; Hines & Mehrabian, 1979; Mehrabian & Russell, 1974). Dominance mediates approach–avoidance behavior also: feeling more in control over retail settings, for example, has been shown to lead to approach behaviors (Yani-de-Soriano & Foxall, 2006).

In a musical context, pleasure is operationalized as how much a person simply likes the music heard. Arousal is operationalized as how arousing the person considers the music to be. Dominance refers to the person's control over the music, such that recent work has specifically conceptualized dominance in terms of the amount of choice

one has over the decision to hear music at all, and if so what that music should be (e.g., Krause & North, 2016b).

Prior research concerning music has often considered the relationship between how arousing that music is and people's degree of liking for it. Much of this research has concerned Berlyne's (1971) theory, which states that moderately-arousing music is liked most (Huron, 2009; Kellaris, 1992; North & Hargraves, 1997a, 1997b). Of course these concepts correspond well with Mehrabian and Russell's model, and provide a simple means of considering responses to music as part of responses to the overall, more general milieu in which it is experienced. However, little research has considered how Berlyne's theory might apply to listening in different contexts. The in-situ evidence that does exist stems from research carried out in situations with clear arousal-related connotations, such as physical exercise. An interesting feature of this work was that musical likes and dislikes were influenced directly by expectations of the types of music one would typically encounter in specific circumstances, and situationally-based, arousal-state goals. These findings show specifically that participants attempt to use music to optimize arousal evoked by the situation in question (Hargreaves & North, 2010; Krause & North, 2016b; North & Hargreaves, 1996a) such as achieving a highly-aroused state while exercising by listening to loud, fast music or a relatively calm state while relaxing by listening to slow, quiet music. This arousal-*optimization* strategy clearly does not, however, equate to specifically an arousal-*moderation* strategy, as Berlyne's theory implies it should, suggesting that people's use of music in daily life may not be captured by considering arousal alone (Krause & North, 2014, 2016b), and instead requires consideration of the goals that one has in a given location at a given point in time. Moreover, this research did little to place the importance of context-

specific expectations in a coherent theoretical framework, which the present study attempts to address directly.

Mehrabian and Russell's dominance dimension has largely been ignored in previous music research. However, the model's utilization of pleasantness and arousal dimensions maps very well indeed onto the central concerns of Berlyne's theory, and does so in a way that integrates these with approach and avoidance responses to the overall listening situation. Moreover, although research on the Mehrabian and Russell (1974) model has historically debated the relevance of the dominance dimension, more recent work has stressed the importance of this because of its usefulness in explaining in situ approach-avoidance behaviors (Yani-de-Soriano & Foxall, 2006). Research findings now exist to confirm Mehrabian and Russell's contention that people prefer situations that provoke both pleasure and dominance (Mehrabian, Wihardja, & Ljunggren, 1997), with findings regarding people's responses to music specifically also indicating a positive relationship between pleasure and dominance (Krause & North, 2014, 2016b). More simply, the PAD dimensions can assimilate much of the existing research concerning musical likes and dislikes with much of the previous work on responses to environments; and the dominance dimension specifically provides a means of considering how control over the music heard in particular contexts can explain liking for that music, and also how this might relate to responses to the situation overall.

In everyday life, people experience a varying degree of control and choice regarding the music they encounter. The recent commercial success of technological innovations in mobile listening devices and Internet music streaming services, for instance, means that dominance may now be an important variable in explaining in-situ musical likes and dislikes. Indeed, control has been implicated in prior research

findings concerning everyday music listening, and reported functions of the music and emotional responses experienced therein (e.g., Greasley & Lamont, 2011; Sloboda, 2005; Sloboda & O'Neill, 2001). Moreover, recent research that has considered the PAD model in the context of everyday listening indicates that the location, activity, and the person's perception of dominance are important significant predictors of not only the presence of music during everyday activities, but also the person's judgments of that music (Krause & North, 2016b). Indeed, consideration of these additional variables is also a crucial component of understanding the overall contextualized experience, of which music is only one constituent part: capturing responses to the overall milieu is important to illuminating how people experience music in daily life.

In order to examine everyday listening in terms of the PAD model, age, sex, music engagement, music identity and personality must be considered as control variables, given the considerable quantity of previous research implicating these individual differences in responses to music. For instance, adolescents are more likely to use digital technologies like YouTube, Spotify, and iTunes while adults are more likely to access music via CD and radio (Avdeeff, 2012; Komulainen, Karukka, & Hakkila, 2010; Nielsen Company, 2012; Smith, 2012). Regarding the uses of music, men are more likely to use music for cognitive reasons while women are more likely to use music for emotional reasons (Chamorro-Premuzic, Swami, & Cermakova, 2012; North, Hargreaves, & O'Neill, 2000), although recent research has questioned whether this is the case in real-life everyday listening (e.g., Randall & Rickard, 2016). Additionally, people's level of engagement with music is related to how often they participate in music-related activities: individuals who are more engaged with music are more conscious of their use of music when trying to change their mood (Greasley & Lamont, 2006). Moreover, individuals who rated music as more important in their life

experience a greater quantity of music in everyday life (Krause et al., 2015). As music is also a means of defining one's identity (MacDonald, Hargreaves, & Miell, 2009), the ways in which people use technology to interact with music are bound up with their musical self-image (Krause & Hargreaves, 2013). Therefore, it is possible that people who are more engaged with music and/or whose identity is based more strongly on music might have a stronger desire to control the music that they encounter, which might in turn influence how people respond in terms of the PAD model. Similarly, personality traits relate to musical likes and dislikes (e.g., North, 2010; Rentfrow & Gosling, 2003; Rentfrow & McDonald, 2010) and are also associated with varying uses of music (e.g., Chamorro-Premuzic & Furnham, 2007; Chamorro-Premuzic et al., 2012), so that personality should similarly be included as a control variable.

Aim and Hypotheses

This study aimed to specifically consider how context-specific, everyday listening might be considered in the light of Mehrabian and Russell's theory. Prior research has applied the PAD model to musical listening via observational data. Although ecologically valid, as it was captured in-situ (via the Experience Sampling Method and Day Reconstruction Method for example –see e.g. Krause, et al., 2015; Krause & North, 2016b; North, et al., 2004; Greasley & Lamont, 2011), the application of the PAD model to everyday music listening could benefit from consideration via an experimental design.

While closely-controlled laboratory experiments have the advantage of limiting the influence of additional variables, the unnatural setting simultaneously leads to a difficulty in applying the findings outside of the laboratory (Persson & Robson, 1995; Reis & Gosling, 2010). Therefore, the present study aimed to conduct a theoretically grounded study in a naturalistic context. Specifically, the individual's degree of control

over music selected was manipulated overtly in a controlled manner by having the participants listen either to music provided by the experimenter or to self-selected music: given the arguments of the PAD model we expected that self-selected music, which provides a greater degree of control on the part of the respondent, would lead to greater liking for the music and for the overall situation in which that listening occurs. Similarly, the location was overtly manipulated by asking participants to listen in one of three locations. Participants were asked to listen to music while commuting (which represents a typical everyday listening context); while exercising (which represents another typical listening context in which the respondent also has a clear arousal-state goal); and under neutral laboratory conditions (which reflect those employed typically in research on musical likes and dislikes). Thus, the present research allowed for the consideration of causal relationships while minimally-sacrificing ecological validity.

Addressing everyday music listening, based on predictions drawn from Mehrabian and Russell's (1974) and Berlyne's (1971) theories, this study aimed to examine how the manipulation of location and choice of music might influence people's response to the music as well as their overall experience of the situation as a whole (which will be referred to as the "episode"), using the PAD framework dimensions. Three hypotheses were applied separately to consider the listeners' response to the music and overall episode:

> Hypothesis 1: Following Berlyne's theory, the arousal rating assigned to the music and the episode respectively will be a significant predictor of liking the music and the episode, even when controlling for individual difference factors.
>
> Hypothesis 2: Following the PAD model, ratings of control (dominance) assigned to the music and the episode respectively will be a significant predictor of liking

the music and the episode, even when controlling for individual difference factors.

Hypothesis 3: After controlling for individual difference factors, (a) ratings of liking for the music and the episode will be subject to a main effect of music type, such that the self-selected music is preferred to the experimenter-selected music, reflecting the greater dominance associated with the former. Additionally, (b) a main effect for location is possible, such that music is liked more in some situations than others, which follows from the literature indicating that people use music to achieve particular goals in particular contexts, so that music may be more useful in some situations than in others. Finally, there may also be (c) a significant interaction between the music type and location, indicating that control has a differential influence on liking for the music/episode in different locations.

Additionally, following the PAD model, there will be a positive relationship between liking ratings assigned to the music and the overall episode, even when controlling for individual difference factors (Hypothesis 4).

Method

Participants

Participants were students of an Australian university, and were also gym members (due to the possibility of being allocated to completing the listening task at the gym). While 285 individuals provided their background information and contact details, analysis was performed using the data from the 216 participants who fully completed the study (75.79% completion rate). The 216 participants were aged 17-51 years (M = 21.50, Mdn = 19, SD = 5.80) and 170 (78.70%) were women. As in previous

research (e.g., Krause & North, 2016a; Krause et al., 2015; North & Hargreaves, 1995), three judges rated participants' levels of musical education and training from open-ended responses. The intra-class correlation coefficient for the three raters was .86, and 43.98% of the sample were classified as "low" (i.e., no to little experience), 50.46% classified as "moderate" (i.e., playing an instrument recreationally), and 5.56% classified as "high" (i.e., proficiency on an instrument).

Recruitment involved publicizing the study to students on the University campus and use of the University's dedicated research participation program. Participation was voluntary, although participants were eligible to win one of four $50 iTunes gift vouchers. Additionally, university students recruited via the participation program received course credit for their participation.

Research Design

This study employed a 3 (location) x 2 (music) independent-subjects design in which participants in one of three specific contexts, namely at a gym, while commuting on public transportation, in or a conventional experimental lab-based setting, were asked to listen to music from either their personal collection or provided by the experimenter. Participants were allocated to one of the six conditions using block randomization (for each sex, randomized sets of numbers (1-6) were created using www.randomizer.org).

Locations. All participants were asked to listen to 15 minutes of music in a particular situation, namely in the laboratory, while commuting on public transportation, or while at the gym. The gym and commuting conditions represent two common, everyday listening contexts, as denoted by previous experience sampling method research (e.g., Greasley & Lamont, 2011; Krause, North, & Hewitt, 2016; North

et al., 2004). Additionally, they differ with regard to expected level of arousal associated with the setting (e.g., Krause & North, 2014; North & Hargreaves, 1996a, 1996b). Conversely, the laboratory setting reflects the context of previous research that has attempted to deliberately rule out the role of the everyday environment in which listeners experience music.

Participants assigned to the gym or public transportation conditions were instructed to complete the listening task when they next entered the locations in question. (Note that transit by bus or train were treated as functionally equivalent, as both involve the same activity with the same goal.) Participants assigned to the laboratory condition made arrangements to complete the listening task at a convenient time: these individuals were escorted to the laboratory by the lead researcher but were alone in a quiet room when completing their listening task.

Music. To maintain consistency in how the music was accessed and selected, all participants listened to a 15-minute playlist. The experimenter-provided music condition involved the participants listening to a pre-assembled playlist of songs, involving five current "top 10" chart music tracks as denoted by the most popular pop music local radio station, as this represented the music that enjoyed a good deal of public exposure at that time (see Appendix). Participants in the "experimenter-provided" condition were given the playlist as a single mp3 file to upload onto their listening device. Those in the "self-selected music" condition were asked to create a 15-minute playlist in advance that they were told was to be used in their allocated location: the determination of the playlist was otherwise left to their discretion. All participants were given the instruction not to listen to their playlist until completing the listening task.

Additionally, because studies (Krause & North, 2016a; Krause, North, & Hewitt, 2014a; Krause et al., 2015) established that more positive responses to music are associated with devices and selection methods involving increased user input (i.e., mobile mp3 players), for consistency, all participants in the present research used their personal mobile listening devices with headphones to listen to playlists. Participants were asked to use their personal listening device with their own headphones, as they would normally do so, in order to listen to their prepared playlist (i.e., not to use shuffle or select other music than the playlist).

Measures

Preliminary questionnaire. Participants reported their sex and age. They then rated separately the importance of technology and music in their lives (hereafter the "technology importance rating" and "music importance rating" respectively) on seven-point Likert scales (1 = *not at all*, 7 = *extremely*), and reported how many hours they listened to music on an average day and how many hours they interacted with technology on an average day. These questions have been used in previous research to measure engagement with music and technology (e.g., Krause & North, 2016a; Krause et al., 2015), with the current sample's responses indicating that participants were engaged with music and technology on a daily basis (see Table 1). They also wrote an open-ended response regarding their musical education background.

Participants completed Krause and North's (2016a) measure of music and technology identity, stating respectively the extent to which each of "Music", "Music technology", "Technology", and "Cloud-based technology" "is central to my identity" on seven-point scales (anchored by 1 = *not at all*, 7 = *completely*). As in prior research, the responses were entered into a principal components analysis with varimax rotation,

resulting in one factor that accounted for 63.64% of variance (see Table 2) (Krause & North, 2016a, 2016b; Krause, North, & Heritage, 2014). The resultant factor scores were used as the "music-technology identity score" in subsequent analyses (Cronbach's α= .81).

-Table 1 and 2-

Individuals also indicated how often they accessed music in different formats (namely, physical media, digitally via a computer, digitally via a mobile device, from an Internet source, and from a cloud source) and made selection decisions regarding their listening (namely, choosing a specific artist/ song/ album selection, playlist, random/shuffle, and other) on seven-point scales (1 = *never*, 7 = *always*). Lastly, they completed Langford's (2003) short form of the "Big Five" personality inventory, chosen for its concise nature and demonstrated reliability (Langford, 2003; North, 2010). Previous research showed there was only a slight decline in predictive validity associated with the decrease in the total number of items, thus supporting the use of the shortened measure when multiple measures are administrated or administration time is short (Langford, 2003). In this short form, the items with the highest factor loadings were retained so that one item represented each of the Big Five personality traits (loadings between .69 and .82; M = .76). This measure requires participants to rate themselves on seven-point scales. Openness, conscientiousness, extroversion, agreeableness, and neuroticism are represented by "uncreative-creative," "lazy-hard working," "shy-outgoing," "headstrong-gentle," and "nervous-at ease" respectively.

Listening task questionnaire. Following their 15-minute listening task, participants completed a short questionnaire on which they rated how they perceived

the music as well as their overall experience ("episode"). Specifically, using seven-point scales (1 = *not at all*, 7 = *very much*), individuals answered three questions about the music that provided data concerning liking, arousal and control, namely "How much did you like the music you listened to?," "How arousing did you consider the music to be?," and "How much control did you feel you had over the music that you listened to?" respectively. An additional question asked how familiar the music was to the participant (hereafter referred to as the "familiarity rating") as the participants' familiarity with the music heard could co-vary with their other responses.

Given that the music was only one element to the participants' experience, three further questions obtained ratings on seven-point scales that addressed feelings of liking, arousal and control with regard to the participant's assessment of the episode overall. These questions pertained to the totality of the scenario and were "How much did you enjoy the overall episode?," "How arousing did you find the overall episode?," and "How much control did you feel you had over the entire episode?" Finally, participants rated how often they found themselves in the situation in question (from 1 = *never* to 7 = *a lot*; hereafter referred to as the "novelty" rating).

Procedure

After reading the information sheet and providing consent, participants completed the preliminary questionnaire online. All participants were then contacted twice via email. The first email provided instructions regarding their allocated task (i.e., the location of music listening) and asked for a reply to confirm participant understanding. In the case of participants in the laboratory condition this first email also requested that the participants arrange a time to complete the task. The second email provided instructions regarding the playlist music (i.e., either to download the

attached file or to construct a playlist for use in their assigned situation) and how to complete the task questionnaire. Note that the only differences in the text used in differing conditions were those required to reflect the nature of those conditions, so that the instructions across conditions were otherwise identical.

Every participant used his or her own personal music device with headphones to listen to the music for 15 minutes in the allocated location. Immediately following the 15-minute listening, participants used an Internet-enabled mobile device to complete the task questionnaire. All participants were debriefed and thanked for their participation via the final task questionnaire webpage.

Results & Discussion

In order to consider the inverted-u relationship between ratings of liking and arousal, as predicted by Berlyne's theory, the arousal ratings assigned to the music and overall episode (rated as 1-7) were recoded as -3 to +3 respectively, and then converted to absolute values. These are referred to as the "arousal magnitude ratings" subsequently. Thus, high arousal magnitude values represent ratings towards the poles of the scale, so that a positive relationship between ratings of liking and an arousal magnitude rating is indicative of a real-terms U-shape relationship, while a negative relationship is indicative of a real-terms inverted-U relationship.

Two separate generalized linear mixed method (GLMM) analyses ($\alpha = .025$) investigated the participants' ratings for (a) how much they liked the music and (b) how much they liked the overall episode. In order to determine which individual difference control variables were included, bivariate correlations were first conducted between the individual difference control variables and criterion variables (see Table 3). The control variables demonstrating significant correlations ($\alpha = .05$) were retained as

predictor variables along with the music familiarity rating, novelty rating, music arousal magnitude rating, music control rating, music type, location, and music type by location interaction which were also entered as predictor variables in the GLMM analyses.

-Table 3-

Music Liking Rating

One background variable, the mobile device access rating, was retained for the GLMM analysis concerning the music liking rating (see Tables 4 and 5 for results). With regard to H1, the music arousal magnitude rating was not significantly related to liking; thus the results do not support Berlyne's theory, but are consistent with other research that has failed to support Berlyne's theory in naturalistic listening contexts (e.g., North & Hargreaves, 1996b). As predicted by H2, the music control rating was a significant predictor of liking for the music, even when controlling for the additional variables that might otherwise intervene: its positive association is consistent with the PAD model and previous research (e.g., Krause & North, 2016b; Liljeström, Juslin, & Västfjäll, 2013; Mehrabian et al., 1997).

Concerning H3c, the music type by location interaction was non-significant, although both music type and location gave rise to significant main effects, supporting H3a and H3b. With regard to H3a concerning music type, the means and significant pairwise contrast indicated that self-selected music was liked more than the experimenter-provided music ($\beta = 0.95$ [0.51, 1.38], t (203) = 4.24, $p < .001$, $\eta^2 = .081$), reflecting the greater dominance associated with the former. Note that this was found even when controlling for familiarity with the music, which implies that the finding is more readily attributable to dominance than to participant's prior experience of the music.

With regard to H3b concerning location, means indicate that the music heard in the lab was liked most followed by that heard on public transport and then the gym. Post-hoc pairwise comparisons indicated that music was liked significantly more in the laboratory than at the gym (β = 0.54 [0.19, 0.89], t (203) = 3.06, p < .01, η^2 = .044) and that music was liked significantly more on public transportation than at the gym (β = 0.45 [0.08, 0.82], t (203) = 2.39, p < .05, η^2 = .027). The pairwise comparison between the laboratory and public transportation was non-significant (β = 0.09 [-0.27, 0.46], t (203) = 0.51, p = .612, η^2 = .001). In this study, the laboratory setting involved presenting the listening task as a focused activity: there were no distractions and the participants were asked to do nothing else while listening to the music, which may have influenced the liking ratings. The finding also emphasizes the importance of considering the context in everyday listening.

Additionally, as a manipulation check, a t-test was performed concerning music type and music dominance: the significant result (t (214) = 15.06, p < .001) supports the expectation that people listening to self-selected music should rate their degree of control as significantly higher than those listening to the experimenter-provided music.

-Tables 4 and 5-

Episode Liking Rating

Given the results of the bivariate correlations (see Table 3), average technology use, accessing music by a computer, and selecting music via shuffle were included as control variables in the GLMM analysis that considered how much the individuals liked the overall episode. The other predictor variables entered into the GLMM were the music ratings (liking, arousal magnitude, and control), episode arousal magnitude

rating, episode control rating, music familiarity rating, novelty rating, music type, location, and music type by location interaction (see Tables 6 and 7 for results).

Regarding H1, the episode arousal magnitude rating was significantly related to participants' liking for the overall episode. However, the nature of the relationship was such that higher ratings of arousal (absolute values per the magnitude ratings) were associated with higher ratings for overall liking, rather than Berlyne's inverted-U shape pattern. Consistent with H2, the episode control rating was significantly related to participants' liking for the overall episode. In particular, the positive relationships indicated that higher control ratings were associated with higher ratings for overall liking, even when accounting for the control variables, in support of Mehrabian and Russell's (1974) theory. Furthermore, the significant positive association between liking for the music and liking for the overall episode supports H4, indicating that liking the music is related to one's overall contextualized experience.

The interaction between music type and location was significant. This significant interaction supports H3c, which concerned the influence of the location and music type on participants' liking for the episode. The pairwise comparisons revealed that when in the laboratory, participants who listened to the experimenter-provided music rated liking their experience significantly more than did those who listened to their own music (β = -0.94 [-1.55, -0.34], t (198) = -3.08, $p < .01$, $\eta^2 = .046$). However, means showed that participants' episode liking ratings did not differ based on whether the music was self-selected or experimenter-provided in the other two locations (on public transportation: β = -0.10 [-0.77, 0.57], t (198) = -0.29, $p = .776$, $\eta^2 = .000$; and at the gym: β = -0.37 [-0.82, 0.09], t (198) = -1.58, $p = .117$, $\eta^2 = .012$). The pattern of results for the laboratory condition was surprising: contrary to the prediction of H3a, when participants were in the lab then the experimenter-chosen music was associated with

liking the experience more. There are at least two possible explanations for this result. One is that the lack of realistic context inherent to a laboratory focused participants on the music listening task, and it is this that influenced their responses in some way. Moreover, compared to the other two locations (which have task-related connotations), the laboratory setting may have prompted the participants to select music based purely on how much they liked it rather than its utilitarian value; and a pre-determined list of songs might have been perceived as less unusual in the laboratory, since it is a typical feature of lab-based research that participants have little control.

-Tables 6 and 7-

General Discussion

These results can be interpreted meaningfully in terms of Mehrabian and Russell's (1974) PAD model. In particular, although previous research has tended to ignore the dominance dimension, the present findings indicate that, at least in the context of music, the control dimension can make a useful contribution to the understanding of responses to the environment, even when controlling for a number of additional variables: this supports the conclusions of recent research (e.g., Krause & North, 2016b; Krause, et al., 2016). Support for the full, three factor model with regard to music listening came from the main analyses: the present results confirm that dominance, operationalized as degree of control over the music, was related to an individual's response to both the music and to the overall situation. In particular, the results support the notion that music selection can be a feature of control within everyday listening contexts: self-selected music was associated with significantly higher

music liking ratings than was the experimenter-provided music, even when allowing for a number of control variables.

This is not to say that, in terms of music listening, control can be conceptualized as simply whether one is listening to one's own music versus that provided by someone else. In truly 'real' listening, control is likely far more complex. Previous research implies, for instance, that this more realistic conceptualization of control might also include the means by which the music is accessed and selected (Krause, North, et al., 2014a; Krause et al., 2015). Similarly, it is possible that a naturalistic definition of control would also involve an individual's perception of how the music *fits* the listening situation. For instance, individuals may experience positive consequences (such as maintaining arousal levels and motivation to exercise via highly arousing music heard at the gym – North & Hargreaves, 1996a) and judge the music as appropriate/fitting to the situation without necessarily having personally chosen the specific music heard.

While focused on the context of listening, the present findings also have implications for the role of individual listener characteristics in explaining the role of control. In particular, while we purposely included a number of variables particular to the individual listener as control variables (such as age, sex, music engagement, music identity and personality), the few variables that were included in the main analyses (on the basis of their significant correlations with the outcome variables) were non-significant predictors when considered alongside the contextual variables. In short, control does not appear to be related to factors internal to the listener, but rather exists as a concept in its own right without any reference to these. So while the current evidence supports the contention that dominance can be operationalized as control/choice concerning the music, future research is needed to further examine and

develop the definition of dominance in explaining people's experiences with everyday music.

In conclusion, the main contribution of the present study is support for the notion that consideration of contextualized music listening should allow for listeners' degree of control, operationalized via the Mehrabain and Russell model. While previous work has focused on the roles of pleasure and arousal, the current results indicate that dominance, the third dimension within the model, cannot be ignored. Further, importantly, the results are based on experimenter manipulation of both the location in which participants listened to music and whether the music was self-selected or experimenter-provided: the results demonstrate that both location and music type had a clear impact on people's liking for the music and their experience overall.

Four limitations of the research should be noted. First, while three locations were included, the gym and public transportation represent only two of the many situations in which people experience music in everyday life. Second, personal experiences on public transportation, at the gym, or in any other everyday location vary both between and within individuals: diary or other longitudinal study designs could provide more detailed evidence concerning people's responses in terms of the PAD model in a manner that captures these variations in individual experiences. Third, the music used in this study was preselected (both in the experimenter-provided and participant-selected conditions) as necessary to the design: while research has considered what music people perceive as appropriate in different contexts (e.g., Krause & North, 2014; North & Hargreaves, 1996a), future research might consider investigating real-time, contextualized music selection habits. Using a within-subjects design, future research could consider whether certain music and presentation formats (e.g., a pre-made playlist with music in a pre-determined order versus shuffle or

selections made at the time) might be judged more appropriate to certain contexts. Moreover, such research may also consider general- and context-specific music genre preferences. Fourth, the study's design required the use of a restricted sample of Australian university student gym members, so that it would be beneficial to replicate this study using different samples, with an emphasis on including more males: given the existence of previous research (Chamorro-Premuzic et al., 2012; North et al., 2000) showing that males and females prioritize different functions of music, we might expect these different uses to mediate the definition and role of dominance in contextualized music listening. Nonetheless, the findings support the application of Mehrabian and Russell's PAD model to everyday music listening.

References

Andersson, P. K., Kristensson, P., Wästlund, E., & Gustafsson, A. (2012). Let the music play or not: The influence of background music on consumer behavior. *Journal of Retailing and Consumer Services, 19*(6), 553-560. doi:10.1016/j.jretconser.2012.06.010

Avdeeff, M. (2012). Technological engagement and musical eclecticism: An examination of contemporary listening practices. *Participations: Journal of Audience & Reception Studies, 9*(2), 265-285.

Berlyne, D. E. (1971). *Aesthetics and psychobiology*. New York: Appleton-Century-Crofts.

Chamorro-Premuzic, T., & Furnham, A. (2007). Personality and music: Can traits explain how people use music in everyday life? *British Journal of Psychology, 98*, 175-185. doi:10.1348/000712606X111177

Chamorro-Premuzic, T., Swami, V., & Cermakova, B. (2012). Individual differences in music consumption are predicted by uses of music and age rather than emotional intelligence, neuroticism, extraversion or openness. *Psychology of Music, 40*(3), 285-300. doi:10.1177/0305735610381591

DeNora, T. (2000). *Music in everyday life*. Cambridge, UK: Cambridge University Press.

Donovan, R. J., & Rossiter, J. R. (1982). Store atmosphere: An environmental psychology approach. *Journal of Retailing, 58*(1), 34-57.

Greasley, A. E., & Lamont, A. (2006). *Musical preference in adulthood: Why do we like the music we do?* Paper presented at the the 9th International Conference on Music Perception and Cognition, University of Bologna, Bologna, Italy.

Greasley, A. E., & Lamont, A. (2011). Exploring engagement with music in everyday life using experience sampling methodology. *Musicae Scientiae, 15*(1), 45-71. doi:10.1177/1029864910393417

Hargreaves, D. J., & North, A. C. (2010). Experimental aesthetics and liking for music. In P. N. Juslin & J. A. Sloboda (Eds.), *Handbook of Music and Emotion: Theory, Research, Applications* (pp. 515-546). Oxford, UK: Oxford University Press.

Heye, A., & Lamont, A. (2010). Mobile listening situations in everyday life: The use of MP3 players while travelling. *Musicae Scientiae, 14*(1), 95-120. doi:10.1177/102986491001400104

Hines, M., & Mehrabian, A. (1979). Approach-avoidance behaviours as a function of pleasantness and arousing quality of settings and individual differences in stimulus screening. *Social Behavior and Personality, 7*(2), 223-233.

Huron, D. (2009). Aesthetics. In S. Hallam, I. Cross, & M. Thaut (Eds.), *The Oxford Handbook of Music Psychology* (pp. 151-159). Oxford, UK: Oxford University Press.

Juslin, P. N., Liljeström, S., Västfjäll, D., Barradas, G., & Silva, A. (2008). An experience sampling study of emotional reactions to music: Listener, music, and situation. *Emotion, 8*(5), 668-683. doi:10.1037/a0013505

Kellaris, J. (1992). Consumer esthetics outside the lab: Preliminary report on a musical field study. *Advances in Consumer Research, 19*, 730-734.

Komulainen, S., Karukka, M., & Hakkila, J. (2010). Social music services in teenage life – A case study. *In S. Viller & B. Kraal (Eds.) Proceedings of the 22nd Conference of the Computer-Human Interaction Special Interest Group of Australia on Computer-Human Interaction, OZCHI'10, November 22-26, 2010*, 364-367. doi:10.1145/1952222.1952303

Konečni, V. (1982). Social interaction and music preference. In D. Deutsch (Ed.), *The Psychology of Music* (pp. 497-516). New York, NY: Academic Press.

Krause, A. E., & Hargreaves, D. J. (2013). myTunes: Digital music library users and their self images. *Psychology of Music, 41*(5), 531-544. doi:10.1177/0305735612440612

Krause, A. E., & North, A. C. (2014). Contextualized music listening: Playlists and the Mehrabian and Russell model. *Psychology of Well-Being: Theory Research and Practice, 4*: 22. doi:10.1186/s13612-014-0022-7

Krause, A. E., & North, A. C. (2016a). Music listening in everyday life: Devices, selection methods, and digital technology. *Psychology of Music, 44*(1), 129-147. doi:10.1177/0305735614559065

Krause, A. E., & North, A. C. (2016b). Pleasure, arousal, dominance, and in situ responses to music. *Psychology of Music, advanced online publication*. doi:10.1177/0305735616664214

Krause, A. E., North, A. C., & Heritage, B. (2014). The Uses and Gratifications of Using Facebook Music Listening Applications. *Computers in Human Behavior, 39*, 71-77. doi:10.1016/j.chb.2014.07.001

Krause, A. E., North, A. C., & Hewitt, L. Y. (2014a). Music selection behaviors in everyday listening. *Journal of Broadcasting and Electronic Media, 58*(2), 306-323. doi:10.1080/08838151.2014.906437

Krause, A. E., North, A. C., & Hewitt, L. Y. (2016). The role of location in everyday experiences of music. *Psychology of Popular Media Culture, 5*(3), 232-257. doi:10.1037/ppm0000059

Krause, A. E., North, A. C., & Hewitt, L. Y. (2015). Music-listening in everyday life: Devices and choice. *Psychology of Music, 43*(2), 155-170. doi:10.1177/0305735613496860

Langford, P. H. (2003). A one-minute measure of the Big Five? Evaluating and abridging Shafer's (1999a) Big Five markers. *Personality and Individual Differences, 35*(5), 1127-1140. doi:10.1016/S0191-8869(02)00323-9

Liljeström, S., Juslin, P. N., & Västfjäll, D. (2013). Experimental evidence of the roles of music choice, social context, and listener personality in emotional reactions to music. *Psychology of Music, 41*(5), 579-599. doi:10.1177/0305735612440615

MacDonald, R. A. R., Hargreaves, D. J., & Miell, D. (2009). Musical identities. In S. Hallam, I. Cross, & M. Thaut (Eds.), *The Oxford handbook of music psychology* (pp. 462-470). Oxford: Oxford University Press.

Mehrabian, A., & Russell, J. A. (1974). *An approach to environmental psychology*. Cambridge, MA, USA: Massachusetts Institute of Technology.

Mehrabian, A., Wihardja, C., & Ljunggren, E. (1997). Emotional correlates of preferences for situation-activity combinations in everyday life. *Genetic, Social, and General Psychology Monographs, 123*, 461-477.

Nielsen Company. (2012). Music discovery still dominated by radio, says Nielsen Music 360 report. http://www.nielsen.com/us/en/insights/press-room/2012/music-discovery-still-dominated-by-radio--says-nielsen-music-360.html. Retrieved from http://www.nielsen.com/us/en/insights/press-room/2012/music-discovery-still-dominated-by-radio--says-nielsen-music-360.html.

North, A. C. (2010). Individual differences in musical taste. *The American Journal of Psychology, 123*(2), 199-208. doi:10.5406/amerjpsyc.123.2.0199

North, A. C., & Hargraves, D., J. (1997a). Experimental aesthetics and everyday music listening. In D. J. Hargreaves & A. C. North (Eds.), *The social psychology of music* (pp. 84-103). Oxford, UK: Oxford University Press.

North, A. C., & Hargraves, D., J. (1997b). Liking, arousal potential, and the emotions expressed by music. *Scandinavian Journal of Psychology, 38*, 45-53. doi:10.1111/1467-9450.00008

North, A. C., & Hargreaves, D. J. (1995). Subjective complexity, familiarity, and liking for popular music. *Psychomusicology, 14*, 77-93.

North, A. C., & Hargreaves, D. J. (1996a). Responses to music in aerobic exercise and yogic relaxation classes. *British Journal of Psychology, 81*, 535-547.

North, A. C., & Hargreaves, D. J. (1996b). Situational influences on reported musical preference. *Psychomusicology, 15*, 30-45.

North, A. C., Hargreaves, D. J., & Hargreaves, J. J. (2004). Uses of music in everyday life. *Music Perception, 22*(1), 41-77. doi:10.1525/mp.2004.22.1.41

North, A. C., Hargreaves, D. J., & O'Neill, S. A. (2000). The importance of music to adolescents. *British Journal of Educational Psychology, 70*, 255-272.

O'Hara, K., & Brown, B. (2006). Consuming music together: Introduction and overview. In K. O'Hara & B. Brown (Eds.), *Consuming music together: Social and collaborative aspects of music consumption technologies* (pp. 3-18). Dordrecht, The Netherlands: Springer.

Persson, R. S., & Robson, C. (1995). The limits of experimentation: On researching music and musical settings. *Psychology of Music, 23*, 39-47.

Randall, W. M.; & Rickard, N. S. (2016). Reasons for personal music listening: A mobile experience sampling study of emotional outcomes. *Psychology of Music*, advanced online publication. 10.1177/0305735616666939

Reis, H. T., & Gosling, S. D. (2010). Social psychological methods outside the laboratory. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (Vol. 1, pp. 82-114). Hoboken, NJ: John Wiley & Sons, Inc.

Rentfrow, P. J., & Gosling, S. D. (2003). The do re mi's of everyday life: The structure and personality correlates of music preferences. *Journal of Personality and Social Psychology, 84*(6), 1236-1256. doi:10.1037/0022-3514.84.6.1236

Rentfrow, P. J., & McDonald, J. A. (2010). Preference, personality, and emotion. In P. N. Juslin & J. A. Sloboda (Eds.), *Handbook of music and emotion: Theory, research, applications* (pp. 669-695). Oxford, UK: Oxford University Press.

Skånland, M. S. (2011). Use of mp3 players as a coping resource. *Music and Arts in Action, 3*(2), 15-33.

Sloboda, J. A. (2005). *Exploring the musical mind*. Oxford, UK: Oxford University Press.

Sloboda, J. A., Lamont, A., & Greasley, A. E. (2009). Choosing to hear music: Motivation, process, and effect. In S. Hallam, I. Cross, & M. Thaut (Eds.), *The Oxford Handbook of Music Psychology* (pp. 431-440). Oxford: Oxford University Press.

Sloboda, J. A., & O'Neill, S. A. (2001). Emotions in everyday listening to music. In P. N. Juslin & J. A. Sloboda (Eds.), *Music and emotion* (pp. 415-429). Oxford, UK: Oxford University Press.

Smith, E. (2012, August 14). Forget CDs; Teens are tuning in to YouTube --- Nielsen survey says more youngsters listen to music via video-sharing site, while some adults still groove to cassettes. *The Wall Street Journal,* p. B3.

Yalch, R. F., & Spangenberg, E. R. (2000). The effects of music in a retail setting on real and perceived shopping times. *Journal of Business Research, 49*(2), 139-147. doi:10.1016/S0148-2963(99)00003-X

Yani-de-Soriano, M. M., & Foxall, G. R. (2006). The emotional power of place: The fall and rise of dominance in retail research. *Journal of Retailing and Consumer Services, 13*, 403-416. doi:10.1016/j.jretconser.2006.02.007

Appendix

The experimenter-provided playlist included “Take me home” by Cash Cash, “Rather be” by Clean Bandit, “Best day of my life” by American Authors, “Shot me down” by David Guetta, and part of “Braveheart” by Neon Jungle in that order so that the playlist lasted 15.08 minutes. The playlist was provided to the participants with disclaimer text regarding its use related to copyright laws. Specifically, the disclaimer explained that use of the music file for the singular purpose of participating in the study was legal in Australia under the tertiary music license. Further, it explained that participants were responsible for deleting (destroying) the file following their participation in concordance with prevailing copyright protection laws.

Table 1.

Sample Characteristics

Sample	Music importance rating	Technology importance rating	Average daily listening amount (hours)	Average daily technology use (hours)
M	5.83	6	3.18	7.68
Mdn	6	6	3	7
SD	1.17	1.10	2.09	3.80
N	215	216	216	216

Note. Importance ratings were made using a seven-point scale.

Table 2.

Principal Components Analysis of the Identity Questionnaire Items

Identity Statement	Factor 1
Music technology is central to my identity.	0.89
Web-based cloud technology is central to my identity.	0.81
Technology is central to my identity.	0.76
Music is central to my identity.	0.72
Eigenvalue	2.55
% Variance Explained	63.64

Table 3.

Summary of Bivariate Correlations Concerning the Potential Predictor Variables and Outcome Variables

Variable	Music liking (pleasure) rating	Episodic pleasure rating
Sex[a]	-.04	.01
Age[a]	-.04	-.07
University qualification[a]	.02	.05
Music importance rating[b]	.05	.01
Technology importance rating[a]	.00	.11
Average daily listening amount (hours)[a]	.02	-.01
Average daily technology use (hours)[a]	.10	.15*
Music education level (1-3)[a]	.09	.09
Collection access: Physical CDs/ tapes/ records[b]	.04	-.07
Collection access: Digitally via a computer[a]	.13	.08
Collection access: Digitally via a mobile device[b]	.14*	.19**
Collection access: From an Internet site[b]	.02	.01
Collection access: From a Cloud Source[a]	.02	.01
Selection method: Selecting a specific Artist/ Album/ Song[a]	-.05	-.05
Selection method: Playlist (yours or someone else's)[a]	.08	.13
Selection method: Random/ Shuffle [a]	.03	.14*

Selection method: Other (Internet radio, radio, etc.)[a]	.09	.09
Openness[b]	-.05	-.05
Conscientiousness[b]	.06	.04
Extraversion[c]	-.01	.00
Agreeableness[b]	.09	.06
Neuroticism[c]	-.07	.02
Music-technology identity score[b]	.04	.11
How often do you find yourself in the situation you were just in? (Novelty rating)[a]	-.10	-.04
Familiarity rating[b]	.60***	.39***

Note. Sex was coded as 1 = *females,* 2 = *males*; and possessing a university qualification was coded as 1 = *no*, 2 = *yes*.

[a] N = 216; [b] N = 215; [c] N = 214.

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

Table 4.

GLMM Analysis Predicting Music Pleasure Responses (N = 214)

Predictor variable	*F*	η_p^2
Collection access: Digitally via a mobile device	F (1, 203) = 1.09, p = .298	0.005
Novelty rating	F (1, 203) = 0.32, p = .573	0.002
Music familiarity rating	F (1, 203) = 37.13, p < .001	0.155
Music arousal magnitude rating	F (1, 203) = 1.22, p = .271	0.006
Music dominance rating	F (1, 203) = 6.74, p = .010	0.032
Music type	F (1, 203) = 17.95, p < .001	0.081
Location	F (2, 203) = 5.20, p = .006	0.025
Music type X location interaction	F (2, 203) = 1.23, p = .295	0.006

Table 5.

Means, Standard Errors, and 95% Confidence Intervals of the GLMM Analysis Concerning the Music Pleasure Ratings (N = 214)

Main effect	Variable	Mean	Std. Error	95% CI
Location	In the laboratory	5.91	0.12	[5.68, 6.14]
	On public transportation	5.82	0.14	[5.54, 6.10]
	At the gym	5.37	0.13	[5.12, 5.62]
Music type	Self-selected	6.17	0.12	[5.94, 6.40]
	Experimenter-provided	5.23	0.15	[4.94, 5.52]

Note. Continuous predictors were fixed at the following values: Mobile device access = 6.00, familiarity rating = 6.00, novelty rating = 5.00, arousal magnitude rating = 1.51, dominance rating = 4.00.

Table 6.

GLMM Analysis Predicting Overall Episode Pleasure Responses (N =214)

Predictor variable	*F*	η_p^2
Average technology use (hours)	F (1, 198) = 1.73, p = .190	0.009
Collection access: Digitally via a mobile device	F (1, 198) = 1.64, p = .203	0.008
Selection method: Random/ Shuffle	F (1, 198) = 2.27, p = .133	0.011
Novelty rating	F (1, 198) = 2.46, p = .118	0.012
Music familiarity rating	F (1, 198) = 0.12, p = .732	0.001
Music pleasure rating	F (1, 198) = 32.45, p < .001	0.141
Music arousal magnitude rating	F (1, 198) = 0.08, p = .779	0.000
Music dominance rating	F (1, 198) = 0.34, p = .561	0.002
Episode arousal magnitude rating	F (1, 198) = 8.52, p = .004	0.041
Episode dominance rating	F (1, 198) = 4.65, p = .032	0.023
Music type	F (1, 198) = 4.20, p = .042	0.021
Location	F (2, 198) = 0.56, p = .575	0.003
Music type X location interaction	F (2, 198) = 4.02, p = .019	0.020

Table 7.

Means, Standard Errors, and 95% Confidence Intervals of the GLMM Analysis Concerning the Overall Pleasure Ratings (N = 214)

Music type	Location	Mean	Std. Error	95% CI
Self-selected	In the laboratory	4.84	0.19	[4.46, 5.22]
	On public transportation	5.33	0.20	[4.94, 5.73]
	At the gym	5.28	0.15	[5.00, 5.57]
Experimenter-provided	In the laboratory	5.78	0.17	[5.45, 6.11]
	On public transportation	5.43	0.22	[5.00, 5.86]
	At the gym	5.65	0.17	[5.32, 5.99]

Note. Continuous predictors were fixed at the following values: Technology hours = 7.70, Computer access = 6.00, Select via shuffle = 5.00, Music pleasure rating = 6.00, Music arousal magnitude rating = 1.51, Music dominance rating = 4.00, Familiarity rating = 6.00, Novelty rating = 5.00, episode arousal magnitude rating = 1.43, and episode dominance rating = 5.00.