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Mood, Music Choices, and the Emotional Outcomes of Music Listening: An Examination of the Moderating Role of Rumination using Experience-Sampling Methodology

Elizabeth E. Kinghorn, *The University of Western Ontario*

Supervisor: Watson, Kevin E., *The University of Western Ontario*
Co-Supervisor: Grahn, Jessica A., *The University of Western Ontario*
A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Music
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Abstract

Research indicates that the ways individuals engage with music listening in daily life has emotional consequences, and that these consequences, and their relationship to well-being, are influenced by a complex interaction among situational variables and personal dispositions. One such disposition is rumination, a response style characterized by repeated dwelling on negative thoughts and feelings. The tendency to ruminate is strongly related to issues such as depression and anxiety in the non-music domain, and music research indicates this trait may moderate relationships between a listener's mood, the emotional content of their music choices, and the outcomes of listening. The primary aim of the present study was to assess this potential moderation using Experience-Sampling Methodology. Secondary aims included collection of descriptive data regarding typical listening scenarios as well as exploratory assessment of relationships between musical background/experience, motivations for listening, and outcomes.

Participants (N=157) downloaded the MuPsych smartphone app and completed regular reports about their listening experiences over a two-week period. Information collected included mood measures taken at the onset of listening and again after a five-minute period, as well as information about current context and musical selections. Participants also completed measures of trait rumination and musical background.

Results obtained via multilevel structural equation modeling indicate that although associations between initial mood, music valence, and affective outcomes were significant and in the expected direction, trait rumination generally did not significantly moderate these relationships. Nor was musical background or experience related to any motivation for listening or listening outcomes. Descriptive data, however, tended to support prior research regarding

listening frequencies, common listening contexts, and the prevalence of affective change associated with listening.

The present study has implications for music therapy and education, perhaps especially for awareness-building programs designed to help individuals acquire adaptive affect regulation skills and habits. Results here also lend support to the idea that the emotional outcomes of music listening are more strongly influenced by minute-to-minute situational variables than by dispositional or between-subjects variables.

Keywords

Music listening, emotion, affect regulation, music-evoked emotion, experience-sampling methodology

Summary for Lay Audience

Listening to music is one of the most commonly enjoyed leisure activities, and for many people, it is a nearly ubiquitous part of their daily lives. Research indicates that music can elicit a variety of emotional responses including joy, contentment, and sadness, and can help people to relax or raise energy levels. Furthermore, many people listen to music for the express purpose of influencing how they feel. However, just as music can be used in healthy ways to create emotional experiences, people sometimes reproduce unhelpful patterns of managing their emotions through music listening, potentially leading to detriments to their well-being. Research also indicates that the tendency to ruminate or dwell on our negative thoughts and feelings may also influence the emotions experienced in response to music, and subsequent impact on well-being.

The present study aimed to explore connections between people's tendencies to ruminate, their music listening choices, and emotions experienced in response to music. Participants ($N = 157$) downloaded the MuPsych app and over a two-week period, they were prompted to answer questions every time they used their phone to listen to music. Questions asked included information about their mood before and after listening, whether they chose happy or sad music, and whether they had specific motivations for listening. Participants also provided information about their tendencies to ruminate and their musical background.

Data analysis found that the mood a listener was in at the time of listening was related to mood changes after listening; the mood of the music was also related to outcomes. However, this study found that the tendency to ruminate did not affect their listening choices or the emotional outcomes of music listening sessions. Furthermore, it was found that whether an individual

played a musical instrument or had formal training in music was not related to listening motivations or outcomes.

This study has implications for music therapy and for education, as music listening habits and ways of managing daily emotions may be learned. The results of this study also emphasize that elements of individual listening sessions may be more important in determining outcomes than personality traits or other dispositions.

Acknowledgments

The completion of this work would not have been possible without the support and encouragement of a number of key individuals. First, I would like to thank my primary supervisor, Dr. Kevin Watson, for his guidance and support through this process. Dr. Watson's high standards and commitment to robust research and teaching excellence have been and will continue to be an inspiration to me. I would also like to thank my dissertation co-supervisor, Dr. Jessica Grahn, for her valuable insights, leadership, and for the supportive and encouraging environment she has created within the Grahn lab, and my second reader, Dr. Mark Daley, for his valuable feedback. I also wish to acknowledge the incredible scholars and humans who made up this project's defense committee: Dr. Betty Anne Younker, Dr. Patrick Schmidt, Dr. Ingrid Johnsrude, and Dr. Suvi Saarikallio. These scholars' feedback and discussion have inspired me to strive for even greater professional integrity and excellence, and I look forward to maintaining these collegial relationships going forward.

I owe a great debt of gratitude to Dr. William Randall of the University of Jyväskylä, for his guidance and assistance in setting up the study, managing the MuPsych smartphone data collection app, and final data analyses. Dr. Randall's expertise in methodology and data analysis was invaluable to me through this process, as was his willingness to make himself available to talk through the research with me.

I wish to acknowledge the wonderful, supportive communities I have had the privilege of being a part of throughout my doctoral journey. Specifically, I would like to thank the music education department at Western; the conversations I have been a part of and the encouragement I have received from this community since I arrived as a master's student in 2013 have been

invaluable in helping me to become the teacher and researcher I am today. I have also loved being a part of the Music, Cognition, and the Brain Initiative (formerly the Musical Learning Across the Lifespan Project), a multidisciplinary group committed to education and research exploring the many facets of musical engagement. I am exceptionally thrilled to begin work as a Postdoctoral Associate with this Initiative in September of 2021, and I am excited to play a role in moving this important Initiative forward.

I am so grateful for the encouragement of my family and friends. I want to specifically acknowledge the love and support of my study hall group and the incredible friends that I have made on my graduate school journey; a special thanks must go to Kelly, Kristine, Eric, and Liz, each of them incredible musicians, scholars, and teachers in their own right. I also owe a great deal of gratitude for the love and encouragement of the friends who have been there through all of life's journeys, and I want to give a special thank you to my friend Christina, who has been my co-conspirator, the sister I never had, and an inspiration to me since we were 14 years old.

I owe immense gratitude to my parents, Roger and Vaike Kinghorn, for helping me to become the person I am today. They have never wavered in their love and support, have held me to high standards of effort and integrity, have taught me to love, respect, and show generosity and compassion to my fellow humans, and have loved me through all life has brought.

Finally, and most especially, I would like to thank my partner, Mik Patton. Through the highs and the lows of this experience and our lives together in general, he has cheered me on when I needed encouragement, comforted me when I despaired, helped me brainstorm when I was stuck, and loved me through everything we have been through over the past 12 years together. I would not be where I am today without the incredible love and friendship I have found within this very special relationship.

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STATEMENT OF THE PROBLEM

The role that music listening plays in maintaining emotional well-being is being increasingly recognized both in therapeutic and everyday settings (McFerran, Garrido, & Saarikallio, 2016). Music listening can elicit a range of positive emotions including joy, contentment, and excitement (Juslin, 2019), and research has demonstrated activation of the limbic system and so-called "reward pathways" in the brain in response to music listening (Blood & Zatorre, 2011; Mas-Herrero, Dagher, & Zatorre, 2018; Salimpoor, Zald, Zatorre, Dagher, & McIntosh, 2015). Questionnaire studies have indicated that 93% of people use music to change their mood, with 49% doing so often (Juslin & Laukka, 2004). People often report listening to music specifically to improve a negative mood or prolong a positive one, to cope with stress or negative emotions, or to raise arousal levels, among other motivations (Randall & Rickard, 2017a). Clinical research (e.g., Erkkilä, Punkanen, Fachner et al., 2011) has shown that music therapy, including listening activities, can help with a variety of mental health and emotional issues. For example, music listening has been shown to alleviate anxiety and depression and enhance wellness and quality of life in patients facing illness (Batt-Rawden, DeNora, & Ruud, 2005; Teppo, Mari, Sari et al., 2008). Outside of clinical settings many people engage with music listening specifically for the emotional experience it provides (Juslin & Laukka, 2004), and research is increasingly suggesting that deliberately employing music listening to manage our daily emotions, moods, and stress responses may have short- and long-term positive effects on our well-being (Chin & Rickard, 2013; Miranda, Gaudreau,

Debrosse, Morizot, & Kirmayer, 2012; McFerran & Saarikallio, 2014). Yet prior research (e.g., Juslin, Liljeström, Västfjäll, Barradas, & Silva, 2008; McFerran et al., 2016; Randall & Rickard, 2017b) has also indicated that the affective outcomes of music listening are likely determined by complex interactions among variables related to the specific musical selection chosen, the context in which the listening takes place, and individual variables related to the listeners themselves, and the nature of these interactions is not yet well-understood.

While previous investigations have indicated that the valence (happy/sad) of the music selected for listening is a key predictor of the affective outcomes of listening (Randall & Rickard, 2017a, 2017b), some conflicting findings have arisen regarding which musical valence qualities (e.g., happy/sad) elicit certain affective outcomes. For example, many people find the experience of sadness in music to be pleasurable (Sachs, Damasio, & Habibi, 2015) or consoling (Taruffi & Koelsch, 2014; Van den Tol & Edwards, 2013) and the short-term experiences of sadness may be seen as an adaptive behavior with long-term benefits (Larsen, 2000; Saarikallio & Erkkilä, 2007; Tamir, 2016; Van den Tol, 2016). However, listening to negatively valenced music has also been found to intensify negative moods (McFerran et al., 2016) and has been correlated with higher levels of depression (Dillman Carpentier, Brown, Bertocci, Silk, Forbes, & Dahl, 2008). Garrido (2009) has raised concerns that, for some people, choosing negatively valenced music for listening may be maladaptive and result in undesirable outcomes.

This phenomenon is further complicated when one considers how certain person variables, specifically the initial mood of the listener, interact with musical valence to impact affective response. For example, one's initial mood is a factor previously shown

to influence the valence of music chosen for listening (e.g., Gibson, Aust, & Zillmann, 2000; Hunter, Schellenberg, & Griffith, 2011), as well as the frequency of emotional motivations for listening (e.g., Randall & Rickard, 2017a). Randall & Rickard (2017a) found that, in the context of everyday music listening, emotional motivations for listening were reported more than twice as often when participants were in a negative mood, and a separate investigation by the same researchers (Randall & Rickard, 2017b) found that a person's initial mood valence and arousal levels were the biggest predictors of mood valence and arousal change respectively during a music listening episode. However, conflicting findings regarding this relationship have arisen from previous investigations. For example, an experimental study by Knobloch and Zillmann (2002) found that participants who had been induced into a negative mood chose to listen to high energy, joyful music in the post-mood-induction interval to a greater extent than participants in positive or neutral moods. Zavoyskiy, Taylor, and Friedman (2016) found that happy music appeared to improve negatively valenced (sad) moods in their participants. Other studies (Chen, Zhou, & Bryant, 2007; Dillman Carpentier et al., 2008; Gibson et al., 2000; Hunter et al., 2011; Taylor & Friedman, 2015; Taruffi & Koelsch, 2014; Van den Tol & Edwards, 2013, 2015), however, have found a mood congruent selection bias in favour of music that matches the participant's current mood. For example, Chen, Zhou, & Bryant (2007) found that participants in a depressed mood demonstrated an increased attraction to sad music, which often resulted in a worsening of mood. Xue, Li, Yin, Zhu, & Tan (2018) found that participants who had been induced into a sad mood showed a preference for music that was slow and expressed sadness over faster, happier music. Vuoskoski & Eerola (2011) found that a participant's initial mood created a mood-

congruent bias in the way they interpreted emotionally ambiguous pieces of music. Thus, the interaction effect of listener mood and musical valence on affective response during musical listening requires further investigation.

Music's demonstrated ability to influence affective states makes it a potentially powerful tactic for affect regulation. Affect regulation refers to any deliberate efforts to influence the frequency, intensity, and duration of various affective states (Larsen & Prizmic, 2004), and it is a critical component of emotional well-being (Gross & John, 2003). It is accomplished through the use of strategies such as distraction, the diverting of attention away from one's negative thoughts and feelings and their sources, or avoidance, specifically avoiding particular emotion-eliciting experiences (Gross, 2015). Deficits in affect regulation, a key issue in a number of emotional and mental health issues such as depression, generalized anxiety, and other disorders (Larsen & Prizmic, 2004), are often related to the habitual use of maladaptive regulation strategies. A great deal of prior research in this area has rested on the framework provided by Mood Management Theory (MMT; Zillmann, 1988a, 1988b). This media-specific theory of affect regulation posits that people are driven to use media, including music listening, to manage their moods in daily life. This theory has a particular focus on mood repair and the relief of negative moods. MMT has, however, had difficulty accounting for the mood-congruent bias some people tend to display when choosing music, as the idea of choosing music that may worsen mood is counter to the hedonic goal of mood repair (Knobloch, 2003).

The potential for everyday music listening to aid in managing daily moods and emotions is increasingly a topic of investigation (Rickard & McFerran, 2012). Music listening that is associated with certain emotion regulation or coping strategies appears to

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have a positive relationship with emotional well-being, and everyday music listening is increasingly being recognized as an effective means of enhancing well-being through the management of managing moods, emotions, and stress responses (Zoteyeva, Forbes, & Rickard, 2016). For example, Miranda & Claes (2009) found that problem-focused coping through music listening was associated with lower levels of depression in adolescent girls. Zoteyeva et al. (2016) found that veterans who were experiencing high levels of depression, stress, and negative social interactions used music listening to aid in regulating their emotions. Chin and Rickard (2013) found that engaging with music for the purposes of cognitive and emotion regulation may enhance wellbeing primarily through the use of cognitive reappraisal.

Music listening may also, however, become a component of "unhealthy patterns" (Garrido & Schubert, 2015b, p. 314) of coping or maladaptive affect regulation. In the previously mentioned study by Miranda & Claes (2009), findings also indicated that avoidance/disengagement coping through music listening was associated with greater levels of depression in adolescent girls, while emotion-focused coping through listening was associated with greater levels of depression in adolescent boys. Chin and Rickard (2013) found that music listening coupled with a tendency to regulate emotions through expressive suppression may result in undesirable wellbeing outcomes. Miranda et al. (2012) assert that the day to day experiences of emotion provided by music listening may, over time, result in symptoms of anxiety and depression reaching clinical levels, and even subclinical-level symptoms have the potential to significantly disrupt psychosocial functioning (Lewinsohn & Essau, 2002). As discussed above, while a temporary increase in negative affect as a result of music listening may not ultimately be

detrimental to the individual, there is concern when this decline in mood is the result of maladaptive affect regulation or when an individual has certain dispositions that result in difficulty resolving negative shifts in affect (Randall & Rickard, 2017b).

The affective outcomes of music listening may be of special concern for people who habitually engage in rumination, defined as "repetitively thinking about the causes, consequences, and symptoms of one's negative affect (Smith & Alloy, 2009, p. 117). This disposition, known as trait rumination, is characterized by repetitive negative thought, an attraction to and difficulty disengaging from negative stimuli, and a difficulty regulating affect, particularly negative affective states (Garrido & Schubert, 2011a). Trait rumination is linked to a variety of mental health disorders such as anxiety and eating disorders, and its relationship with depression is particularly well-established (Nolen-Hoeksema & Morrow, 1993). The use of rumination as an affect regulation strategy is generally considered maladaptive in that ruminating effectively focuses attention on the negative affect without any adaptive problem-solving or epistemic curiosity (a more adaptive side of the self-absorption concept known as reflection). Such focused attention may reinforce and prolong negative affect rather than resolve it. This reinforcement of negative affect can lead to dysphoric symptoms becoming clinical over time (Miranda et al., 2012).

Previous findings have suggested that rumination may moderate relationships among moods, daily experiences, and well-being outcomes. For example, Genet & Siemer (2012) found that use of rumination in daily life moderated the relationship between the experience of unpleasant daily events and negative mood episodes. During times of intense rumination use by participants, higher levels of unpleasant daily events

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predicted higher levels of negative mood. However, on days when participants reported lower use of rumination, higher levels of unpleasant events were not associated with higher levels of negative mood. Abela & Hankin (2011) also found that trait rumination moderated the relationship between negative life events and future depressive symptoms.

Some recent music studies (e.g., Garrido & Schubert, 2015b; Larwood & Dingle, 2021) have suggested that trait rumination may similarly moderate relationships among mood, music listening, and affective outcomes, with findings indicating that high ruminators tend to engage in maladaptive behaviour patterns through music listening (McFerran & Saarikallio, 2014; Saarikallio, Gold, & McFerran, 2015; Sakka & Juslin, 2018). For example, some investigations (McFerran & Saarikallio, 2014; Saarikallio & Erkkilä, 2007) have found that adolescent participants used music listening to accompany rumination and that this behaviour sometimes exacerbated negative moods. The authors also noted that the participants who described engaging in this activity tended to display poorer markers of mental health. Listening diary data collected by Garrido, Schubert, & Bangert (2016) indicated that participants engaged in ruminative thinking during listening that ultimately had negative consequences on their emotional wellbeing. Larwood & Dingle (2021) found that after a negative-valence mood induction, people high in trait rumination experienced a greater worsening of mood after listening to negatively valenced (sad) music. Garrido & Schubert (2015b) found that high ruminators experienced a significantly greater increase in depression scores after listening to sad music than did low ruminators, possibly reflecting ruminators' difficulty with disengaging from negative stimuli and dissipating negative affect (Garrido & Schubert, 2011b). However, in a separate investigation, the same researchers found that high and

low ruminators did not differ in terms of their affective response to sad music (Garrido &
Schubert, 2015a). Some research (e.g., Chen et al., 2007; Schubert, Halpern, Kreutz, &
Garrido, 2018) supports the idea that trait rumination may be related to a maladaptive
attraction to negatively valenced (sad) music. However, Garrido & Schubert (2013)
found that trait rumination correlated not with a general preference for negatively
valenced music, but specifically with scale items indicating a perceived benefit of
listening to sad music. Thus, the question of what specific role rumination may play in
moderating affective response during music listening remains open.

Affect regulation is a complex, dynamic process that unfolds over time in real-
world contexts (Gross, 2015; Sakka & Juslin, 2018). Much of the prior research into
relationships between rumination and music listening has been conducted using survey
and experimental designs. While survey research has the potential to illuminate certain
phenomena, it may not account for the situational variables that are at play in a given
music listening context, and research that has assessed such variables (e.g., Juslin et al.,
2008; Randall & Rickard, 2017a, 2017b) has indicated that those variables are of key
importance. Research conducted in retrospective designs (i.e., asking participants to
recall specific instances of music use or describe how they typically engage with music)
is subject to memory biases, and these biases are of particular concern when asking
participants to recall emotional information (Randall & Rickard, 2013; Hektner, Schmidt,
& Csikszentmihalyi, 2007). Survey and experimental data in this area has often been
collected in a single session, which does not allow researchers to empirically assess
habitual patterns of behaviors. Experiments, while they may minimize recall bias and

implement controls required to make causal inferences, may also lack ecological validity, and as such may miss important elements of the daily music listening experience.

Previous experiments examining responses to music listening behaviors (e.g., Chen et al., 2007; Garrido et al., 2016) have frequently incorporated researcher-selected music. As a result, findings may not capture how participants would respond to self-selected music, an important consideration given that prior research indicates responses are stronger to self-selected music (Blood & Zatorre, 2001; McFerran & Saarikallio, 2014; Pereira, Teixeira, Figueiredo, Xavier, Castro, & Brattico, 2011). Those studies that have allowed participants to select their own music have often provided specific directions for music selection. For example, both Garrido & Schubert (2015a, 2015b) and Larwood and Dingle (2021) asked participants to select a piece of music that they anticipated would make them feel certain emotions (i.e., either happy or sad), and this procedure may not capture the selections a listener might make when experiencing those emotions as part of daily life.

An alternative method for examining affective outcomes of day-to-day music listening is Experience-Sampling Methodology (ESM; Hektner et al., 2007). ESM prompts participants, either through the use of smartphone apps, pagers, and/or listening diaries, to provide information at regular intervals or whenever they engage in a particular activity. ESM reports are often used to collect information about a participant's thoughts, feelings, and activities as they go about their typical day-to-day lives. For example, music listening studies such as those conducted by Randall and colleagues (e.g., Randall & Rickard, 2017a, 2017b; Randall, Rickard, & Vella-Brodrick, 2014) have used smartphone apps to collect data during typical music listening episodes, allowing

researchers to assess motivations for listening, pre- and post-listening measures of participant mood, and descriptions of the listening context or music selected. Because ESM may be used to collect longitudinal data, the methodology can be used to assess trends or habitual patterns of behavior. The procedure allows researchers to collect information about a number of key variables in real-time, free of recall biases (Hektner et al., 2007).

Evidence is accumulating that the emotional experiences prompted by everyday music listening may contribute, positively or negatively, to emotional wellness and mental health issues. However, previous research has also suggested that these affective outcomes of music listening, as well as the relationship between music listening and well-being, appear to be influenced by a combination of individual listener variables and situational factors (Juslin et al., 2008; Randall & Rickard, 2017a, 2017b). In particular, while prior investigations into relationships between rumination and music listening have been conducted using survey and experimental research designs, to date no previous studies have examined the specific role that trait rumination may play in impacting the affective outcomes of everyday music listening while accounting for key situational variables such as listener mood and music choice, within a naturally-occurring context and without researcher manipulation.

Purpose Statement

The primary purpose of the present study is to investigate trait rumination as a potential moderator of the relationships observed in prior literature among initial mood valence, the valence (i.e., happy/sad) of the listener's chosen music, and valence change

after a short period of music listening, using Experience-Sampling Methodology. Secondary aims included collecting descriptive data about typical listening situations and motivations, examining the frequency of affective change during music listening episodes in day-to-day life, and exploring potential relationships among musical background, music listening motivations, and outcomes.

Specifically, the present study aimed to address the following research questions:

Research Questions

1. Does everyday music listening produce changes to listener mood valence or levels of arousal? With what frequency?

2. Does trait rumination predict changes to listener mood valence during everyday music listening?

3. Does a listener's initial mood valence predict mood valence change during everyday music listening? If so, is this relationship moderated by rumination?

4. Does the valence of the listener's musical selection predict mood valence change during everyday music listening? If so, is this relationship moderated by rumination?

5. Does the listener's initial mood predict the valence of their musical selection? If so, is this relationship moderated by rumination?

6. Are the variables level of formal musical training or experience with active music-making associated with different listening motivations or affective outcomes?

Chapter Two

REVIEW OF LITERATURE

In recent years, music psychologists have become increasingly interested in the impact of personal music listening on one's day-to-day life. Prior research has indicated that music listening serves as a tool for identity construction and expression (Hines & McFerran, 2014), as a way to engage in peer affiliation or foster a feeling of connection with others (North, Hargreaves, & Hargreaves, 2004), and as a background to ordinary day-to-day activities (Randall & Rickard, 2017a). Schäfer, Sedlmeier, Städtler, & Huron's (2013) research into the functions of music listening suggested that of the numerous reasons people cite for engaging with music listening, mood and arousal regulation was rated as most important by participants. The regulation of negative affective states (e.g., sadness) seems of particular concern, as symptoms of depression and other mood disorders, even when below clinical threshold, have the potential to disrupt psychosocial functioning and may eventually descend into clinical levels (Lewinsohn, Solomon, Seeley, & Zeiss, 2000; Miranda et al., 2012). Of particular concern is how certain habitual patterns of responding to negative affective states, such as ruminating, might influence patterns of music use for this purpose as well as the related outcomes (e.g., Chen et al., 2007).

The present review of literature will summarize previous findings related to music listening and affective response, with a specific focus on five categories: (a) theoretical views of music listening and affective response, (b) variables that impact affective outcomes of music listening, (c) music listening for affect regulation, (d) the role of

rumination in affective response to music listening, and (e) research methods employed in the study of music listening and affective response.

Theoretical Views of Music Listening & Affective Response

While it is widely accepted that music is capable of eliciting affective responses (Juslin, 2019), there is less agreement as to the exact nature of those responses or how they may be best defined. The term affect is an "umbrella term" (Juslin, 2019, p. 43) comprising a number of different experiences. Gross (2015) has described affective responses as encompassing moods, emotions, and stress responses, each of which represent qualitatively different experiences that vary in their intensity, duration, and focus. Baltazar & Saarikallio (2016) offered a broader conceptualization of affect that also included preferences, motivational impulses, and general affective style. In terms of the affective responses that might be elicited through music listening, the constructs of mood and emotion have received the most attention.

Juslin (2013), along with other researchers (e.g., Juslin & Västfjäll, 2008; Vuoskoski & Eerola, 2012), has argued that affective responses evoked by music are best described as emotions, which are commonly defined as intense, object-directed, and relatively brief affective experiences comprised of subcomponents including subjective feelings, expressive behaviors (e.g., facial or bodily expression), action tendencies (Gabrielsson, 2011), and physiological and neurological responses (Chanda & Levitin, 2013; Krumhansl, 1997). In contrast, moods are generally defined as states that are more diffuse, more persistent, and may have no apparent immediate cause, lacking the "aboutness" (Larsen, 2000; p. 130) that characterizes emotion.

Researchers have often used the terms mood and emotion interchangeably (Vuoskoski & Eerola, 2012), and the lack of conceptual clarity is perhaps due to the dearth of empirical support for any clear delineation between the two states (Beedie et al., 2005). The two states undoubtedly share a number of important facets, albeit with slightly different manifestations. They are both "experiential entities" (Larsen, 2000, p. 129), involving some degree of feeling on the part of the individual. They both have physiological correlates, albeit slightly different ones; Larsen (2000) delineates emotion as involving "rapid response" systems (e.g., the autonomic nervous system), while moods are more likely to involve "sustained response" systems like metabolism and immune system responses (p. 129). Moods and emotions are also each associated with some form of expression and can be communicated to others, with certain overt facial expressions associated with particular emotions and certain modes of speaking and body language associated with mood (Larsen, 2000, p. 130). Juslin (2019) further highlights that often the beginnings and ends of emotional experiences in daily life are difficult to define, and indeed some view affect as a continuous phenomenon; at any given time, some argue, an individual is experiencing some form of affect, whether they are consciously aware of the experience or not (e.g., Barrett, Bliss-Moreau, Duncan, Rauch, & Wright, 2007). Larson (2000) has asserted that the distinctions between affective states may ultimately be a question of intensity or degree.

The manner in which affective responses are observed and measured is reliant on the way affect is conceptualized. One distinction prevalent in the research literature is that between Categorical and Dimensional models of affect. Categorical models view affective states as discrete entities. These categories are often deemed "basic" as in the

Basic Emotion Model (Ekman, 1992), which posits that all emotions are derived from a set of basic emotion categories such as happiness or sadness. In this theoretical approach, each of these basic emotions is associated with a specific, distinct set of neurophysiological, expressive, and subjective responses (Posner, Russell, & Peterson, 2005).

Studies that assess emotional responses to music using categorical conceptualizations do so in a number of ways. One popular self-report method is to ask participants simply to name the emotion they are feeling in response to music listening, either through free description or by selecting one from a given list (Juslin et al., 2008; Gabrielsson, 2011). For example, in a large study involving almost a thousand respondents, Gabrielsson (2011) asked participants to describe in their own words the most intense experience of musical emotions they could recall. Results of this study found that participants used a huge variety of different, complex terms to describe the emotions evoked by music. Some studies ask participants to rate the degree to which they are experiencing a series of related emotions on a Likert-type or visual analog scale, sometimes involving pre-existing psychometric measures. Larwood & Dingle (2021), for example, had participants rate, on a five-point scale, the degree to which they were experiencing four emotions specifically related to sadness using the Discrete Emotion Questionnaire (Harmon-Jones, Bastian, & Harmon-Jones, 2016). One of the most popular psychometric tools for assessing discrete affective states is the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971). Respondents are presented with a list of different mood states (e.g., nervous, resentful, active, energetic) and asked to rate, on a five-point scale from "Not at all" to "Extremely," the degree to which they are presently

experiencing each of the indicated mood states. The 47 items on the POMS are grouped into seven subscales designated Depression, Tension, Anger, Fatigue, Confusion, and Vigour, and a total Mood Disturbance Index (MDI) may also be computed. An advantage to this measure is that it allows for direct comparison of pre- and post-listening mood states as respondents do not simply indicate which moods they are experiencing, but also the degree to which they are experiencing them. Several studies (e.g., Garrido & Schubert, 2015a, 2015b; Garrido et al., 2016) have used this measure to assess mood before and after an experimental listening session.

Although a categorical conception of affect has been popular, especially in affective neuroscience (Posner et al., 2005, p. 715), its validity has been called into question by empirical research that has failed to identify these specific responses and categorize them as distinct from one another. Criticism of categorical models of affect also points to the difficulties these models have in resolving debate regarding the number of emotion categories that ought to exist and how they ought to be described and assessed (Juslin & Sloboda, 2010). Empirical evidence from affective neuroscience, too, has found limited evidence supporting several basic emotion theorists' assertions that each basic emotion corresponds to a particular pattern of physiological and neural activity. For example, some researchers have suggested that each basic emotion is characterized by its own unique set of facial expressions. However, other research has suggested that similar facial expressions, such as smiling or furrowing of the brow, may be associated with more than one emotional experience (Posner et al., 2005).

A contrasting manner of conceptualizing affect is the Dimensional Model, which views affective states as existing along one or more continua representing different facets

of the experience (Eerola & Vuoskoski, 2011). The most frequently employed dimensional model in music research is the Circumplex Model of Affect (Russell, 1980; Russell & Barrett, 1999). This model conceives of affective experience as varying along two orthogonal continua: valence and arousal. Russell and Barrett (1999) have referred to these dimensions as "core affects", and affective states may be located in two-dimensional space in accordance with their placement along each of these continua. Valence refers to the pleasantness or aversiveness of a stimulus, which in relation to affect corresponds to those states experienced as positive versus those experienced as negative. Arousal refers to the degree of activation of the autonomic nervous system. The circumplex model is a common way of assessing both the emotions expressed by music as well as those induced through music listening. Participants are sometimes offered a Likert-type, visual analog, or sliding scale along which to rate either the music or their own affective state along the dimensions of pleasantness-unpleasantness (or positive-negative) and from high to low arousal. For example, Witvliet & Vrana (2007) asked participants to rate a variety of excerpts using a tool called the Self-Assessment Manikin (Hodes et al., 1985), a non-verbal, visual tool designed to help respondents map their own responses onto two- or three-dimensional space. Other researchers have used a Continuous Digital Response Interface (CDRI), which allows participants to adjust their ratings of valence and arousal as the music unfolds, a method that is advantageous as one piece of music may, over time, communicate or elicit different emotions (Geringer, Madsen, & Gregory, 2004; Schubert, 2001, 2004).

Another dimensional conceptualization that has appeared in the literature investigating music use in everyday life is Watson, Clark, & Tellegen's (1988) Positive

and Negative Affect Schedule (PANAS), which characterizes emotions in terms of approach and avoidance. Under this model, Positive Affect (PA) and Negative Affect (NA), rather than occupying the two poles of a bipolar scale, are orthogonal dimensions. The authors describe PA as "the extent to which a person feels enthusiastic, active, and alert", while NA is described as "a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states" (Watson et al., 1998, p. 1063). The 20-item PANAS, with 10 items representing PA and 10 representing NA, presents respondents with a number of affective terms (like "interested", "excited", and "nervous") which they are instructed to rate on a five-point scale from "very slightly or not at all" to "very much". Depending on the instructions given to the participant, the PANAS can be used to assess how a participant is feeling at the moment of data collection, or it may be used to assess how a participant has generally been feeling over the past days or weeks. This makes it a flexible tool that can empirically assess a participant's mood at the onset of a listening episode, evaluate any changes in mood state as a result of listening, and assess emotional well-being more generally. For example, Vuoskoski & Eerola (2015) used the PANAS pre- and post-listening to empirically assess outcomes, while Ter Bogt, Vieno, Doornwaard, Pastore, & Van den Eijnden (2017) used the questionnaire to collect information about the emotions young people typically experienced while listening to music. The scale has generally demonstrated excellent reliability in both music and non-music research.

A third dimensional model that has received less attention in the music literature is Thayer's (1989) conceptualization of affect as varying along the dimensions of Energetic and Tense Arousal. According to Thayer, these two dimensions create a four-

quadrant space that represent four complex moods: calm energy, tense energy, calm tiredness, and tense tiredness (Thayer, 2012).

While evidence from affective neuroscience has supported the idea of two independent physiological systems, valence and arousal, combining to produce a variety of affective experiences (Posner et al., 2005), dimensional models of affect have been criticized for a "lack of differentiation" (Rickard, 2012, p. 212). As Juslin (2019) points out, emotions such as fear and anger, while occupying similar places in two-dimensional valence-arousal space, may represent qualitatively different experiences for individuals, and as such drive musical behavior in different ways. Furthermore, the mapping of these affective states does not allow for the experience of mixed emotions, a point which may be especially important when investigating response to music (Eerola, 2018). A further issue for music research is that assessment tools that evaluate musical emotions using models developed from research on general emotional experiences may not be adequate for describing emotions evoked by music (Zenter, Grandjean, & Scherer, 2008). Feldman Barrett (2006) has further suggested a combination of dimensional and categorical approaches. In this model, the underlying structure of the affective response ultimately lies along the two dimensions of valence and arousal, but one's cognitive interpretations of the experience tends to be categorical. In other words, we experience an affective state characterized by some particular combination of arousal and valence, and our interpretation of that experience leads us to name the emotion using a categorical term (e.g., happiness, sadness, anger). Some studies in the music domain have supported this idea, including studies that have assessed affective state using both categorical descriptors and general dimensions (e.g., Kreutz, Ott, Teichmann, Osawa, & Vaitl, 2008).

Variables That Impact Affective Outcomes of Listening

Prior research suggests that the outcomes of music listening are the result of interactions among a variety of different variables related to the listening situation, the music chosen, and the listeners themselves (Greb, Steffens, & Schlotz, 2019; Juslin et al., 2008; Randall & Rickard, 2017b). Important variables related to the listening situation include the listening environment, accompanying activities, and with whom the music is heard. Variables of interest related to the music include the emotional quality (valence and arousal levels) of the music and the degree of control listeners may exercise over the choice of music for listening. Important listener variables include initial mood state before the onset of listening, emotional health and wellbeing, musical experience, and one's motivation for listening.

A listener's physical environment and social context have a powerful influence on the reasons for and functions of listening (Sloboda, O'Neill, & Ivaldi, 2001). Listeners actively utilise music in different situations to produce different psychological states (North et al., 2004). For example, Juslin et al. (2008) found that although people did experience musically evoked emotions in a variety of locations, such emotions were most likely to occur when participants were at home or outdoors, findings that were consistent with prior studies (North et al., 2004; Sloboda et al., 2001). When specific emotions were considered, Juslin et al. (2008) found that the emotions "sadness-melancholy", "calm-contentment", and "nostalgia-longing" were experienced more often when participants were alone, while "pleasure-enjoyment", "happiness-elation", and "anger-irritation" were evoked more often when respondents were in the presence of others.

Another series of variables that must be considered when investigating emotion outcomes of personal music listening are those related to the music itself. For example, Juslin et al. (2008) found that listening to familiar music slightly increased the likelihood of a music-evoked emotional response (p. 679), and the familiarity of the chosen selection has been shown to influence musical preference and the enjoyment of listening to sad music in particular (Schubert, 2007). The emotional qualities of the selected music – often defined as the valence and arousal levels of the music - are a crucial element of the listening experience. Randall & Rickard (2017b) sought to determine predictors of emotional outcomes of listeners as a result of music listening. To assess the affective properties of the music, participants were asked to rate the mood of the music using two 7-point slider scales labeled Negative to Positive and Low Energy to High Energy. These scales indicated the subjectively perceived emotion of the music. While the strongest influence on listener mood change was determined to be listener initial mood, the next strongest predictors of changes in listener valence and arousal were the respective perceived values of valence and arousal in the music. The third strongest predictor was enjoyment of the music, which predicted positive change in both listener valence and arousal.

Individual listener variables that may impact affective response to music listening include one's motivation for listening, initial mood state before the onset of listening, and preferences for music that expresses particular emotional qualities. For example, Juslin et al. (2008) found that certain motives for listening were associated with particular emotional responses. Listening with the goal of regulating emotion was associated with "sadness-melancholy", while listening to relax was correlated with the experience of

"calm-contentment". Saarikallio & Erkkilä (2007) found that the adolescents they interviewed reported using music to seek consolation, to distract from a current mood, to calm down when anxious, and occasionally, to intensify sadness or other negatively-valenced affect. Randall & Rickard (2017a) asked participants to choose from a comprehensive list of listening motivations they categorized as emotional reasons (e.g., to improve mood), social reasons (e.g., to express my identity/values), and other reasons (e.g., for background music). The researchers examined the relationships among both general categories and individual reasons for listening and changes to mood valence and arousal. Findings indicated, however, that emotional reasons produced no significant change in either the listener's affective valence or arousal levels, suggesting that these regulatory listening endeavors may not be having their expected or desired effect. In contrast significant affective changes were observed for the Other category of motivations.

Results from prior music listening research has indicated that a person's initial mood exerts a significance influence on the mood of the music they choose to listen to (e.g., Gibson et al., 2000; Hunter et al., 2011), and the frequency of emotional motivations for listening (e.g., Randall & Rickard, 2017a). Randall & Rickard (2017b) found that a listener's initial mood predicted the affective outcomes of listening directly, and produced an interaction effect between initial mood and music valence, such that the valence of the music chosen had a moderating effect on short-term mood outcomes. The two variables of mood and music valence are highly intertwined in current research. A person's mood state has been shown to affect their musical preferences, especially in terms of their preference for happy versus sad music. In general, when mood is not taken

into account, adult listeners have a demonstrated preference for happy rather than sad music (Hunter, Schellenberg, & Schimmack, 2010; Khalfa, Roy, Rainville, Dalla Bella, & Peretz, 2008; Ladinig & Schellenberg, 2012). However, when a person's mood at the time of music selection is considered, their choices tend to run congruent to their current mood. In other words, their preference for happy music tends to disappear when they are in a negative mood, and often a preference for sad music in those circumstances instead emerges. As such, some research has attempted to clarify what is driving these mood congruent choices.

Friedman, Gordis, & Förster (2012) conducted a series of three experiments intended to assess the influence of listener mood on preference for happy or sad music. In each experiment, participants were induced into specific moods (sad or neutral) by watching video clips. Following mood induction in the first experiment, participants ($N =$ 129) were asked to identify three pieces of music they would most like to listen to and provide ratings of the degree to which their selections were happy/sad or slow/fast. Those in the sad mood condition rated their musical selections as significantly sadder and slower than those in the neutral condition. Sad participants also indicated that they felt the music would be more likely to fuel continued thought about the video they had seen than did those in neutral moods. In the second experiment, participants ($N = 35$) were asked to identify six of their favourite songs: three songs they would consider happy/energetic, and three they would classify as sad/mellow. Following mood induction, participants were presented with the titles of their six nominated songs and asked to rate, on a seven-point scale, the degree to which they felt like listening to each of those songs in the present moment. Data analyses indicated that sad participants did not show a

greater preference for sad songs than those in neutral moods, but did show a significantly lower preference for happy music than those in neutral moods, leading the authors to speculate that mood-congruent preferences for sad music when in sad moods may be driven by a desire to avoid mood-incongruent music.

In the third experiment, undergraduate participants ($N = 93$) again underwent a mood induction procedure, this time with a happy mood condition added. Participants again nominated happy and sad songs and the desire to listen to each of their selections was again rated post-induction on a seven-point scale. This experiment added a series of questions regarding how each participant predicted the chosen song would make them feel (rated on a seven point scale from "much worse" to "much better"), how appropriate they felt listening to each selection would be (rated on a seven-point scale from "very inappropriate" to "very appropriate"), and how right they thought it would feel to be listening to each selection while in their current mood (rated on a seven point scale from "very wrong" to "very right"). Data analysis found that participants in the sad condition showed no greater desire to listen to sad songs than those in the neutral condition; however, those in the happy mood condition showed less desire to listen to sad songs than the neutral group. Similar analyses on happy music found that those in sad moods expressed significantly less desire to listen to happy music than those in happy or neutral moods. Analysis of responses to questions regarding the anticipated effects and appropriateness of the different selections found that those in sad moods felt that happy music would not make them feel better. Taken together, the results of these three experiments raised the possibility that the choice of mood-congruent music may reflect an aversion to happy music rather than an attraction to sad music.

Xue et al. (2018) aimed to expand on this prior research indicating that mood-congruent music choices may be driven in part by feelings of appropriateness regarding the type of music (in terms of its emotional content) that would be most suitable for their present circumstances. Participants in this study were 49 students from a university in China (mean age 22.10, SD = 2.15). These participants were told that the study was about mood and autobiographical memories rather than about music choices, in order to address potentially confounding demand characteristics. Data was collected in-person and involved a mood induction procedure as well as data collection about moods and preferences via questionnaire. Participants first completed a Chinese translation of the PANAS (Watson et al., 1988; translation by Qiu, Zheng, & Wang, 2008) before being randomly assigned to either a happy, neutral, or sad mood group, and each group underwent a mood induction procedure. Those in the happy and sad groups were asked to intentionally recall three autobiographical memories congruent with the target mood (i.e., those in the happy mood group were asked to recall three happy autobiographical memories). For control purposes, the participants in the neutral group were asked to simply write down the content of their last three meals. Participants again completed the PANAS in order to assess the effectiveness of the mood induction procedure. Participants then completed a music preference questionnaire, drawn on research by Friedman et al. (2012); Participants rated their desire (on a seven-point scale where 1 = not at all and 7 = very much) to listen to several different styles of music including happy, sad, fast, slow, or emotionally ambiguous music, and also rated how appropriate they felt listening to happy, sad, or neutral music would be at the present time. Participants were also asked to give at least three reasons for their choices, although those data were not presented or

analyzed in the present publication. A final question asked them to what extent they had been thinking of the autobiographical memories they had been asked to recall during induction when they rated their musical preferences.

Assessment of the effectiveness of the mood induction procedure via repeated-measures ANOVAs suggested that the mood induction procedure had had the intended effect. It was further revealed through analysis that participants in both sad and happy groups indicated that their preferences were influenced by the memories they had recalled during the induction phase, while this was not the case for the neutral mood group. Analysis of preference ratings via one-way ANOVAs found that participants in the sad group showed a greater preference for sad music and felt sad music was more appropriate in their current circumstance, while the happy group showed greater preference for and feelings of appropriateness toward happy music. Within-group comparisons were further conducted using one-way ANOVAs and it was revealed that for the happy and neutral mood groups, happy and neutral music was significantly preferred over sad music. However, for the sad mood group, no significant differences were found between preferences for happy, sad, or neutral music, indicating that although this group preferred sad music to a greater extent than those in happy or neutral moods, they did not show a specific preference for it over happy music when within-group comparisons were made. In contrast, those in happy and neutral moods preferred happy or neutral music to a significantly greater extent than they did sad music. Overall, the authors posit that the results suggest that while mood-congruent preferences were definitely displayed in their sample, that contrary to other results (e.g., Friedman et al., 2012; Taylor & Friedman, 2014) it was the happy mood group that showed an aversion to mood-incongruent music

rather than the sad mood group, indicating a need for further study to identify possible moderating influences of other variables. These authors also briefly reported a variety of reasons participants had given for their choices, and these included conforming to their present environment/atmosphere, enhancing the retrieval of memories, and mood improvement; however, these reasons were not comprehensively discussed, nor were they included in any inferential analyses.

Research focused on the question of whether people are able to obtain short- or long-term mood benefits from listening to sad music has indicated that sad music listening can produce worsening of mood, but can also be associated with positive feelings and outcomes. For example, Eerola, Peltola, & Vuoskoski (2015) conducted a survey study of Finnish adults ($N=$ 386) who were instructed to first think of a piece of music they would consider as sad-sounding, and then presented with a list of 30 statements, rated on a five-point scale from "strongly disagree" to "strongly agree", assessing their attitudes towards sad music. The questionnaire included statements directed at motivations (e.g., "I listen to sad music only in a certain state of mind"), general attitudes toward sad music (e.g,. "Sad lyrics are an essential part of the sadness expressed by music"), and potential outcomes (e.g., "Sad music intensifies my own negative feelings", "Listening to sad music makes me anxious"). The authors specifically included statements reflecting dislike for sad music, as this attitude had been frequently observed in prior qualitative data. Initial examination of the items indicated that overall, participants expressed generally positive attitudes towards sad music, expressing generally low agreement with items indicating that sad music listening was related to "unpleasant feelings" (p. 7). The ratings were then subjected to exploratory factor

analysis and a five-factor solution was retained. These factors were designated as follows: (a) "avoidance", comprised of items describing negative experiences with sad music; (b) "autobiographical", including statements about connections between sad music and autobiographical memories, empathy with the music, and connections with state of mind; (c) "revival", which involved items describing positive effects of sad music, resembling the "revival" factor from Saarikallio's (2008) Music in Mood Regulation scale; (d) "appreciation", which includes statements regarding sad music's impact on their appreciation of life; (e) "intersubjective" including items related to feelings of support, importance of lyrics, and listening while with others; and (f) "amplification", comprised of items related to the involuntary worsening of negative emotions with sad music. The results suggest that people's attitudes towards sad music vary considerably and that sad music listening can produce both positive and negative outcomes.

Randall & Rickard's (2017b) model of affective outcomes of music listening, one that accounts for both individual dispositions (e.g., personality traits) and contextual variables (e.g., mood, activity, etc), has indicated that listener-level variables such as initial mood and the valence of the participants' music selection contributed more to explaining the variance in outcomes than did other individual difference variables such as personality traits, gender, and general measures of well-being. Future research into the affective outcomes of music listening must therefore account for these variables in examining other potential relationships.

Music Listening for Affect Regulation

One of the avenues through which music listening may to contribute to well-being is its employment in the service of affect regulation. Affect regulation is a process through which affective states, whether positive or negative, are created, changed, or maintained (Baltazar & Saarikallio, 2016). Extant research has conceptualized this process in terms of three related but arguably distinct phenomena: (a) emotion regulation, (b) coping, and (c) mood regulation. Each of these phenomena may be distinguished from one another by the type of affect they regulate, although there is considerable overlap among them (Gross, 2015). Each process is marked by a focus on regulatory goals which are accomplished through the use of strategies and other psychological processes, resulting in both short- and long-term consequences (Gross, 2015). Affect regulatory behaviors are often learned (Zillmann, 1988a, 1988b, 2000) and each person typically learns habitual ways of responding to their affective states.

Emotion regulation refers to the process of influencing various facets of emotional response, including the subjective experience of the emotion and its other subcomponents (e.g., expressive behavior, physiological responses) or even which emotions one experiences, when, and for how long (Gross, 2014). The dominant theory of emotion regulation is the Process model (Gross, 1998; Gross, 2014), which asserts that an emotional response is a process wherein a particular situation is encountered and is attended to and evaluated in terms of what it might mean for one's short- or long-term goals. That evaluation results in the experience of an emotion. The process model further asserts that there are various points in this process in which a regulation strategy could be applied in order to manage the subsequent emotional response. Gross (2014) groups

possible regulation strategies into five families: (a) situation selection, (b) situation modification, (c) attention deployment, (d) cognitive change, and (e) response modulation. The first four of these families are referred to as antecedent-focused strategies, which work by minimizing or eliminating the particular emotional response before it begins; these strategies can involve anticipating and avoiding or reframing thoughts or deploying attention away from a potentially emotion-eliciting event. The fifth family of strategies, response modulation, relates to response focused strategies. Response-focused strategies are employed after the emotional response has already occurred and focus on mitigating its effects. These strategies and tactics can involve suppressing either the expression of the emotional response or the action tendencies that characterize it (e.g., not acting out in anger).

Research based on this process model tends to indicate that antecedent-focused strategies are more adaptive than response-focused ones in that they tend to be associated with greater well-being outcomes. For example, in a series of studies Gross & John (2003) investigated uses of the antecedent-focused strategy of cognitive reappraisal and the response-focused strategy of expressive suppression in samples of undergraduates. Cognitive reappraisal was operationally defined as reframing one's thoughts surrounding a particular situation in such a way as to change the eventual response to that situation. An example might be the reframing of setbacks at school or work as learning experiences (i.e., adopting a growth mindset) rather than as examples of personal failure in order to mitigate the negative affect that can accompany a fixed mindset. Expressive suppression was defined as restraining the expression of an emotion (e.g., controlling one's facial expressions in order to mask one's emotions from others in social contexts). The

researchers constructed the Emotion Regulation Questionnaire (ERQ), consisting of a reappraisal subscale and a suppression subscale. Each subscale contained several items used to assess the use of the respective strategy in general as well as more targeted statements regarding the use of these strategies to manage either positive or negative emotions. As hypothesized, the reappraisal subscale was associated with a greater capacity for management of negative moods in particular, while the suppression subscale was associated with more negative assessment of emotions, lack of experiential clarity, and a lesser sense of one's ability to repair negative moods in particular. Reappraisal was also associated with more frequent experience of positive emotions and less negative emotion, while the opposite was true for those who reported habitually suppressing emotional expression. Further studies in the series also found that reappraisal and suppression had differential effects on social functioning and general measures of well-being. Overall, the studies paint a picture of these two strategies in which habitual use of cognitive reappraisal is found to be more adaptive (i.e., associated with greater markers of well-being), while habitual use of expressive suppression appears less adaptive and predicts lower indices of emotional, social and overall wellness.

Subsequent studies of emotion regulation through music have adopted the framework suggested by Gross & John (2003) and have utilized the ERQ to assess participants' emotion regulation tendencies. Chin & Rickard (2013) conducted a questionnaire study with the hypothesis that an individuals' habitual use of either cognitive reappraisal or expressive suppression would mediate the relationship between music use and various well-being outcomes. Adult participants ($N = 637$) between the ages of 20-58 completed a variety of measures: (a) the ERQ; (b) the Music Use

Questionnaire (MUSE; Chin & Rickard, 2012), a multi-faceted measure of musical engagement; (c) the short form of the Positive and Negative Affect Schedule (PANAS; Thompson, 2007); (d) the Mental Health Continuum - Short Form (MHC-SF; Lamers , Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2012); and (e) the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The authors performed separate analyses for each well-being outcome with musical engagement, operationalized using the MUSE, serving as the independent variable and ERQ subscale scores as the mediator. Although some styles of musical engagement (e.g., musical engagement for social connection) did directly predict various outcomes, it was found that the use of music for cognitive and emotional regulation did not directly predict wellbeing outcomes; however, the use of music for cognitive or emotion regulation did significantly predict well-being outcomes indirectly via the strategy of reappraisal. Relationships between other motivations for musical engagement such as engaged production and social connection and negative well-being outcomes were found to be partially mediated by habitual use of the strategy expressive suppression. Furthermore, these authors found evidence of both complementary and competitive mediation, indicating that there were likely variables in the study that may have influenced these relationships (and well-being in general) that had not been considered. Overall, however, the results of this study suggest that habitual use of certain emotion regulation strategies may mediate the effects of various forms of musical engagement on various well-being outcomes.

Coping is a form of affect regulation specifically targeted at the management of stress responses. Coping can also be distinguished from other forms of affect regulation via its temporal dynamics; coping tends to involve extended periods of responding to

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stressful life circumstances, such as workplace stressors, and life events such as bereavement or personal illness (Gross, 2014). Like emotion regulation, coping is assumed to involve the use of strategies which tend to be subsumed under three specific styles. Problem-focused coping attempts to modify or minimize the effects of the stressor, whatever it may be. Emotion-focused coping focuses on managing the negative emotional responses that accompany stressful life circumstances. Finally, avoidance/disengagement coping involves ignoring or otherwise avoiding dealing with a stressful situation (Carver, Scheier, & Weintraub, 1989).

In a study of Canadian adolescents ($N = 418$), Miranda & Claes (2009) explored relationships among music uses, depression, and coping strategies via music listening. The authors had respondents complete a researcher-designed, 10-item questionnaire asking them to rate (on a 5-point scale from "never" to "always") the degree to which they engaged in music listening to enact various forms of coping. Items completed the statement, "When I am stressed by problems at school, with friends and family, I listen to my favourite music to…" and responses represented problem-focused coping (e.g., "help myself reflect better"), emotion-focused coping (e.g., "help myself gain more positive emotions"), and avoidance/disengagement coping (e.g., "avoid thinking about my problems") strategies. Participants also completed a French language version of the Beck Depression Inventory (Bourque & Beaudette, 1982) to assess depressive symptoms. Correlational and regression analyses revealed differential relationships among depression and the different styles of coping via music listening, and also found differences on the basis of gender. Problem-oriented coping was negatively associated with depression levels, while avoidance/disengagement was positively associated with

depression levels in those identifying as female. Emotion-oriented coping via music listening was found to be positively associated with depression severity in those identifying as male. These results echo those found in the emotion regulation literature which have found that different approaches to regulation are associated with different measures of wellbeing.

Larsen (2000) has compared mood regulation to a feedback loop, not unlike a thermostat, in which an assessment of one's current mood state is compared to one's desired mood state. Where discrepancies exist, the individual will take steps, via mood regulatory strategies and mechanisms, to correct that discrepancy. Although Larsen emphasizes that each person's desired mood state may vary, theories of mood regulation tend to assume that people's general motivations are to minimize negative moods and maximize positive ones.

A significant amount of research on mood regulation with music has rested on the framework provided by Mood Management Theory (MMT; Zillmann, 1988a, 1988b, 2000). This theory proposes that individuals will choose to consume media (e.g., music, television, film) for the purposes of regulating their moods. MMT's ideas about mood regulation are in part inspired by Cognitive Dissonance Theory (Festinger, 1957) and its ideas regarding message consumption and avoidance. Like MMT, Festinger's theory is one of selective exposure; he posited that people deliberately avoid messages that conflict with existing beliefs and attitudes because that conflict produces discomfort. This idea requires the assumption that individuals can anticipate their reactions to certain stimuli and behave accordingly (Zillman, 1988a, p. 327). Zillmann described cognitive dissonance theory as "a special case of mood-management theory" because "the

experience of dissonance may be construed as a bad mood that is produced by exposure to counter-attitudinal persuasive messages" (Zillmann, 1988a, p. 329). MMT's most basic assumption is that individuals are generally motivated to attain and maintain positive affect, and that the discomfort of negative moods ought to drive an individual to seek relief (Zillmann, 1988b).

A second fundamental premise of MMT, the theory of affect-dependent stimulus arrangement (Zillmann & Bryant, 1985), posits that the desire to prolong positive and improve negative moods will move individuals to arrange their stimulus environments to accomplish these goals. Media consumption offers an attractive option for the re-arrangement of the stimulus environment because it brings representations of different environments to the individual. Due in great part to technology, finding and consuming media is fast and requires very little effort on the part of the consumer (Zillmann, 1988a). MMT posits that strategies for using media to regulate mood are acquired via operant learning, that those pieces of music that affected mood positively at one point are more likely to be chosen again in the future.

Zillmann (1988a; 1988b) suggested that media of varying forms and genres possess broader properties that might account for their influence on mood. He referred to these properties as excitatory potential, absorption potential, behavioral/semantic affinity, and hedonic valence. The excitatory potential of a stimulus describes its effect on arousal. Media high in excitatory potential is highly stimulating, while that low in excitatory potential might be described as calming or relaxing. Music therapy literature has found that music can affect a significant decrease in arousal due to stress (Pelletier, 2004), while other research has found that certain music is also capable of heightening emotional

arousal, particularly when it is associated with pleasure (Salimpoor, Benovoy, Longo, Cooperstock, & Zatorre, 2009). Both hypoarousal (e.g., boredom) and hyperarousal (e.g., stress) are generally considered noxious states that individuals, according to MMT, should be motivated to regulate (Bryant & Zillmann, 1984). Absorption potential refers to the capacity of a stimulus to engage attention. Moods are maintained in part due to the rehearsal of cognitions that serve to reinforce affect (Hollon & Kendall, 1980), and engaging with highly absorbing media may improve mood by disrupting these mood-perpetuating cognitions (Knobloch-Westerwick, 2006). The semantic affinity of a stimulus refers to the degree to which it is in line with the individual's present situation. If one is lonely, listening to music with lyrics describing loneliness or loss is likely to strengthen those mood-reinforcing cognitions, regardless of the absorption potential of the music (Zillmann, 1988b). Finally, hedonic valence refers to the degree to which a stimulus is pleasant or unpleasant. In terms of affect, emotions or moods usually perceived as experientially negative (e.g., sadness, anger) are referred to as negatively valenced, while more positive emotions and moods (e.g., joy) are said to be positively valenced (Zillmann, 1988a).

It has been argued that research should strive to parse out the specific effects of each of these media properties (e.g., Knobloch-Westerwick, 2006), but this has proven difficult. For one, these elements are very difficult to separate; media that is absorbing is also often arousing, and the effects of semantic affinity versus hedonic valence in the case of negative affect are difficult to discern (Reinecke, 2017). Another issue has to do with valence and how it is defined. What one person finds aversive, another may find quite pleasant, and some have posited that the experience of aesthetic emotions is

fundamentally different from the experience of "real-life" emotions, such that individuals may find that music expressing negative emotions can be experienced as positive affect (Schubert, 1996). The problem of media valence has received a great deal of attention, with a significant body of work specifically dedicated to negatively-valence (i.e., sad) music (Garrido, 2017).

MMT makes very specific predictions about the kinds of media people are likely to favour for mood repair. First, MMT predicts that people in noxious states of arousal (e.g., stressed out, bored) should be motivated to return to a state of "excitatory homeostasis" (Zillmann, 1988b, p. 241) and should therefore choose media that is the opposite of their current state in terms of its excitatory potential. A second prediction has to do with mood valence; if one is in a state of negative affect (e.g., sadness, anger), MMT predicts that individual will choose media that is absorbing, positively valenced (relative to the current affective state), and low in semantic affinity to their present situation (Zillmann, 2000). Some music literature appears to support these predictions. In an experimental study, Knobloch and Zillmann (2002) found that participants who had been induced into a negative mood chose to listen to high energy, joyful music in the post-mood-induction interval to a greater extent than participants in positive or neutral moods. Zavoyskiy et al. (2016) found that happy music appeared to improve sad moods in their participants. Studies by Thompson, Schellenberg, and Husain (2001) and Husain, Thompson, and Schellenberg (2002) found that the people in their samples showed a clear preference for the most upbeat, "happiest" sounding music, results which some have suggested are in line with MMT in that they support the idea that people generally like to consume positively valenced media that is likely to make them feel good (Garrido, 2017).

A growing body of evidence, however, has challenged MMT's predictions regarding the specific characteristics of media chosen for specific mood-related purposes. Results of investigations of uses of sad music (e.g., Garrido & Schubert, 2011a) indicate that some people experiencing negative moods show a preference for choosing mood-congruent music. Knobloch (2003) referred to this as the problem of "down-bringing content" (p. 234). Knobloch & Zillmann (2003) found that young people who were romantically disenchanted or lonely showed a clear preference for "love-lamenting" music, challenging MMT's ideas regarding the semantic affinity of media chosen for mood repair. Likewise, Gibson et al. (2000) also found that young people experiencing varying degrees of loneliness gravitated toward mood-congruent music. Hunter et al. (2011) found that participants in happy and neutral moods preferred happy-sounding over sad-sounding music, but that participants in sad moods did not display this preference. Inconsistent results regarding the choice of mood-congruent versus mood-incongruent music presents a significant challenge to MMT. In an effort to address these inconsistencies, researchers have offered a number of possible explanations for this apparently counter-hedonistic behavior.

Garrido (2017) has suggested that there may be a difference between music's short term and long term effects on mood, that the original emotional impact of the music and its subsequent long-term effects may not be the same. It has further been suggested that people may not only be cognizant of this, but may deliberately postpone gratification with an eye toward long-term benefit (Zillmann, 2000). Saarikallio & Erkkilä (2007) found that adolescents reported engaging with music that made them feel worse at first, but that they believed this would help them feel better eventually. The choice of mood-

congruent versus mood-incongruent music may reflect the chosen mood regulation strategy. Saarikallio (2008) found support for the idea that music use may reflect strategies like diversion, meaning "forgetting unwanted thoughts and feelings with the help of pleasant music" and discharge, which is "about emotional disclosure, releasing anger or sadness through music that expresses these emotions" (p. 293), a finding that was echoed in results obtained by Van den Tol and Edwards (2013, 2015).

The choice of music that initially serves to maintain or worsen a negative mood might also reflect societal expectations and feelings of appropriateness. Taylor & Friedman (2015) found that participants in sad moods did not so much show a preference for sad music as an aversion to explicitly happy music, and when asked about their choices, participants reported that they felt that listening to happy music would be inappropriate and therefore ineffective. There are also instances in which prolonging a negative mood is deemed useful by the individual. It could be argued that these are also examples of delayed gratification. Prolonging a negative mood in order to conform to societal expectations or to motivate certain behaviors, if the results are in line with what the individual expects, should presumably eventually produce positive feelings (Zillmann, 2000).

It is also possible that the choice of mood-congruent music when experiencing negative affect may reflect maladaptive regulation strategies. For example, McFerran & Saarikallio (2014) found that those suffering the greatest mood disturbances showed the greatest tendency to feel worse after music listening, and Garrido et al. (2016) found that participants with tendencies to depression were more likely to choose music that reinforced their negative moods, despite anticipating that the music would be effective in

mood repair. Such findings suggest that certain habitual ways of responding to negative affect may moderate relationships among mood, mood repair goals, and music listening choices.

The most comprehensive music-specific model of affect regulation is Van Goethem and Sloboda's (2011) Goals, Strategies, Tactics, and Mechanisms (GSTM) framework. These authors have asserted that a comprehensive model of affect regulation through musical engagement needs to take into account the interactions among four levels of analysis: (a) Goals refer to the aims of the regulatory process (e.g., to reduce negative feelings, to increase positive feelings); (b) Strategies refer to the plan of action taken to achieve regulatory goals (e.g., distraction, reappraisal); (c) Tactics refer to the activity through which regulatory endeavors will be realized (e.g., listening to music, taking a walk); and (d) Mechanisms refer to the psychological processes through which one's affective state is either maintained or altered (e.g., Juslin and colleagues BRECVEMA mechanisms, like episodic memory or emotional contagion; Juslin, 2013; Juslin, Liljeström, Laukka, Västfjäll, & Lundqvist, 2011; Juslin & Västfjäll, 2008). In their original study proposing this framework, Van Goethem and Sloboda conducted a pair of diary studies to investigate the use of particular strategies in musical affect regulation. In the first study, 44 adult participants were asked to fill in a questionnaire each time they listened to music that they had selected. They were asked whether they had deliberately chosen music to alter or maintain an existing affective state, and if so which strategies they had employed to achieve these goals and whether that strategy had been successful. Parts of the questionnaire were open-ended in which participants could fill in a text response of their own choosing, and in other parts, participants were asked to

choose from a set list of options. The one-week data collection period culminated with a structured interview in which participants were asked to elaborate on their diary responses. Results indicated that participants reported the use of six specific regulation strategies: relaxation, distraction, active coping, introspection, venting, and rational thinking. A follow-up study of 60 participants found that the most often chosen strategy was relaxation, followed by distraction and active coping, while introspection, venting, and rational thinking were used far less frequently.

In a subsequent study based on this framework, Sakka & Juslin (2018) compared depressed and non-depressed individuals with regard to their use of music for emotion regulation in everyday life. Participants ($N = 77$) between 19–65 years of age responded to a questionnaire measuring emotion regulation in terms of the prevalence of various regulation goals, strategies, and mechanisms. Results indicated that the most frequently reported goal was to enhance positive emotions. Music use seemed to serve a number of different regulation strategies, including cognitive strategies such as reflection and reappraisal. Contrary to hypotheses, however, there were few differences between depressed and non-depressed listeners in terms of the stated frequency of use of presented strategies (reappraisal, suppression, distraction, acceptance, discharge, physical modulation, rumination, and reflection), with the most common regulation strategy reported being discharge.

When music listening is associated with certain adaptive emotion regulation strategies, such as distraction, such behaviors appear to have a positive relationship with emotional well-being. Music listening may also, however, become a component of maladaptive affect regulation. In particular, the choice of listening to mood-congruent

music while experiencing negative affect may, for individuals with certain personality traits, reflect maladaptive regulation strategies and habitual ways of responding to negative affect that have the potential to negatively impact emotional wellbeing.

The Role of Rumination in Affective Responses to Music Listening

A great deal of research into music listening and its emotional impact indicates that individual dispositions can affect music listening choices and subsequent effects. Rumination, in particular, has emerged as a potentially important influence on the ways people use music in day-to-day life and the emotions elicited in everyday music listening scenarios. Nolen-Hoeksema et al. (2008) define rumination as "a mode of responding to distress that involves passively focusing on symptoms of distress and on the possible causes and consequences of these symptoms" (p. 400). Rumination may be considered as a behaviour (i.e., one can actively ruminate) or as a personality characteristic, referred to as trait rumination, which is marked by the tendency to engage in ruminative behaviors (Nolen-Hoeksema, 1991; Trapnell & Campbell, 1999). The construct of trait rumination has been operationalized in various ways, yet each of these conceptions share a focus on repetitive thought that is negative in nature, and the tendency to habitually dwell on thoughts, feelings, and circumstances without the benefit of adaptive problem-solving (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Various measures of trait rumination exist, including the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), the Cognitive Emotion Regulation Questionnaire (Garnefski, Kraaij, & Spinhoven, 2001), the Ruminative Response Scale (Treynor, Gonzalez, & Nolen-Hoeksema, 2003), and the Self-Reflection and Self-Rumination Scale (Elliott & Coker,

2008). These measures often correlate quite highly with one another (Nolen-Hoeksema et al., 2008; Samtani & Moulds, 2017).

Research results have associated rumination with various mental health and general well-being issues. Some studies (e.g., Nolen-Hoeksema, 2000; Spasojević & Alloy, 2001) assessing general ruminative tendencies have revealed predictive relationships with the onset and severity of depression and anxiety symptoms. For example, Nolen-Hoeksema (2000) assessed relationships among both self-report and clinical measures of anxiety and depression in adult participants ($N = 1,132$) during two separate in-person sessions, spaced one year apart. The self-report measures completed included the Beck Depression Inventory (BDI; Beck & Steer, 1984), the Beck Anxiety Inventory (BAI; Beck & Steer, 1988), and the Response Style Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1993). Clinical assessments, conducted by a trained interviewer, included the Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbon, & Williams, 1995), the Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960), and other behavioural assessments. Results indicated that participants whose SCID scores indicated major depressive disorder also scored higher on the RSQ in both sessions and that ruminative tendencies assessed at session one predicted diagnostic status at the second session. Post hoc analyses further revealed that the rumination scores of those whose depression remitted between session one and two were significantly lower than those who continued to experience depression at clinical levels. RSQ scores between sessions one and two were highly correlated ($r = 0.67$), supporting the idea that ruminative tendencies are a fairly stable disposition.

Spasojević & Alloy (2001) examined a possible predictive relationship between trait rumination and episodes of depression among first-year university students ($N = 137$). In an initial session, participants completed a number of measures intended to assess several identified risk factors for depression; participants were subsequently categorized as either high or low risk. Participants also completed the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991) to assess their general ruminative tendencies, as well as an assessment of past major depressive episodes. After this initial session, researchers followed up with participants every six weeks for the next two and a half years, assessing participants for the onset of depressive episodes and level of depressive symptomology at each session. Analyses revealed significant predictive relationships among rumination, private self-consciousness, and neediness ($p < .05$), and between rumination and negative cognitive styles, dependency, self-criticism, and number of past major depressive episodes ($p < .001$). Each of these relationships remained significant even after controlling for cognitive risk status and current depressive symptoms. Further mediation analyses were conducted separately for each risk factor to examine whether rumination mediated the relationship between each of the risk factors and an assessment of prospective major depressive episodes. With the exception of neediness, having a ruminative disposition was found to partially mediate the relationship between each risk factor and the likelihood of experiencing depression at some point during the data collection period.

Experimental studies involving induced rumination have provided evidence for causal connections between rumination and well-being outcomes. In these studies, researchers actively induce rumination in participants and then assess post-induction

outcomes or behaviors. This induction often follows the procedure set out by Nolen-Hoeksema & Morrow (1993) and involves asking participants to specifically "focus on the meanings, causes, and consequences of their current feelings" (Nolen-Hoeksema et al., 2008, p. 402) for a designated period of time. Such induction studies (e.g., Lyubomirsky, Tucker, Caldwell, & Berg, 1999; Nolen-Hoeksema & Morrow, 1993) have specifically highlighted the interaction between rumination and mood, with results indicating that induced rumination serves to worsen a negative mood for those already experiencing negative affect, but has much less of an effect on those in neutral or positive moods (Lyubomirsky et al., 1999; Nolen-Hoeksema & Morrow, 1993). For example, Lyuobomirsky et al. (1999) found that participants in a negative mood who were induced to ruminate tended to recall more negative past memories, spend more time spontaneously talking about current problems in their lives, and made less positive predictions about the future. When participants were induced to ruminate on their negative moods, they tended to feel more helpless and less equipped to solve their problems, and when confronted with a solution to one of their issues, dysphoric ruminators showed a decreased level of motivation to actually implement the solution.

Prior investigations of rumination within the music literature have primarily operationally defined the construct using the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999). This measure is comprised of two subscales: an 11-item subscale designed to assess ruminative tendencies, and a 12-item subscale designed to assess reflection, an orthogonal trait that encompasses a more adaptive form of self-focus. In developing the measure, Trapnell & Campbell (1999) were responding to what they referred to as the "self-absorption paradox" (p. 287) they perceived as inherent in the

literature on private self-consciousness (PrSC; Fenigstein, Scheier, & Buss, 1975). The researchers were concerned with resolving prior literature which indicated that private self-consciousness, described as the tendency to focus on one's own thoughts and feelings, was strongly associated with both negative and positive well-being outcomes, as well as with the orthogonal personality constructs Neuroticism and Openness to Experience. Trapnell & Campbell suggested that this apparent contradiction might be resolved by delineating two different forms of turning inward, specifically, a ruminative form associated with negative affect and self-concept, and a reflective form driven by "epistemic curiosity" (p. 287). Construct validity of the RRQ was tested through evaluation of the subscales' relationships with the personality dimensions described by the Five-Factor Model of Personality (Costa & McCrae, 1985). The rumination subscale correlated highly with markers of Neuroticism, while the reflection subscale correlated highly with markers of Openness to Experience. Associations among the scales and other Big Five constructs were near zero, lending support to the researchers' hypothesis that it is the motivation driving the self-focus (i.e., rumination versus epistemic curiosity) that may, when delineated, explain relationships between private self-consciousness and both positive and negative well-being outcomes. Trapnell & Campbell have reported high levels of internal reliability for the rumination subscale ($a = .90$).

Ruminative behavior within the context of music listening has become an area of interest among some music researchers (e.g., McFerran & Saarikallio; 2014; Saarikallio & Erkkilä, 2007). For example, McFerran & Saarikallio (2014) conducted a qualitative study intended to probe young people's beliefs about the mood-improving effects of music listening. The researchers interviewed 40 young people between the ages of 13 and

19, many of whom had struggled with mental health issues such as depression and anxiety, about their music listening habits and beliefs about the benefits of musical engagement. Some of the participants reported using music listening to fuel repetitive dwelling on negative thoughts and feelings, a behaviour often accompanied by withdrawal from other people. Participants acknowledged that this behaviour often had the effect of intensifying or prolonging negative moods and emotions. Such participants also tended to show poorer markers of mental health overall. These findings echoed those of Saarikallio & Erkkilä (2007), whose adolescent participants also reported that music listening sometimes fuelled cycles of dwelling on negative thoughts, feelings, and events.

Because rumination is associated with a particular attraction to negatively valenced stimuli (Nolen-Hoeksema et al., 2008), research into rumination's relationships with music listening and mood has accordingly focused on how the emotional valence (happy/sad) of selections chosen for music listening may have differing outcomes for those with and without ruminative tendencies. Researchers (e.g., Chen et al., 2007; Garrido & Schubert, 2011a, 2013, 2015a, 2015b) have investigated hypotheses regarding ruminators' attraction to sad music in particular, a tendency that may be a maladaptive manifestation of their general attraction to negative stimuli. However, a review of the extant research reveals some conflicting findings and the need for further investigation of this variable.

Chen et al. (2007) hypothesized that ruminators and non-ruminators would make different choices regarding the emotional content of music selected for listening. This experimental study examined the music listening choices of high and low ruminators (*N* = 252) following a mood induction. Negatively valenced or emotionally neutral video

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clips were shown to participants to induce either a sad or a neutral mood state. Half of the participants in each group were instructed to focus on their mood state through a series of prompts. Participants were then offered a selection of researcher-chosen songs, selected to represent both "sad" and "joyful" emotional content, and given eight minutes to listen to a selection of their choice. Data analyses revealed both a main effect of rumination as well as a significant two-way interaction between mood and ruminative tendencies. Ruminators in the sad mood condition spent significantly less time listening to joyful songs than those in the neutral condition, whereas non-ruminators exhibited similar music listening patterns in both conditions. Analyses of minute-to-minute data for sad participants revealed a significant interaction between rumination and time. The difference between high and low ruminators in amount of listening time spent on joyful versus sad music was insignificant across the first few minutes of listening, but became significant after approximately four minutes of listening, indicating that non-ruminators showed an increase in preference for joyful music over time that was not found in ruminators, whose preferences remained more stable over time.

Garrido & Schubert (2015b) investigated whether rumination would predict listener mood effects during sad music listening among university students. Participants ($N = 175$) were asked listen to one self-selected piece of sad music, and one self-selected piece of happy music. Participants completed a variety of measures in advance of the listening session, including the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), the Profile of Mood States (POMS; McNair et al., 1971), the absorption subscale of the Absorption, Intellectance, and Liberalism Questionnaire (AIT; Glisky & Kihlstrom, 1993), the Like Sad Music Scale (LSMS; Garrido & Schubert, 2013), and a

researcher-designed questionnaire intended to assess personal perceptions of the effects of sad music listening (Predicted Effect of Sad Music; PESM). Mood valence was assessed in terms of four dimensions: Calm/Anxious, Tired/Energetic, Sleepy/Alert, and Negative/Positive. Baseline mood measures were assessed prior to the listening session. Participants were then asked to listen to a self-selected piece of sad music, after which mood measures were again taken. For analysis purposes, the researchers grouped participants by rumination scores, delineating a high rumination group and a low rumination group split according to the median rumination score. Analyses of scores from the Predicted Effects of Sad Music questionnaire found that items encompassing both positive and negative effects were rated significantly higher by high ruminators than by low ruminators, supporting the notion that some ruminators predict they will benefit from sad music listening. Rumination was found to be a significant predictor of high scores on the Like Sad Music Scale, indicating an attraction to sad music listening in general. Results also indicated that both high and low ruminators experienced an increase in POMS depression scores; however, an interaction with rumination was also detected, indicating that high ruminators and low ruminators experienced different effects of sad music listening.

Garrido et al. (2016) conducted a longitudinal, mixed-methods study of undergraduate students ($N = 177$), each of whom was randomly assigned to either a happy music listening group or a sad music listening group and given access to either a happy or a sad researcher-created playlist. Both happy (seven songs) and sad (six songs) playlists were constructed by the researchers and contained songs that spanned a variety of genres. Mood measures were assessed as a total Mood Disturbance Index using the

short form of the Profile of Mood States (POMS-Short; Curran, Andrykowski, & Studts, 1995), and participants also completed the rumination subscale of the RRQ (Trapnell & Campbell, 1999) prior to the initial experimental session. The highest and lowest quartile scores on the rumination scale were used to create high and low rumination groups respectively. At the initial session, participants were asked to listen to their assigned playlist in its entirety, with mood measures taken before and after listening. Participants were then provided with a link to access their playlist online and asked to listen to it on their own at least twice a week for the during of the four week data collection period. Participants were instructed that they were not obligated to listen to the playlist in its entirety, but could pick and choose songs from it as they saw fit. Listening diaries kept by participants recorded which songs they chose to listen to and why. At the conclusion of the experiment, data from the sad music group revealed that high ruminators' mood index scores after individual listening sessions were significantly lower than low ruminators, indicating a more negative outcome. No such effect was detected in the happy listening group. Furthermore, content analysis of listening diaries found a significant relationship between rumination and the number of words referring to death. Further thematic analysis of listening diary data revealed that participants reported that the music called forth negative thoughts and memories, and that when already in a negative mood, listening could result in the participant engaging in ruminative thinking, which sometimes led to further sad music listening. However, participants also described resisting these effects of listening by choosing to listen to certain songs and not others, by curating the order in which they listened to the songs, or by following their prescribed playlist with music more in line with their affective goals. They also described listening to the music

in situations in which they would be distracted, either by a particular activity or the presence of other people, and that this helped counter any unintended effects.

Garrido & Schubert (2015a) investigated trait rumination's potential influence on the mood effects of music listening in Australian university students (N = 335). Participants completed a selection of questionnaires that included the RRQ (Trapnell & Campbell, 1999), measures of Neuroticism and Openness via the Big Five Aspect Scale (BFAS; DeYoung, Quilty, & Peterson, 2007), a subscale assessing trait absorption from the Absorption, Intellectance and Liberalism Questionnaire (AIT; Glisky & Kihlstrom, 1993), and the Profile of Mood States (POMS; McNair et al., 1971). Participants completed an initial assessment of mood state, and then were invited to listen to a piece of self-selected music "that makes them (or is likely to make them) sad" (p. 247). Mood measures were then collected again to assess any change in mood post-listening. Participants were then invited to complete a questionnaire assessing their perceptions of effects on mood as a result of music listening. This researcher-constructed measure was used to assess potential positive and negative outcomes of listening. Finally, participants were asked to choose and listen to a piece of music they anticipated would make them feel happy, after which time mood measures were completed one final time. Analyses of personality measures and baseline scores on the mood valence dimension revealed that people with high scores in rumination were in a more negative mood at baseline than those lower in this trait. Rumination scores were positively correlated with scores on the Tension and Depression subscales of the POMS, as well as with a total Mood Disturbance Index score. Participants reporting the highest and lowest 10% of rumination scores were assigned to a high rumination group (n = 33) and a low rumination group (n

= 33) respectively. Mixed-design ANOVA analyses revealed no significant differences in depression and mood disturbance index scores between high and low ruminators after sad music listening. However, while both groups experienced decreases in depression and mood disturbance index scores after happy music listening, those high in rumination experienced a greater decrease in these measures than low ruminators, indicating that high ruminators experienced different effects of happy music listening than low ruminators. These results highlight the potential need to expand research focus from primarily sad music listening to music with a wider range of emotional content.

Larwood & Dingle (2018) investigated whether music listening while in a sad mood state would result in an improvement of mood regardless of whether the music was self- or experimenter-selected. The researchers further hypothesized that participants' ruminative tendencies, assessed using the RRQ (Trapnell & Campbell, 1999) would moderate the relationship between sad music listening and the mood outcomes of music listening. Participants were randomly assigned to one of three listening groups. The first group was instructed to choose a piece of music from their own libraries. The second group was given a piece of experimenter-selected sad music, while the third group served as a control group and heard no music at all. The researchers used video clips to induce either a sad or neutral mood in their participants ($N = 128$), rather than assessing the participants' naturally occurring baseline mood. Degree of experienced sadness was assessed using the Depression subscale of the Profile of Mood States – Short Form (POMS-D-SF; Shacham, 1983). Mood measures were completed at three points in time: baseline, post-mood induction, and post-listening. Participants were also asked to rate the degree to which they perceived the song they had listened to as sad. Analyses revealed

that all three groups experienced mood improvement post mood induction, whether they were listening to music or not, but that the self-selected music group and the control group returned to baseline sadness levels, while those in the experimenter-selected music group indicated slightly higher levels of sadness at the end of the experiment than at baseline. These results lend support to the idea that self-selected music may be more effective for mood repair than music chosen by others. Rumination was not found to moderate this association for participants in any of the three groups, nor was rumination related to the degree of perceived sadness in either the self-selected or researcher-selected music. In contrast, a subsequent study by Larwood & Dingle (2021) did find a moderating effect of rumination. This online study included a similar mode of mood induction and a directed listening session in which participants were instructed to listen to a piece of sad music which they themselves had pre-selected. Degree of sadness experienced was assessed with the sadness items from the Discreet Emotion Questionnaire (Harmon-Jones et al., 2016), which was administered after mood induction and again after sad music listening. Results indicated that participants experienced increased sadness after a period of sad music listening and that the extent to which sadness scores changed from pre- to post-listening was moderated by trait rumination. People high in rumination were additionally more likely to experience musical entrainment, select a song with conditioned responses and associated memories, as well as experience emotional contagion while listening. However, when several key BRECVEMA mechanisms for elicitation of music-evoked emotion were added to the prediction model, this moderating relationship was no longer significant.

The extant literature investigating the role of rumination in music listening and listener mood state has suggested a predictive role for rumination on well-being outcomes. However, much about the relationships among rumination, music valence, and listener mood valence remains unclear. While some previous research has found rumination to have a moderating effect on the mood outcomes of sad music listening (Garrido & Schubert, 2015b; Larwood & Dingle, 2021), other research has found no such interaction (Garrido & Schubert, 2015a; Larwood & Dingle, 2018). These conflicting results may be due in part to the methodologies selected for these investigations, which have relied primarily on questionnaires to gather retrospective reports, or laboratory experiments utilizing researcher-selected excerpts for music listening.

Research Methods: Music Listening & Affective Response

The extant research into relationships among personal music listening, individual variables, and listener affective response has often been conducted through the use of retrospective reports collected through surveys, or laboratory experiments structured by researchers, with some investigations employing both procedures. More recently, investigators have begun utilizing Experience Sampling Methodology, which shows great promise as a way of conducting ecologically valid research within this field of inquiry.

Many studies of everyday music listening have been conducted using survey methods (e.g., Chamorro-Premuzic & Furnham, 2007; Groarke & Hogan, 2018). These designs typically ask participants to recall and describe how they habitually engage with music in their daily lives and the outcomes of their listening experiences. Survey studies generally involve administering a number of psychometric scales and demographic

questionnaires, and then assessing the relationships among them using statistical techniques such as descriptive, correlational, and/or regression analyses. In order to investigate such potential relationships, a number of survey instruments have been developed to collect data regarding participants' uses of music, and specific employment of music for affect regulation.

The authors of the Uses of Music Inventory (UMI; Chamorro-Premuzic & Furnham, 2007) were responding to a need for a robust psychometric instrument that could be used to assess how various individual differences, specifically personality traits, may be associated with different motivations for music use. Items for this measure were designed based on a thorough review of prior literature as well as on themes that had emerged from a qualitative pilot study that had employed focus groups and interviews for data collection. The resulting 15-item scale was administered to 341 students from universities in the United Kingdom and the United States (241 female, 100 male). Each item in the scale featured a statement such as, "Listening to music is an intellectual experience for me," and respondents indicated their agreement with each statement on a five-point Likert-type scale from "strongly disagree" to "strongly agree." Data reduction in the form of principal components analysis subsequently revealed a three factor structure of motivations for music use: (a) emotion- or mood-related uses, (b) rational/intellectual uses, and (c) background uses. These factors were found to be correlated with one another, but not strongly, with Pearson's r coefficients ranging from -0.25 through 0.26.

Research employing the UMI has suggested that dispositional factors such as personality traits may predict various uses of music, although the findings from these

studies are far from definitive. Some studies have uncovered positive correlations between emotional uses of music and Neuroticism (e.g., Chamorro-Premuzic & Furnham, 2007; Chamorro-Premuzic, Swami, Furnham, & Maakip, 2009), dispositional negative affect (Getz, Chamorro-Premuzic, Roy, & Devroop, 2012), and experienced stress (Getz, Marks, & Roy, 2014). For example, participants in Chamorro-Premuzic & Furnham's (2007) study completed the UMI along with the following measures: (a) the Wonderlic Personnel Test (WPT; Wonderlic, 1992) as a measure of general intelligence; (b) the Typical Intellectual Engagement (TIE; Goff & Ackerman, 1992) designed to examine the degree to which a person enjoys intellectually demanding activities; and (c) the Neuroticism, Extraversion, Openness Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) to assess participants on the five dimensions of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. In addition to finding Neuroticism positively correlated with emotional uses of music, Conscientiousness and Extraversion were found to be negatively correlated with emotional uses. Results also indicated positive correlations between each of the variables of general intelligence, TIE, and Openess to Experience with cognitive uses of music.

Chamorro-Premuzic, Swami, et al. (2009) conducted an investigation of university students in Malaysia ($N = 227$), administering the UMI alongside the NEO-FFI. Data were assessed using structural equation modeling, with the three categories of music uses serving as endogenous variables and personality dimensions serving as exogenous variables. Analyses again revealed Neuroticism to be positively associated with emotional uses of music. Contrary to prior results, however, Extraversion was also found to positively predict emotional uses of music. The relationships uncovered in this

study were later replicated in a separate investigation of Spanish university students (Chamorro-Premuzic, Gomà-i-Freixanet, Furnham, & Muro, 2009).

Getz et al. (2012) investigated how uses of music related to trait affect and certain contextual variables, such as listening location and social listening context. South African adolescents ($N = 193$) aged 12 to 17 years completed the UMI, the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), and responded to several questions about music use, including information about physical and social listening environments. Results, obtained via structural equation modeling, revealed that dispositional negative affect positively predicted emotional uses of music, while trait positive affect was associated with both cognitive and background uses of music. Getz et al. (2014) explored relationships among perceived stress, optimism, musical training, uses of music, and music preferences in a study of South African university students ($N = 154$). Alongside the UMI, participants completed the following measures: (a) the Perceived Stress Scale (PSS; Cohen, Kamarch, & Mermelstein, 1994), a 10-item inventory in which participants indicate the degree to which they have recently experienced feelings of stress; (b) the 10-item Personal Attributes Optimism Survey (PAS; Scheier & Carver, 1985) which assesses a person's tendencies toward optimism; (c) one question regarding musical training, expressed in years; and (d) Rentfrow & Gosling's (2003) Short Test of Musical Preference (STOMP). Data analyses employed linear regressions to predict the three uses of music assessed by the UMI with stress, optimism, and years of musical training serving as predictor variables. Results indicated that emotional uses of music were positively predicted by both optimism and experienced stress, while cognitive uses of music were predicted by years of musical training and negatively predicted by optimism.

The results of studies that have employed the Uses of Music Inventory (UMI) suggest that dispositional factors such as personality traits may predict various uses of music. However, the UMI has been criticized as overly simplistic. Lonsdale (2019) suggested that an assessment of emotional uses of music were hindered by a lack of consideration of possible differences between the use of music for the regulation of positive versus negative affective states, a point that Chamorro-Premuzic, Swami, et al. (2009) also acknowledged may have contributed to conflicting results and weak correlation coefficients obtained in their study and others. Reliability of the three subscales of the measure has also come into question. In their original study, Chamorro-Premuzic & Furnham (2007) reported good reliability for each of the three subscales (M[emot], a = 0.78; M[cog], a = 0.85; M[back], a = 0.76). Subsequent studies however have not replicated this level of reliability. Chamorro-Premuzic, Swami, et al. (2009) initially found poor reliability for the three subsections of the UMI (M[emot], a = 0.56; M[cog], a = 0.61; M[back], a = 0.59), which prompted the authors to try to fix measurement errors in order to improve the subscales' reliabilities. Getz et al. (2012) found even more serious issues with subscale reliability. While the value obtained for the M[back] subscale was deemed acceptable (a = 0.60), values for the other two subscales were very low (M[emot], a = 0.25; M[cog], a = 0.23). The authors opted to perform their own exploratory factor analysis on measure items, which revealed that both M[emot] and M[cog] subscales contained one item each that did not fit well with the remainder of the items. The authors removed the ill-fitting items, leaving four items in each subscale rather than five. Cronbach's alpha for the amended subscales was slightly better, but still very low (M[emot], a = 0.34; M[cog], a = 0.26). Nevertheless, despite these

shortcomings, subsequent researchers who have created instruments used to assess uses of music have drawn items from the UMI, and used it to establish construct validity for their own measures.

Recognizing the need for a measure that would assess strategies specifically employed for the regulation of mood states using music, Saarikallio (2008) developed the Music in Mood Regulation scale (MMR). The scale was based on a theoretical model of music's mood-regulatory functions suggested by a qualitative study of music-driven mood regulation in adolescents (Saarikallio & Erkkilä, 2007). A grounded theory analysis of the data from this investigation suggested the existence of seven regulatory strategies: Entertainment, Revival, Strong Sensation, Diversion, Discharge, Mental Work, and Solace. For the initial version of the scale, seven items were created to represent each of the seven regulatory strategies. A sample of 1,515 adolescents from a variety of Finnish schools were administered the 49-item questionnaire, with data analyzed using confirmatory factor analysis through structural equation modeling. Assessments of factor loadings resulted in the removal of items with loadings below the selected threshold, resulting in a 40-item measure representing the seven different regulatory strategies. Construct validity was assessed by examining associations with general measures of mood regulation, such as the Negative Mood Regulation Expectancies (NRM; Catanzano & Mearns, 1990), the ERQ (Gross & John, 2003), the Mood Regulation Scale (Lischetzke & Eid, 2003), and the Trait Meta Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). Results indicated that associations between the MMR and general mood regulation measures were low, an expected result as the MMR was designed to assess a unique mood regulation tactic. An abbreviated version of the MMR

scale, the Brief Music in Mood Regulation Scale (B-MMR; Saarikallio, 2012), employs 21 items to assess the same seven regulatory strategies. This measure has also been validated and both the brief version and the full version have been employed in subsequent survey studies.

Thomson, Reece, & Di Benedetto (2014) employed the MMR in a survey study of university students ($N = 146$) intended to assess the relationships among Saarikallio's (2008) musical mood regulation strategies and psychopathology in young people. In addition to the MMR, respondents also completed the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1993), provided information about their musical training and background, and reported the number of hours per day they generally spent listening to music. Results of multivariate regression analyses indicated that, as a whole, music-related mood regulation predicted levels of psychopathology. High use of the mood regulation strategy Discharge (the venting of negative emotion through music) predicted high levels of depression, while use of Discharge and Diversion (distraction from worries and stress) strategies predicted high levels of anxiety and stress. The authors further assessed musical training as a possible moderator of the relationship between total MMR scores and depression, anxiety, and stress, but no significant interaction with musical training was found.

More recently, Saarikallio, Gold, & McFerran developed and validated the Healthy-Unhealthy Music Scale (HUMS; Saarikallio et al., 2015), a measure for assessing musical engagement as an indicator of proneness for depression in youth. Items were generated from literature reviews and emergent themes developed from grounded theory analyses of prior qualitative data (McFerran & Saarikallio, 2014). The original 21

items were piloted by a sample of adolescents ($N = 44$), some of whom ($n = 15$) had been clinically diagnosed with depression and were receiving treatment. After performing statistical analyses and analyzing open-ended feedback from participants and their teachers, the questionnaire was expanded to a 36-item format. This second version was then completed by a sample of university students ($N = 187$) who were asked to self-report depression symptoms using the depression subscale of the Kessler Psychological Distress Scale (K10; Kessler, Andrews, Colpe, et al., 2002). Items were categorized into two groups according to their correlations with self-reported depression scores, and exploratory and confirmatory factor analyses were performed. The final version of the HUMS involved two subscales, one whose items loaded onto a "healthy" uses of music latent factor which was associated with lower levels of depression, and an "unhealthy" uses of music factor that correlated positively with higher levels of depression. Construct validity was further established using other constructs related to depression, including the K10, the Mental Health Continuum Short Form (MHC-SF; Keyes, 2002) and the Rumination-Reflection Questionnaire (Trapnell & Campbell, 1999), which distinguishes between an adaptive (reflection) and a maladaptive (rumination) form of self-focus.

Survey studies of music listening have been particularly important for identifying dispositional elements, such as personality traits (Chamorro-Premuzic & Furnham, 2007) and emotion regulation tendencies (Chin & Rickard, 2013), that may influence or predict various aspects of the music listening experience, including affective outcomes. Another advantage to the use of surveys is the ability to investigate larger sample sizes than studies conducted using other research methodologies, owing to the fact that they are less labor intensive and may be administered online, increasing their visibility and

accessibility for a wider population (Hektner et al., 2007). However, this methodology has been criticized for its reliance on participant memory, which may be biased, particularly for emotional events. Concern has been raised that this bias may result in an over-reporting of emotional motivations for listening (Randall & Rickard, 2017a) or inaccuracy in describing the outcomes. Some studies, like one by Ptacek, Smith, Espe, & Rafferty (1994), have found that correlations between retrospective recall data and data from other sources (e.g., diaries, partner or caregiver assessment) are not always well correlated.

Research on affective responses to music in general has relied heavily on experimental or quasi-experimental research designs have been employed in music listening research to attempt to isolate effects attributable to certain variables. This body of research has investigated potential effects on music-induced emotion responses of the valence of the music chosen for listening, the listening context, and variables related to the listeners themselves. For example, Garrido et al. (2016) randomly assigned participants ($N = 177$) to either a Happy Listening Group (HLG; $n = 94$) or a Sad Listening Group (SLG; $n = 83$). Music playlists for each group were drawn from songs that had been most frequently nominated as 'happy' or 'sad' by participants in previous studies. Pre- and post- mood measures were administered as well as diaries of mood responses, which were analysed both qualitatively and quantitatively. Participants listened to their respective prescribed playlist for four weeks. Results mostly confirmed previous findings that happy music had a more positive effect than sad music on the mood of listeners in a single listening session, although sad music was not found to cause any significant increases in mood disturbance following a single session. As previously

discussed, longitudinal results (pre-experiment to post- experiment) indicated no significant mood differences as measured by the Profile of Mood States-Short (POMS-Short: Curran et al., 1995) were found for either the happy or the sad music group regardless of rumination scores, although qualitative analyses of listening diary data did reveal some associations with this variable.

Some experimental studies have involved the induction of a specific participant mood in order to investigate the effects on certain affective outcomes of music listening. For example, Knobloch & Zillmann (2002) created sets of musical selections that were either low or high in energy and joyfulness. Participants ($N = 116$) were induced into states of bad, neutral or good moods through differential feedback on a facial expression recognition task. Participants were then provided the opportunity to freely choose from the sets of musical selections. Results indicated that respondents in bad moods elected to listen to highly energetic-joyful music for longer periods than did respondents in good moods. Respondents' moods did not significantly differ across experimental mood conditions after music listening. Larwood & Dingle (2021) hypothesized that induced participant sadness would decrease from pre– to post–music listening and that rumination would not moderate this effect. Participants ($N = 386$) were first asked to identify an artist and song that was likely to make them feel sad. Participants completed a baseline measure of sadness (the Discrete Emotion Questionnaire; Harmon-Jones et al., 2016), watched a sadness induction video, completed a second assessment of sadness, listened to their selected song for 3 minutes, and completed a final assessment of sadness. Participants increased in sadness both following the sadness induction and after listening to the self-nominated sad song. The increase in sadness observed was additionally

moderated by rumination such that higher rumination predicted greater increases in sadness.

While these types of experimental studies provide the methodological control necessary to make causal inferences, they assert that control at the expense of ecological validity. Although experimental research can assess some of the contextual variables that may impact emotional outcomes of music listening, like mood at the onset of listening or particular qualities of the music itself, the lack of resemblance to everyday listening scenarios may render results less generalizable.

In order to assess the outcomes of music listening in more ecologically valid settings, researchers have turned to Experience-Sampling Methodology (ESM; Hektner et al., 2007). ESM is a longitudinal research methodology with data collection involving participants systematically self-reporting on their behaviours and experiences as they go through their everyday lives. As its name suggests, ESM is mainly concerned with people's experiences and how they think and feel about them, and therefore the data collected usually involves information regarding participants' thoughts, moods, activities, and social and physical environment. ESM may utilize interval-contingent, event-contingent, or signal-contingent data collection methods (Hektner et al., 2007). Interval-contingent sampling asks participants to complete self-report measures at regular intervals during the day. One concern with this procedure is the possibility that the anticipation of the data-collection time will affect participants' behavior. This concern may be addressed by employing a signal-contingent design in which participants receive a signal, delivered by electronic pager or smartphone application, at random times throughout the research interval as a prompt to complete self-reports. A third

methodology option is the event-contingent design, in which participants are asked to complete reports (known as Experience Sampling Reports or ESRs) whenever they engage in a certain activity. ESM has the potential to collect data regarding the frequency of particular behaviors and their motivations, as well as the effects of those behaviors, while minimizing recall bias (Hektner et al., 2007; Scollon, Prieto, & Diener, 2009). In contrast to one-time psychometric questionnaires, ESM allows researchers to examine the ways in which participants' behaviors vary from situation to situation and to examine the contextual influences on such behaviours (Scollon et al., 2009).

The first studies to use the terminology Experience-Sampling Methodology were those conducted by Csikszentmihalyi and colleagues (e.g., Csikszentmihalyi, Larsen, & Prescott, 1977) in the early 1970s, although the method's roots can be traced to numerous sources within the field of psychology (Larson & Csikszentmihaly, 1983), and researchers have been using diary methods for data collection since the beginning of the 20th century (Larson & Csikszentmihaly, 1983). ESM has been employed to investigate a wide variety of phenomena, including the experience of Post-Traumatic Stress Disorders (Chun, 2016), the experience of student engagement in blended learning environments (Manwaring, Larsen, Graham, Henrie, & Halverson, 2017), and loneliness and social media use (Reissmann, Hauser, Stollberg, Kaunzinger, & Lange, 2018). ESM has also been successfully employed to observe emotion dynamics and regulation in natural contexts (e.g. Carstensen, Turan, Scheibe, et al., 2011; Hill & Updegraff, 2012; Shahar & Herr, 2011; Yeung & Fung, 2012).

Experience Sampling Methodology has been used in music research to investigate relationships among music selection choices, individual listener differences, and

psychological outcomes of music listening (Greasley & Lamont; 2011; Juslin et al., 2008; North et al., 2004; Sloboda et al., 2001). For example Sloboda et al. (2001) utilized a signal-contingent design to investigate the extent to which music selection choice and psychological outcomes such as mood change are associated with participants' descriptions of the functions of music in particular contexts. Participants ($N = 8$) were given pagers and an experience diary to carry for a one-week data collection period and asked to answer a series of questions each time they were signaled. Signals were sent seven times each day throughout a one-week data collection period. Participants were asked to report on whether they were presently listening to music, or if they had heard music since the last time they were paged. They were also asked to provide information about where they were and what they were doing, as well as their motivations for engaging in their present activity. If they had been listening to music, they were asked to provide information about the music itself, including its source (e.g., radio) and style/genre, their motivations for listening, their social context during listening, and the impact of the music. Participants were also asked to "estimate mood states both before and after listening to the music" (p. 15). Follow-up interviews assessed the degree to which participants felt the data collection period represented a typical week. Results indicated that few listening episodes involved listening to music as the primary focus, with music listening mostly used as an accompaniment to other activities. Participants reported that the experience of music listening resulted in them feeling more positive, alert, and focussed, particularly when personal choice over the music was involved.

Greasley & Lamont (2011) compared the everyday music engagement experiences among listeners identified as having low, moderate, or high engagement with

music. Young adult participants ($N = 25$) were asked to report on what they were doing while hearing music (e.g., activities) and the functions/effects of music (e.g., reasons influencing music choices). Participants were sent text messages five times a day, for seven consecutive days, and were asked to fill out a response form each time they received a text. Reports included participants' location, current activity, and their reasons for engaging in the activity. For music episodes only, participants were also asked who they were with, the mode of music delivery, and the technology used in the listening episode. They were also asked to describe the music they were hearing using an open-ended response format. Results indicated that those who were more highly engaged were more likely to experience a greater number of effects of music listening and to report that music changed a specific mood than less engaged listeners. More highly engaged listeners demonstrated greater awareness of the effects of music on their mood, while less engaged listeners showed lower levels of awareness of this effect.

In order to streamline the process of collecting ESRs, Randall & Rickard (2013) designed the MuPsych smartphone application. The authors' aim was to create a mobile experience-sampling methodology (m-ESM) that would be capable of both prompting participants to complete reports, and serving as a data collection tool. The app enables the collection of real-time data regarding individuals' typical music listening habits in a minimally intrusive manner, and is designed such that all study materials, including letters of information, consent documents, and measures may be presented through the app. Originally designed as a music player, the most recent version of the application is designed to detect when a participant is listening to music on their device via their preferred method (e.g., streaming service, local storage, etc), eliminating the need for

participants to alter their listening behaviors for research purposes. The original app was designed for iOS systems, however the current version of the app is only available for Android devices.

For the purposes of piloting the app and assessing its appropriateness for data collection, Randall & Rickard (2013) had participants ($N = 101$) answer prompts both when they used their device to listen to music (music ESRs) and when no music was being played (non-music ESRs). Timestamp data revealed that ESRs were responded to quickly (median response time = 8 seconds) indicating the m-ESM method's appropriateness for assessing participants' current state and contextual variables at the onset of listening, minimizing recall biases. Timestamp data also revealed that participants spent an average of five minutes per day completing study-related materials, providing evidence for the minimally intrusive nature of data collection via the application. Participants completed a brief feedback survey after the fact and reported that the app was easy to use and did not significantly interrupt their daily routine.

Randall & Rickard (2017a) utilized the MuPsych app to probe motivations for listening among 327 young adult participants. Data collection took place over a two-week period. Each time a participant opened their music player and commenced listening, they were prompted to answer questions about their current mood (assessed on sliding scales indicating valence and arousal levels), their physical and social context (e.g., where they were, what they were doing, and who, if anyone, was listening with them), their motivations for listening, and the music they had chosen (e.g., the mood of the music). Participants selected their responses from a drill-down menu populated with options chosen from prior literature regarding motivations and situational factors related to music

listening, but were also given a free response option if they did not feel any of the given

options were adequate. Listening motivations were grouped into Emotional Reasons (e.g.,

"To improve my mood" or "To cope with a situation"), Social Reasons, (e.g., "To create

an atmosphere for socializing"), or Other Reasons (e.g., background music, focused

music listening, cognitive regulation). Results regarding motivations for music listening

proved to be very dependent on the participant's initial mood. When all music listening

episodes were considered, emotional motivations for listening accounted for only about a

third of all episodes. However, emotional motivations for listening accounted for

approximately two-thirds of episodes initiated when participants reported a negative

initial mood. A further study by Randall & Rickard (2017b) with a similar methodology

sought to evaluate a model of affective outcomes of music listening that would take into

account both individual dispositions (e.g., personality traits) and contextual variables

(e.g., mood, activity, etc). Using multilevel structural equation modeling, these authors

demonstrated that listener-level variables such as initial mood and the valence of the

participants' music selection contributed more to explaining the variance in outcomes

than did individual difference variables such as personality traits, gender, and general

measures of well-being.

Experience Sampling Methodology provides a level of ecological validity not

achievable with retrospective reports or laboratory studies. This method of investigation

minimizes the effects of recall biases and allows for data collection in naturally-occurring

environments. Furthermore, because ESM collects multiple data points from each

participant, it allows for intrapersonal comparisons not possible with one-time

questionnaires or interviews. The use of a smartphone app for collecting ESRs allows

participants to respond with the same device they are already using when they listen to music, thereby eliminating the need for extra materials such as pagers or paper listening diaries. Because the MuPsych app is designed to detect when a participant is using their device to listen to music, researchers are able to utilize an event-contingent design. Some prior ESM studies of music listening that have relied on signal contingent designs have found that listening was happening in only 40% of the events sampled (North et al., 2004).

However, Experience Sampling Methodology is not without limitations. Data collected in such uncontrolled environments rarely meet the criteria necessary for causal inferences. Larson and Csikszentmihalyi (1983) have suggested that triangulation of data may mitigate this limitation and lend credibility to any findings. ESM is somewhat labor-intensive for participants who are often required to respond multiple times daily over a period of days or weeks. As a result ESM has been associated with high participant attrition rates (Scollon et al., 2009). However, due to the advantages conferred by new technologies, the collection of data through smartphone applications now enable the research process to pose fewer inconveniences for participants, potentially helping to mitigate such attrition rates.

The literature reviewed above heavily suggests the need for relationships among trait rumination, initial mood valence, chosen music valence (i.e., sad/happy), and affective outcomes to be examined within the context of everyday music listening. Prior studies have, at times, produced conflicting results with regards to rumination's possible role in influencing outcomes of music listening, particularly when sad music listening is considered. However, no known study has examined these relationships in everyday

listening situations in which participants freely guide the listening process, including the selection of music. Furthermore, ESM research that has been conducted on music listening has emphasized the importance of the listener's context, including motivations for listening, in predicting outcomes of listening. The present study, therefore, was undertaken to explore these relationships and listening choices within their typically occurring contexts.

Chapter Three

METHODOLOGY

The goal of the present study was to investigate the relationships among trait rumination, a listener's initial mood, the emotional content of their chosen music, and valence change after a five-minute period of listening through data collected in ecologically valid, everyday settings. The current endeavor also aimed to add to the literature on everyday music listening by describing the music listening scenarios sampled in this dataset in terms of their physical and social contexts, listening motivations, frequency of affective change (assessed on both valence and arousal dimensions), and to explore possible relationships between musical background and music listening motivations and outcomes. An Experience-Sampling Methodology (ESM; Hektner et al., 2007) was employed in the service of these aims. Participants were asked to download the MuPsych smartphone application (Randall & Rickard, 2013), designed to detect when the smartphone user is listening to music and occasionally prompt participants to answer questions about their music listening experience. They were also asked to complete one-time questionnaires assessing participant demographics and musical background and experience, and a measure of trait rumination (see Appendix A). This data collection period lasted two weeks, over the course of which participants completed no more than four experience-sampling reports (ESR) per day.

Some of the data collected, including mood measures and context variables, was retained by researchers at the University of Jyväskylä. This data was incorporated into these researchers' larger model of personal music listening using smartphone devices.

Participants

Participants for the current study were 157 adults aged 17-61 (mean age = 21.54; *SD* = 5.5; three participants declined to give age information) currently residing in Canada or the United States. Closer examination of age information revealed that this sample was slightly skewed in favor of younger participants: 87.1% of participants in this sample were under the age of 25. Ninety-two participants were female, 58 were male, five participants were non-binary, and three participants preferred not to disclose information regarding gender.

Participants' musical backgrounds were varied. In terms of formal music training, 31.8% of this sample reported no formal musical training at all. A further 45.8% reported between one and five years of formal training, 15% had had between six and ten years of training, and 7.4% of the sample had more than ten years of formal training on a musical instrument. A further measure of musical background assessed, independently of formal musical training, the degree to which our participants had experience actively playing an instrument or singing: 22.9% indicated they never participated in active music-making activities, while 10.2% indicated they did so all the time. A more detailed description of musical background and experience can be found in chapter four.

Measures

Questionnaires

Data regarding participants' musical backgrounds was collected using the Musicianship Module of the Music Use and Background Questionnaire (MUSEBAQ; Chin, Coutinho, Scherer, & Rickard, 2018). This module, one of four included in this

questionnaire, is comprised of six questions designed to assess formal music training and frequency of involvement in active music-making activities. Questions one through three assess formal training and knowledge of musical structures. Amount of formal training, assessed in two separate questions as formal training in practice (i.e., on an instrument; Question 1) and formal training in theory (Question 3) is entered in years, while perceived knowledge of musical structures was assessed on a five-point scale (where 1 = *Nothing* and 5 = *A great deal*). Questions four through six assessed the frequency of participants' involvement in active music making activities, here described as playing an instrument, singing, or composing music. These questions assessed how frequently respondents participated in active musicking as a professional (Question 4), and as an amateur (Question 6), as well as the degree to which they practice singing or playing an instrument (Question 5); responses to these items were indicated on a five-point scale (where 1 = *Never* and 5 = *All the time*). The full module can be found in Appendix A.

Data regarding participants' tendencies towards rumination were collected using the Rumination subscale of the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999). This 12-item scale is one part of a two-part measurement tool derived from Fenigstein et al.'s (1975) Private Self-Consciousness scale (PrSC). This questionnaire asks participants to indicate, on a five-point scale (where 1 = *strongly disagree* and 5 = *strongly agree*), their level of agreement with each statement (e.g., "Sometimes it is hard for me to shut off thoughts about myself"; See Appendix A). These subscale items can also be found in full in Appendix A.

Data regarding music listening habits were collected in the form of experience-sampling reports (ESRs). The Experience-Sampling method of data collection has previously demonstrated good validity and reliability (Scollon, 2009). Two kinds of ESRs were collected: Music-ESRs, intended to assess the experience of listening to music as it was occurring, and non-music-ESRs, collected for control purposes.

Music-ESR data provided real-time information about participants listening choices and relevant contextual variables. Data regarding participants' affective state at the onset of listening was collected first. Participants were asked to rate their current mood (e.g., "What mood are you in now?") on two dimensions. The first, *valence*, refers to the degree to which an affective state is perceived as positive or negative, and was assessed on a sliding scale labelled "Mood" with "negative" at one end, "positive" at the other, and "neutral" in the middle. The second dimension, *arousal*, refers to the degree of physiological and cognitive activation being experienced, and was assessed on a sliding scale labelled "Energy" with "very low" at one end and "very high" at the other. This two-dimensional model of affect is common in music and other related research, and the validity and reliability of this method of assessing emotion in music studies, including continuous assessment (that is, assessment of changes in affective state over time) have been well-established (Schubert, 1999; Eerola & Vuoskoski, 2011).

Participants were then presented with a list of specific mood terms, such as "happy", "calm", and "anxious", and asked to choose the one that best described their present state. Options for this forced-choice list were drawn from prior research that has mapped specific affective states onto the two-dimensional space provided by the

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circumplex model; to avoid overwhelming participants with too many choices, the options presented depended on their responses on mood valence and arousal scales (i.e., they were presented with a list of states that typically map into the same quadrant as their personal response). If they did not feel any of the given choices were appropriate, they were presented with an "Other" option, and then offered the opportunity to enter, in text form, a free description of their present mood state. Respondents were then asked to indicate how intense their present mood state was. For example, a participant who had indicated they felt anxious was then asked, "How anxious do you feel?"; responses were indicated on a sliding scale like that used to assess arousal and valence, with "Not at all" at the low end and "Very" at the high end. A full list of included options are presented in Appendix B.

Five minutes after completion of this initial report, if the app detected that music was still playing, the participant was again asked to rate the valence of their current mood, their current arousal level, and were again asked to indicate how intensely they were experiencing the mood state they indicated they were in at the onset of listening. Participants were then asked about their current physical and social environment. Participants were first asked about the presence of others ("Who is listening?") and given a list of options to choose from that included "only me", "partner/spouse", and "colleagues/workmates". They were then asked about their location, with menu choices including "home", "work", or "school". A final screen asked participants what they were doing while they were listening; some of these choices presented in this screen were "housework", "focused music listening", and exercising/sports". All responses were forced choice, but included an "Other" option, which was followed by the option for

respondents to enter a text response if they felt none of the given options were appropriate. Full lists of forced-choice responses for these questions are included in Appendix B. Possible responses for these questions were chosen by the app's designers based on a thorough review of prior literature on uses of music as well as their own prior work (e.g., Randall & Rickard, 2017a, 2017b) and this information, as well as the mood measures collected prior, was retained by the research team at the University of Jyväskylä as part of their larger model of personal music listening via smartphone.

Next, the app requested information about music listening motivations. Participants were asked what their primary reason for listening to music was, and offered a choice of nine general categories of motivations. These motivation categories were: Music for my Mood, To Relax/Calm Down, To Raise/Boost Energy, For Boredom/Habit, For Enjoyment, For Activity, To Listen With Others, To Focus on the Music, and For Thinking/Reflecting. Once a general motivation was chosen, a list of more specific motivations were presented. Under the "Music for my Mood" category, for example, some of the more specific reasons offered were "To cope with a situation", "To feel better", or "To feel worse". Full lists of motivations from each category are also presented in Appendix B. Music use motivations were selected based on reviews of prior literature and prior research by Randall & Rickard (2017a, 2017b).

Finally, we asked listeners to indicate the valence and arousal levels of their chosen selection ("What is the mood/energy level of the music?"). To do so, they were given a sliding scale like the ones they encountered in the mood measures with "positive" at one end, and "negative" at the other for valence, and "very low" at one end and "very high" at the other for arousal. Further information about the music was also collected at

this point and participants were asked to indicate, also on sliding scales, the degree to which they were paying attention to the music, how familiar the music was to them, how much they were enjoying the music, and how suitable they felt the music was as an accompaniment to the activity they had indicated they were engaged in. This information was collected but not included in any of the present analyses.

Non-music-ESRs, collected for control purposes, were signal-contingent, appearing at times the app detected the phone was not being used to play music. These prompts were presented randomly during hours the participant had indicated as their "waking hours" during the app installation process. As we were interested in comparison between episodes of music listening and episodes in which no music is being heard, participants were first asked if they were currently listening to music from some other source (e.g., radio, television, attending a live performance). They then completed the same mood measures, asking about current mood valence and arousal level, and context variables, asking about current activities and the presence of other people, as they did in the music-ESRs. Five minutes after completing this report, they were asked to again assess their affective state using the sliding mood measure scales.

Participants were informed that the app would only collect information for a two-week period after activation and that they were free to uninstall it after that time (or at any time should they choose not to continue contributing data). Once the two-week period was over, the app ceased to prompt participants for information.

Procedure

Ethical approval to conduct this research was obtained through Western's Non-Medical Research Ethics Board prior to data collection. Potential participants were made aware of the study through a variety of means including email lists, posters, and social media advertisements. Individuals wishing to volunteer for the study were first directed to a Qualtrics page where they could read the Letter of Information. Those wishing to participate were then given information about where and how to download and set up the MuPsych smartphone app (Randall & Rickard, 2013). Written consent was not collected in this study so that participants could remain completely anonymous; they were informed in this Letter of Information that by downloading and using the app they were giving implied consent for the collection of information.

Once the app was downloaded to the participant's personal device, they were instructed to enter the study code they had been given on recruitment materials; this unique study code gave respondents access to the questions we had personalized for this study and kept our data separate from that of other researchers. Once they had entered the code they were again presented with this study's Letter of Information. They were then asked to indicate their primary mode of listening to music on their device (e.g., Spotify, Pandora, etc.) and given information on how to adjust settings to allow the MuPsych app to detect activation of said music player. Participants were also asked to indicate "waking hours" (i.e., times in the day they were most likely to be awake) for the purposes of choosing times for the delivery of signal-contingent non-music-ESR prompts that would not interfere with participants' personal sleep schedules.

Once information about waking times and primary music player had been

collected, the participants were asked to complete the required one-time questionnaires (i.e., the demographic questionnaire, the MUSEBAQ, and the RRQ). If they did not wish to complete these questionnaires at that moment, they were able to dismiss the prompt and re-access the surveys from the app's main menu at any time during the data-collection period.

Music-ESRs were event-contingent, with prompts to answer questions automatically appearing when the participant used their preferred music player. When these prompts appeared, participants had the option to dismiss them and continue listening without completing a report. If the participant was in a situation where they could not respond at all to any prompts (e.g., they were driving), the prompt simply remained on the screen until the participant was free to dismiss it. In case participants decided to complete a report at this later time rather than dismiss the prompt, subsequent analyses selected out any reports that were completed more than two minutes from the onset of music playing so that only cases assessing the actual onset of listening were included. To that end, once a music-ESR had been completed, another one was not presented for a period of at least three hours, regardless of how many music listening episodes took place in that time. Similarly, once a participant had completed four music-ESRs in one calendar day, no more were presented that day, even if further listening episodes took place.

RESULTS

Results for the present study will be presented in the following manner: First, descriptive data regarding participant demographics, listening contexts (e.g., listeners, locations, and activities) and listening motivations, and frequency of affective change associated with listening in the present sample will be reported; second, the results of aggregated analyses intended to assess general associations among musical background/experience and listening motivations and outcomes will be presented; and finally, the results of multilevel analysis intended to address primary research questions about the moderating effect of rumination on other, key relationships, will be presented.

Participant Demographics: Musical Background

Results of survey questions on participant background data collected using the Musicianship Module of the Music Use and Background Questionnaire (MUSEBAQ; Chin et al., 2018) revealed that approximately a quarter of the sample (22.9%) had never participated in active music-making activities, while 10.2% indicated that they did so all the time. Participants' experience levels with formal musical training on an instrument were varied, with 45.8% reporting between one and five years of formal training, 15% reporting between six and ten years, 7.4% reporting more than ten years, and 31.8% reporting no formal musical training at all. These results are presented in Tables 1 and 2.

Table 1

Participant Demographic Data: Formal Musical Training & Knowledge

	0	1-5	6-10	11-15	15+
Years of formal training					
Practical	20.1%	46.0%	18.0%	14.9%	1.0%
Theory	32.3%	46.4%	15.5%	5.8%	-

	Nothing	A little	A moderate amount	A fair amount	A great deal
Knowledge of music structure/theory	15.3%	41.4%	14.0%	24.2%	5.1%

Table 2

Participant Demographic Data: Involvement in Music-Making Activities

	Never	Rarely	Sometimes	Often	All the time
How often do you engage in professional music-making (e.g., singing, playing an instrument, composing)?	38.9%	26.1%	16.6%	10.2%	8.3%
How often did or do you practice or rehearse with an instrument or singing?	22.9%	22.9%	18.5%	25.5%	10.2%
How often do you engage in music-making as a hobby or as an amateur?	37.6%	19.7%	22.9%	11.5%	8.3%

Descriptive Data: Experience-Sampling Reports

In total, the present study collected 1,236 individual experience-sampling reports (ESRs) from 157 individual participants. The number of total ESRs completed by each participant varied from one to 28 ESRs per participant, with the average participant completing approximately eight full ESRs. In each report collected during a music listening episode, participants were asked to provide information about where they were, what they were doing, and who else, if anyone, was listening with them. In 93.8% of all listening episodes, participants reported that they were listening alone, either through headphones (66.5%) or speakers (26.9%). The most popular listening location was home, accounting for 44.7% of all listening episodes, while 30.7% of listening episodes took place while the participant was traveling. School/university was also a popular listening location, accounting for 17.3% of all listening episodes. The greatest variability was observed in terms of the activity participants reported engaging in at the time of listening. The most popular activity that accompanied listening was working/studying (18.5% of ESRs), followed closely by walking (13.1%), traveling by bus/plane/train (12.2%), and nothing/waiting (9.7%). Despite being offered a choice of 28 different activities, participants chose "Other" in 4.2% percent of cases. It should be noted that some of these data were collected in 2020 in the midst of the COVID-19 pandemic, and as such, people's mobility and choice of activities may have been limited; however, these data were collected in the summer of 2020, when many places in North America were not in lockdown, and this affected at most approximately 10% of the ESRs sampled here. These results are presented in Tables 3 through 5.

Table 3

Descriptive Data: Listeners

Listeners	% of ESRs
Only me (headphones)	66.5
Only me (speakers)	26.9
Family Members	2.1
Friends	1.6
Partner/spouse	1.6
Strangers/other	0.8
Colleagues/workmates	0.1

Table 4

Descriptive Data: Listener Locations

Listener Location	% of ESRs
Home	45.3
Travelling/commuting	16.2
School/university	17.3
Work	2.2
Other (inside)	1.7
Someone else's home	1.4
Other (outside)	1.1
Restaurant/cafe	0.7
Shops/market	0.4

Table 5

Descriptive Data: Listener Activities

Listener Activity	% of ESRs
Working/studying	18.9
Walking	12.3
On a bus/train/plane	11.9
Nothing/waiting	10.0
Waking up	6.7
In a car (commute)	4.6
Other (unspecified)	4.2
Housework	3.3
Focused music listening	3.1
Eating	3.1
Grooming/self-care	3.0
Exercising/sports	2.0
Web browsing	2.0
Going to bed/sleep	2.0
Relaxing/meditating	1.9
Gaming/entertainment	1.9
Cooking	1.9
In a car (road trip)	1.3
Reading	1.3
Physical work	1.1
Socializing (casual)	0.8
Dancing	0.6
Thinking/problem-solving	0.6
Being romantic	0.4
Shopping	0.4
Creative arts/hobbies	0.4
Cycling	0.1
Running/jogging	0.1
In a meeting	0.1

In each music-ESR completed participants were asked for their primary listening motivation; these motivations can be summed up with nine categories of motivations. Of them, the most frequently chosen motivation category overall was listening as accompaniment to another activity ("For Activity") accounting for 31.9% of all listening episodes. A second key motivation appeared to be listening specifically for enjoyment, accounting for 22.8% of all listening episodes. Motivations related specifically to mood only accounted for 11.2%, and this was not one of the top three listening motivations observed in this study. The third most popular motivation for listening was Boredom, accounting for 11.8% of ESRs. These statistics can be found in Table 6.

Table 6

Descriptive Data: Listening Motivations

Listening Motivation	% of ESRs
For activity	31.9
For enjoyment/entertainment	22.8
For boredom/habit	11.8
Music for my mood	11.2
To raise/boost energy	6.2
To relax/calm down	5.8
For thinking/problem-solving	5.3
To focus on the music	3.3
To listen with others	0.9
Other (unspecified)	0.9

Initial State: Mood & Arousal at the Onset of Listening

Participants' mood at the onset of listening was varied. Visual inspection of histogram data for initial valence, initial arousal, and initial mood intensity suggested a relatively normal distribution of scores. Assessment of frequencies of individual mood states, which participants had selected from a forced-choice list, found many different mood states represented. The most commonly selected moods included "happy" (16.5% of ESRs), "tired" (12.0% of ESRs), "calm" (10.6% of ESRs), "content" (10.2% of ESRs), and "anxious" (7.2% of ESRs), and these top 5 represented states that vary in both valence and arousal. Frequencies of individual mood states are presented in Table 7.

Table 7

Participant Moods at the Onset of Listening

Initial Mood	% of ESRs
Happy	16.5
Tired	12.0
Calm	10.6
Content	10.2
Anxious	7.2
Bored	4.9
Motivated	4.8
Other	4.8
Excited	3.0
Confident	2.6
Proud	2.2
Annoyed	2.1
Stressed	1.9
Worried	1.9
Sad	1.8
Grateful	1.7
Delighted	1.6
Interested	1.6
Hopeful	1.3
Loving	1.3
Unwell	1.2
Upset	0.9
Depressed	0.7
Nostalgic	0.7
Ashamed	0.6
Curious	0.6
Lonely	0.5
Rejected	0.4
Angry	0.2
Awkward	0.1
Disgusted	0.1

Affective Change

Analysis of frequencies in this dataset revealed that the music listening episodes sampled were associated with affective change of some kind, either on the valence or the arousal dimension, in approximately 63.1% of cases, while 36.9% of cases were associated with no affective change on either the valence or arousal dimensions. Listeners in 19.1% of total ESRs experienced valence change without any associated arousal change, while 20.6% of all cases were associated with arousal change only. In the remaining 23.3% of ESR reports, participants reported experiencing both valence and arousal change.

A closer look at each of the two dimensions separately revealed that participants experienced valence change during approximately 42.5% of all listening episodes. When considering only episodes in which participants reported valence change, it was found that 63.3% of the time the valence change was in the positive direction, while the remaining 32.7% of cases involved a valence change in the negative direction. In terms of the arousal dimension, it was found that arousal change occurred in 44% of all cases. When considering only episodes in which participants experienced arousal change, listeners experienced an increase in arousal in 70% of cases, while the remaining 30% of cases were associated with a decrease in arousal.

Aggregated Analyses

Exploratory analyses of potential relationships among musical training and experience, affective change, and motivations for listening were done as aggregated analyses. Aggregating participant responses is one recommended approach for the

analysis of ESM data as respondents contribute multiple data points which are not independent, thereby violating the independence of observations assumption necessary for many single-level multivariate analyses (Hektner et al., 2007). Only those participants who had completed more than five individual ESR reports were included in these aggregated analyses, as less than this was deemed insufficient for estimating participant averages. A total of 63 participants were therefore included in all subsequent analyses.

This subsample of 63 participants was compared with the sample as a whole. It was found that this subsample was comprised of 36 female, 24 male, and 3 non-binary individuals, and these proportions were not significantly different from the sample as a whole. These participants were between the ages of 18 and 39, with a mean age of 21.2 ($SD = 4$), which is again comparable to the sample as a whole. When frequencies of listening locations, activities, and motivations were assessed for this subsample, it was found that the three most popular listening locations (e.g., home, travelling, and school/university), listener activities (e.g., working/studying, walking, and on a bus/train/plane) and listening motivations (e.g., For Activity, Enjoyment/Entertainment, and For Boredom/Habit) were the same for the subsample as for the sample as a whole. Finally, it was determined that the frequency of valence and arousal change in this subset of participants were also similar to those found in the entire sample.

This study was interested in the potential relationships between a background in music-making and the uses and outcomes of music listening, and it is understood that this musical involvement is not limited to those with formal musical training. Therefore, in addition to assessing correlations between music uses/outcomes and years of formal training, associations among degree of involvement in active music-making (i.e., playing

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an instrument/singing) and music uses/outcomes were also explored. Musical background here had been assessed using Chin et al.'s (2018) MUSEBAQ; despite the delineation of this module's items into two subscales, one for formal training and the other for active musicking, these authors recommend that the three items in each subscale be used individually and not be summed into subscale scores as they are intended to each assess a specific facet of musical background/experience. As such, one item from each subscale was selected for subsequent analysis. From the formal training subscale, the item "How much formal training (practice) have you had?" (in years) was chosen to represent the participant's formal music training, and the item "How often did or do you practice with an instrument or singing?" (rated on a five-point scale where 1 = never and 5 = all the time) was chosen from the music-making subscale to represent a participant's experience with active musicking. Both variables were assessed for normality and no problematic skew or kurtosis was observed.

It was expected that these two variables would themselves correlate, as many partake in active music-making activities despite having no formal training. Assessment of the relationship between these two variables (Pearson's r, two-tailed) confirmed this assumption; the correlation between these music background variables was significant and strong ($r = 0.595$, p < 0.001). Despite the strong correlation between these variables, they were both retained and subsequently assessed in terms of their relationships with other variables, as they are intended to delineate two related but different forms of musical engagement.

First, aggregate values for valence change and arousal change were calculated by averaging values at the participant level, and these values were centered at zero giving

them a range of -3 through +3. Then, reason frequencies for each of the categories of music use motivations (e.g., Enjoyment, Relax, Raise Energy) were also averaged to create a proportional value for each participant. These values were then subjected to an arcsine transformation to allow for the normal distribution of data; this form of transformation is recommended when values represent percentages or proportions. To assess any associations between musical background/experience and the frequency of affective change associated with listening, two-tailed Pearson's correlations were computed. None of the assessed relationships were significant; results of these analyses are presented in Table 8.

Table 8

Pearson's Correlations: Musical Background Variables, Affective Change, and Motivations for Music Listening (N = 63)

		r	p (two-tailed)
Formal Training (years)	Valence Change	-0.056	0.661
	Arousal Change	-0.109	0.395
	For activity	0.036	0.777
	For enjoyment	0.012	0.929
	For boredom	-0.163	0.203
	Music for my mood	-0.202	0.112
	To raise energy	0.039	0.760
	To relax	-0.016	0.903
	For thinking	0.244	0.054
	To focus on the music	0.002	0.988
	To listen with others	0.065	0.612
Active music-making	Valence Change	-0.152	0.234
	Arousal Change	-0.020	0.878
	For activity	0.088	0.494
	For enjoyment	-0.017	0.893
	For boredom	-0.229	0.071
	Music for my mood	-0.076	0.552
	To raise energy	0.092	0.475
	To relax	0.012	0.926
	For thinking	0.123	0.338
	To focus on the music	0.044	0.735
	To listen with others	0.025	0.848

Multilevel Analyses

Research questions regarding the relationships among various predictor variables and outcomes and the possible moderating influence of trait rumination were addressed using multilevel structural equation modeling. Aggregated analyses such as those performed on musical background and music uses/outcomes data (Table 5) can assess general trends in the data but averaging values for ESR level variables (i.e., those collected during each music listening episode recorded) can result in the loss of nuance in these relationships, and the preservation of this nuance is especially key when assessing the relationships among these ESR-level variables. Multilevel analyses are also advantageous for longitudinal research methods because these analyses take into account that not every participant has contributed the same number of data points (Hox, 2013).

The present study collected information at two levels of measurement. Level 1 variables were those that could change from one episode of music listening to the next and were collected at the level of the individual ESR. The Level 1 variables examined were initial mood, music valence, and valence change. Level 2 variables were those collected at the level of the individual listener and represented stable characteristics that were likely to remain constant throughout data collection. Trait rumination, assessed using the Rumination subscale of the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), was considered a Level 2 variable. Although 157 participants downloaded the app and provided at least one experience-sampling report, not all participants completed the RRQ. Those that did not complete the RRQ were excluded from multilevel analyses, leaving a data set of 796 individual ESR reports nested within 101 individual participants.

A Rumination score was computed for each participant by averaging the scores from each item of the 12-item subscale in the manner recommended by the subscale's designers and employed by other studies utilizing this subscale (e.g., Garrido & Schubert, 2015a). Possible scores for this subscale range from a low of one to a high of five; in the present dataset, scores ranged from a low of 1.67 to a high of 5.00 (the maximum score), with a mean score of 3.79 and a standard deviation of 0.74. Examination of histogram data revealed responses to be relatively normally distributed without problematic skew or kurtosis; visual histogram inspection was supported by numeric assessment of skewness (-0.61) and kurtosis (0.05) statistics. Internal reliability for this subscale, assessed using Cronbach's alpha, was excellent ($a = 0.92$).

It was hypothesized that rumination might moderate three different relationships; (a) initial mood valence and mood valence change, (b) music valence and mood valence change, and (c) initial mood and chosen music valence. These relationships represent cross-level interactions, with a Level 2 variable potentially moderating relationships among two Level 1 variables. A full conceptual diagram of the hypothesized relationships assessed in the present analysis can be found in Figure 1. Cross-level interactions can be difficult to interpret (Aguinis, Gottfredson, & Culpepper, 2013), and as such, each cross-level interaction hypothesized was assessed with a separate model analysis. Analyses here used a model-building process in which a basic analysis assessing the relationship between the two Level 1 variables of interest was conducted. After confirming the hypothesized relationship among Level 1 variables was significant, rumination was added to the analysis as a potential Level 2 moderator. In this second step, rumination was also assessed as a possible Level 2 predictor of the corresponding

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Level 1 outcome variable. As the strength of ESM data collection lies in its ability to assess multiple situational variables, a third step was carried out in which the other Level 1 variables collected in the present study, if not already included in the basic model, were added to the moderation analysis for control purposes as well as to explore their potential role in predicting outcomes. These variables included: The listener's location, who they were listening with, and what they were doing; music use motivations, assessed as general categories of listening reasons (e.g., For activity, For enjoyment/entertainment, Music for my mood, etc.); music-related variables including the attention being paid to the music, the valence and arousal of the listener's selection, the degree to which the listener was enjoying the music, and how familiar the music was to them; and mood-related variables such as initial valence, initial arousal, and initial mood intensity.

All multilevel analyses were performed using Mplus (Múthen & Múthen, 2015) with random slopes. These analyses utilized maximum likelihood estimation with robust standard errors (MLR), with an accelerated expectation-maximization (EMA) optimization algorithm. Predictor variables in each model were centered using group means, which represents the average for each individual participant. The practice of group-mean centering predictor variables improves interpretability of results and is recommended by Aguinis et al. (2013) for use in cross-level interaction analysis where appropriate (i.e., where values of zero are not impossible). For significance testing, a threshold of $p = 0.05$ was maintained for the following analyses.

Figure 1

Conceptual Diagram: Relationships Assessed in the Present Multilevel Analyses
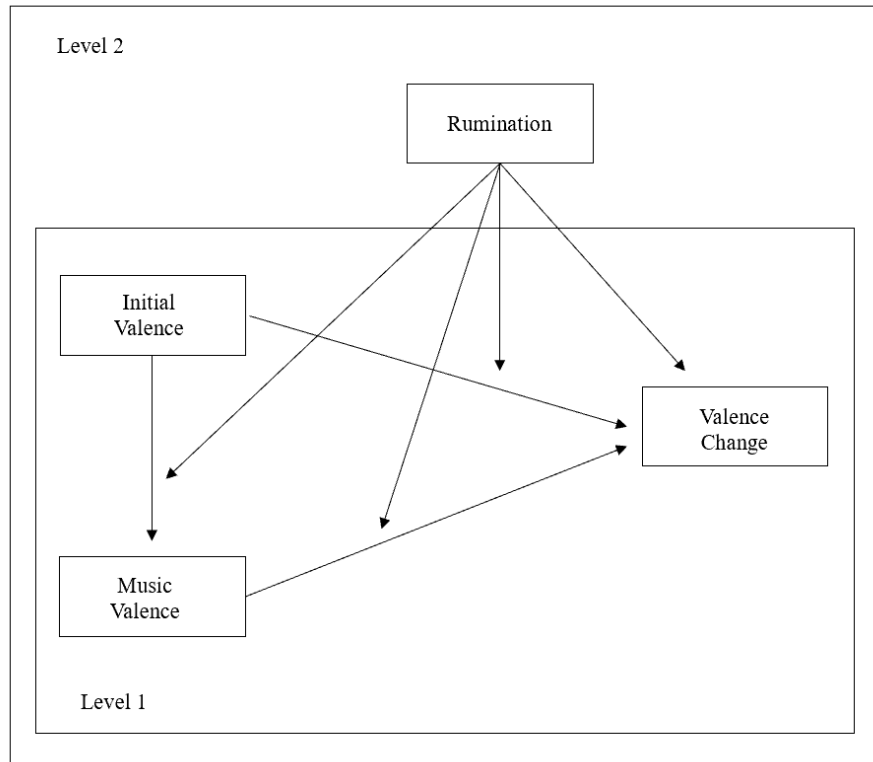
Analysis A

A conceptual diagram of the hypothesized relationship to be assessed in Analysis A can be found in Figure 2. Rumination was assessed as a potential Level 2 moderator of the relationship between initial mood valence and valence change.

Figure 2

Conceptual Diagram: Analysis A
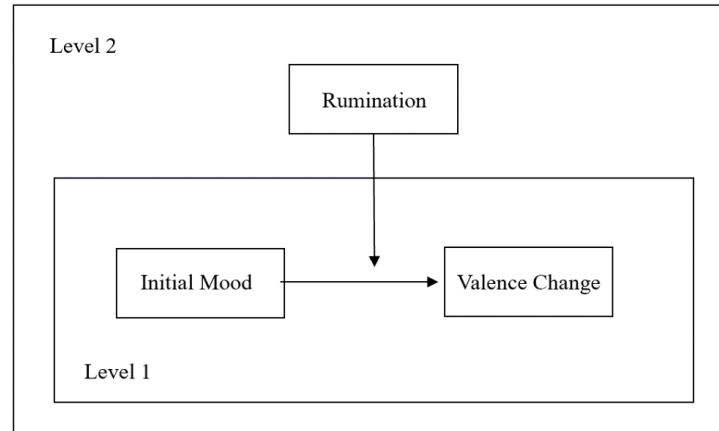
First, a basic model was run to confirm whether initial valence was a significant predictor of valence change. As expected, initial mood did significantly predict mood valence change ($B = $ -0.387, $p < 0.001$). This association was negative, meaning that those in negative moods tended to experience a shift in the positive direction, while those in positive moods tended to experience a shift in the negative direction. Next, the cross-level interaction outlined in Figure 1 was assessed with the inclusion of a random slope coefficient. This analysis also assessed rumination as a potential predictor of valence change with these specific variables in the prediction model. Contrary to the research hypotheses, this interaction was not significant ($B = 0.019$, $p = 0.643$), nor was rumination found to be a significant predictor of mood valence change ($B = $ -0.020, $p = 0.705$). These results are presented in Table 9.

Table 9

Results: Basic (Step 1) and Cross-Level (Step 2) Analyses (Model A; N = 101)

Predictor	Outcome	B	S.E.	B/S.E.	p
Basic Analysis					
Initial Valence (IV)	Valence Change	-0.387	0.034	-11.296	**<0.001*****
Cross-Level Analysis					
Rumination	Valence Change	-0.020	0.052	-0.379	0.705
IV x Rumination	Valence Change	0.019	0.041	0.463	0.643

***p < 0.001

Next, the various contextual variables already identified for inclusion were added to this cross-level moderation model for control and to assess their potential role in predicting outcomes within the context of the previously identified relationship. Although the cross-level moderation remained non-significant here, as did rumination's independent relationship with valence change, several music-accompanied activities and reasons for listening themselves predicted valence change. Specifically, the activities "Housework" (B = -0.258, p = 0.009) and "Physical Work" were both found to negatively predict valence change. Several categories of music use motivations also negatively predicted valence change, namely "For my mood" (B = -0.556, p = 0.003), "For activity" (B = -0.420, p = 0.024), "For enjoyment" (B = -0.396, p = 0.025), "For boredom" (B = -0.494, p = 0.009), and "To relax" (B = -0.702, p = 0.003). Music valence was also a significant predictor here (B = 0.113, p < 0.001), as was the

participants' ratings of enjoyment of their selection ($B = 0.136$, $p = 0.001$). These results

are presented in Table 10; in addition to the original cross-level interaction, only those

predictors significant at a threshold of $p < 0.05$ are included.

Table 10

Cross-Level Moderation Model (Model A) with Contextual Variables Included (N = 101)

Predictor	Outcome	B	S.E.	B/S.E.	p
Activity: Housework	Valence Change	-0.258	0.099	-2.598	**0.009****
Activity: Physical Work		-0.321	0.157	-2.046	**0.041***
Reason: For my mood		-0.556	0.186	-2.982	**0.003****
Reason: For Activity		-0.420	0.186	-2.256	**0.024***
Reason: For enjoyment		-0.396	0.176	-2.247	**0.025***
Reason: For boredom		-0.494	0.189	-2.617	**0.009****
Reason: To relax		-0.702	0.237	-2.956	**0.003****
Music Valence		0.113	0.028	4.109	**<0.001*****
Enjoyment		0.136	0.041	3.363	**0.001****
Rumination		-0.001	0.050	-0.028	0.978
IV X Rumination		0.035	0.040	0.879	0.379

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Analysis B

A conceptual diagram of the hypothesized relationship to be assessed in Analysis B can be found in Figure 3. Rumination was assessed as a potential Level 2 moderator of the relationship between music valence and mood valence change. As with Analysis A, a basic analysis was first run to confirm whether music valence was a significant predictor of mood valence change. Results indicated that music valence was a weak but significant predictor of valence change ($B = 0.081$, $p = 0.018$), confirming the study hypothesis. The cross-level interaction outlined in Figure 2 was assessed with the inclusion of a random slope coefficient. This analysis also assessed rumination as a potential predictor of mood valence change with these specific variables in the prediction model. This interaction was not significant ($B = 0.074$, $p = 0.096$), nor was rumination found to be a significant predictor of valence change ($B = -0.021$, $p = 0.684$). These results are presented in Table 11.

Inclusion of these additional Level 1 predictors had no effect on the cross-level interaction between music valence and rumination ($B = 0.073$, $p = 0.086$), however the direct relationship between rumination and valence change did reach significance ($B = -0.126$, $p = 0.016$). As in Analysis A, the activity "Physical work" negatively predicted valence change ($B = -0.411$, $p = 0.009$), although the relationship observed in Analysis A between housework and valence change was not significant in Analysis B. Within the context of this analysis, no motivations for listening were found to significantly predict outcomes. However initial valence was found to negatively predict valence change ($B = -0.431$, $p < 0.001$), while initial arousal positively predicted valence change ($B = 0.064$, $p = 0.012$), as did participants' enjoyment ratings ($B = 0.134$, $p = 0.002$). These results are

presented in Table 12; only those additional Level 1 predictors that were significant are reported here.

Figure 3

Conceptual Diagram: Analysis B
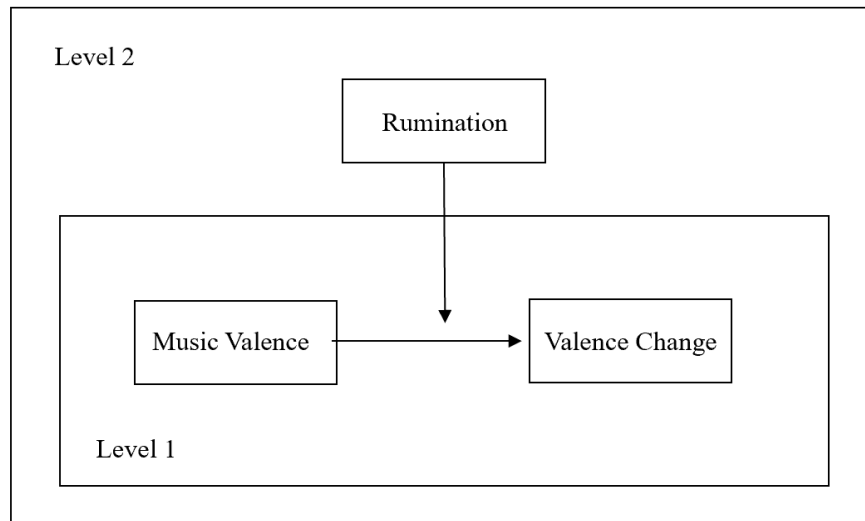
Table 11

Results: Basic and Cross-Level Analyses (Model B; N = 101)

Predictor	Outcome	*B*	*S.E.*	*B/S.E.*	*p*
Basic Analysis					
Music Valence (MV)	Valence Change	0.081	0.034	2.367	**0.018***
Cross-Level Analysis					
Rumination	Valence Change	-0.021	0.051	-0.407	0.684
MV x Rumination	Valence Change	0.074	0.045	1.663	0.096

*p < 0.05

Table 12

Cross-Level Moderation Model (Model B) with Contextual Variables Included (N = 101)

Predictor	Outcome	*B*	*S.E.*	*B/S.E.*	*p*
Activity: Physical Work	Valence Change	-0.411	0.156	-2.631	**0.009****
Initial Valence		-0.431	0.034	-12.608	**<0.001*****
Initial Arousal		0.064	0.025	2.512	**0.012***
Enjoyment		0.134	0.043	3.118	**0.002***
Rumination		-0.126	0.052	-2.408	**0.016***
MV x Rumination		0.073	0.042	1.719	0.086

*p < 0.05, **p < 0.01, **p < 0.001

Analysis C

A conceptual diagram of the hypothesized relationship to be assessed in Analysis C can be found in Figure 4.

Figure 4

Conceptual Diagram: Analysis C
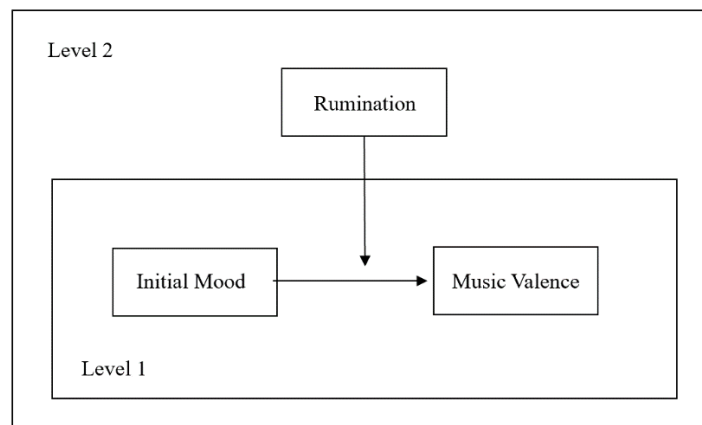
As with Analyses A and B, a basic model was first run to confirm whether initial mood valence was a significant predictor of selected music valence. As had been hypothesized, initial mood valence significantly predicted selected music valence ($B = 0.183$, $p < 0.001$). Finally, the cross-level interaction outlined in Figure 4 was assessed with the inclusion of a random slope coefficient. This analysis also assessed rumination as a potential predictor of music valence with these specific variables in the prediction model. Once again, this interaction was not significant ($B = -0.041$, $p = 0.451$), nor was rumination found to be a significant predictor of music valence ($B = -0.089$, $p = 0.506$). These results are presented in Table 13.

Table 13

Results: Basic and Cross-Level Analyses (Model C; N = 101)

Predictor	Outcome	B	S.E.	B/S.E.	p
Basic Analysis					
Initial Valence (IV)	Music Valence	0.183	0.046	3.962	**<0.001*****
Cross-Level Analysis					
Rumination	Music Valence	-0.089	0.134	-0.665	0.506
IV x Rumination	Music Valence	-0.041	0.055	-0.753	0.451

***p < 0.001

Finally, when additional Level 1 predictors were added to the present cross-level interaction model, the relationships assessed at step two remained non-significant. However, the activity "Grooming" was found the positively predict music valence ($B = 0.567$, $p = 0.008$), as did "Housework" ($B = 0.429$, $p = 0.048$). The music listening motivation "To raise energy" also positively predicted music valence ($B = 0.652$, $p = 0.036$), and a listener's initial mood intensity was found to also positively predict the valence of their selection ($B = 0.143$, $p = 0.001$). These results are presented in Table 14.

Table 14

Cross-Level Moderation Model (Model C) with Contextual Variables Included (N = 101)

Predictor	Outcome	*B*	*S.E.*	*B/S.E.*	*p*
Activity: Grooming	Music Valence	0.567	0.212	2.670	**0.008****
Activity: Housework		0.429	0.217	1.975	**0.048***
Reason: To raise energy		0.652	0.311	2.100	**0.036***
Initial intensity		0.143	0.045	3.177	**0.001****
Rumination		-0.008	0.126	-0.066	0.947
IV x Rumination		0.010	0.051	0.203	0.839

*p < 0.05, **p < 0.01

Chapter Five

DISCUSSION

The present study was undertaken with the aim of assessing trait rumination as a possible moderator of the relationships among initial mood, the valence of the listener's musical selection, and mood valence change associated with a short period of everyday music listening. Secondary aims of the present study were to add to the body of work on everyday music listening in the form of descriptive data about the music listening scenarios sampled by this research, and to explore potential associations between musical background on uses of music and the outcomes of listening through the analysis of data collected via Experience-Sampling Methodology (ESM).

The present data have provided important information about the prevalence of affective change associated with short periods of music listening. It is widely acknowledged that not every encounter with music listening in an individual's typical day will be associated with affective change (Juslin & Laukka, 2004; Juslin et al., 2008), and ESM research offers a way of empirically assessing the frequency of this occurrence. In this dataset, almost two-thirds (63.1%) of all listening episodes were associated with change on at least one of the two affective dimensions (i.e., valence and arousal) assessed in this study, with participants reporting a change in both dimensions in approximately one quarter (23.3%) of all listening episodes. The finding that 63.1% of listening episodes were associated with affective change supports results obtained by prior research. Juslin & Laukka's (2004) survey data found that although the estimated frequency of affective change for individuals varied widely, on average, people reported that music evoked

emotion in them approximately 55% of the time, and ESM data obtained by Juslin et al. (2008) found that participants reported that they felt the music had affected them emotionally in 64% of cases, a number that is directly in line with the results of the present study. Given the variability in this occurrence observed among participants in prior studies (e.g., Juslin & Laukka, 2004), the role of individual differences in predicting the frequency of affective change associated with periods of music listening should be further explored.

The finding that musical background or experience did not significantly predict frequency of motivations for listening or the general outcomes of listening adds to prior literature that suggests that experience playing an instrument, or formal training in music, is not a prerequisite for the use of music to serve various functions in day-to-day life. It further suggests that formal training or a background in music may not be associated with particular outcomes that differentiate active music-makers from avid listeners. This supports the assertion of Bigand et al. (2005), who have suggested that "experienced listeners" can develop a sophisticated relationship with music through their listening habits. This is also good news for those who wish to promote music listening as a tool for well-being, as it means that musical background or formal training is not necessarily required for the adaptive use of music to enhance wellness. However, as these analyses were aggregated, it is possible that some nuance regarding music listening situations was lost, and further analyses should incorporate musical background into a broader model that can take into account these nuances, especially given the apparent importance of the interplay among situational variables on outcomes.

Some of the hypothesized relationships assessed in the present study were significant, and in the expected direction. First, initial mood was found to be a significant predictor of valence change. This lends support to findings from other ESM research with the MuPsych app (Randall & Rickard, 2017b), which found initial mood valence to be the strongest predictor of valence change. As in Randall & Rickard's study, the significant relationship observed in the present study was in the negative direction, indicating that those in negative moods tended to trend in the positive direction, while those in positive moods tended to trend in the negative direction. Randall & Rickard suggested that this may reflect regression toward the mean, particularly in those whose original valence scores were at the extreme ends of the scale. These authors also posited that this observed relationship, which has also been found in the present study, may support the hedonic treadmill model (Brickman & Campbell, 1971), which hypothesized that individual's hedonic states tend to return to neutral after the experience of an extreme positive or negative affective state. This return to a neutral point has been previously demonstrated with arousal; Mood Management Theory posits that individuals use media to return to a state of "excitatory homeostasis" (Zillmann, 1988, p. 463), a premise supported by Berlyne's (1981) theory that listeners prefer to listen to music that will help them attain an optimal level of arousal, although this relationship has not been clearly demonstrated with the valence dimension.

The affect regulation literature, particularly that related to Mood Management Theory, tends to focus on the repair of negative moods and assumes that individuals have no motivation to downregulate positive moods (Larsen, 2000; Randall & Rickard, 2017b). MMT's original premises hypothesized that when in positive moods, individuals

would have no need for mood regulation and may elect not to consume media at all in order to ensure the maintenance of that mood (Zillmann, 1988). There is a good deal of research to support the idea that positive affect is beneficial (Thompson et al., 2001). However some research in the non-music domain has begun investigating the possibility that the downregulation of positive moods, in particular those on the extreme end of positive, may have some adaptive value. For example, Cyders & Smith (2008) found that some are more likely to engage in risky behaviors, including drug use and high-risk sexual behavior, when experiencing highly positive states, and Tan & Forgas (2010) found that when participants were induced into highly positive states, they were more likely to behave selfishly and thus encounter social conflict. Future research should look into the possibility that people are motivated to strive for a hedonic state that is closer to neutral than to a more extreme positive state, and that the music listening experience may help individuals achieve that "hedonic neutrality" (Randall & Rickard, 2017b, p. 509).

The finding that music listening tended to be associated with mood improvement for those in negative moods is promising as it provides further evidence that music listening may be an effective tool for mood repair, supporting the premises of Mood Management Theory (Zillmann, 1988, 2000). However, this trend requires further probing as it leaves open the possibility that a slightly positive mood could become a negative one through music listening. Indeed, Randall & Rickard (2017b) calculated what they referred to as a "critical range of initial valence" (p. 509) in which a slightly positive mood had the potential to become negative, which may run counter to the listener's intentions.

The present study also found a significant positive relationship between a participant's initial mood and the valence of their musical selection, echoing the mood congruency effect that has been observed in other studies (e.g., Chen et al., 2007; Randall & Rickard, 2017b; Thoma et al., 2012; Xue et al., 2018). The present study also found that the valence of a participant's chosen musical selection positively predicted mood valence change, indicating that those choosing more negatively valenced music also tended to experience a mood shift in the negative direction. However, these results also indicated that choosing more positively valenced (i.e., happier) music was associated with mood shifts in the positive direction. These results, taken together with the negative relationship between initial valence and mood, leave open the possibility that the valence of one's musical selection may have a mediating effect on the relationship between initial mood and valence change, although no mediation was tested in the present study.

Some of the hypotheses regarding rumination's potential moderating influence on these other, key relationships were not supported in the present research. Prior research indicating that those who perpetually ruminate may have difficulty regulating negative moods (Nolen-Hoeksema et al., 2008) led to the hypothesis that rumination would moderate the relationship between initial mood and mood valence change after a short listening period, but this interaction was not found to be statistically significant. The present study's hypothesis regarding rumination's potential moderating effect on the relationship between the valence of a listener's musical selection and subsequent mood change was led by prior research indicating that those with the tendency to ruminate may experience different outcomes after listening to sad (Garrido & Schubert, 2015a; Larwood & Dingle, 2021) or happy (Garrido & Schubert, 2015b) music, but analysis also

found this interaction to be non-significant. Finally, drawing on research suggesting that ruminators, due to their attraction to negative stimuli in general, are especially attracted to sad music, particularly when already experiencing negative affect (Garrido & Schubert, 2013; Schubert et al., 2018), it was hypothesized that rumination would moderate the relationship between initial mood and the valence of the listener's music choice; this hypothesis was also not supported by the present results.

In each of the simple cross-level interaction analyses carried out in the present study, rumination was not only assessed as a moderator of other relationships, but was also evaluated for any potential direct relationship with mood valence change. Rumination was not found to have any significant direct relationship with valence change or with music valence (the outcome variable in Analysis C) when these cross-level interactions were assessed without any additional contextual variables added. However, when these additional variables were added to the Analysis B model (which assessed rumination as a moderator of the relationship between music valence and valence change), the direct relationship between rumination and valence change reached significance ($p < 0.05$). This suggests that the involvement of these contextual variables, in particular the activity accompanying listening as well as the motivation for listening, may be key for understanding these relationships. It may be that the relationship between trait rumination and outcomes is itself moderated by contextual variables related to the function the music serves in the listener's present circumstances. As the addition of contextual variables to Analyses A and C did not render relationships between rumination and other assessed variables statistically significant, future research should emphasize exploring relationships among rumination, music listening motivations, and other

contextual variables specifically within the context of listening to music of a particular emotional valence.

The addition of these further contextual variables to the models tested in the present study further underscores the need to take these situational variables into account, and the results of all analyses performed in the present study, including aggregated analyses assessing relationships among listening motivations, outcomes, and musical background, overall lend support to other researchers' suggestions that contextual variables might play a greater role in determining outcomes than more stable, dispositional elements (Larwood & Dingle, 2021; Randall & Rickard, 2017b). Although slightly different patterns emerged from the addition of these variables to each of the cross-level moderation analyses presented here, the importance of both motivations for listening and the activity that accompanies listening is emphasized in the present research. In particular, the finding that listening to music while doing physical work significantly and negatively predicted mood valence change suggests that physical activity while listening may be a situation of interest to future research. The findings that many of the motivations for listening significantly predicted outcomes within the context of the relationship between initial mood valence and valence change is also something that should be explored in further research. In particular, future research should, in an ESM format, look into the possibility that motivations for listening moderate or mediate the relationship between initial valence and outcomes; the indirect effects of motivations for listening on other key variables have already been suggested by prior research (Greb et al., 2019). Finally, within the analyses in which valence change was the outcome variable of interest, enjoyment emerged as a potentially important predictor. It seems

intuitive that a person's enjoyment of their selection (or lack thereof) would contribute to a mood change in the relevant direction. Further study should incorporate enjoyment as a potential moderator of the relationship between music valence and outcomes, as prior research suggests that listening to sad music, despite not enjoying the experience, may reflect maladaptive music listening choices, while the enjoyment of sad music may drive its use in more helpful mood regulation behaviors (e.g., Garrido & Schubert, 2013; Ter Bogt et al., 2017).

When additional contextual variables were added to the cross-level interaction analysis assessing rumination's role in moderating the association between initial valence and music valence, an interesting and un-hypothesized finding emerged. The intensity of the mood state a participant was experiencing at the time of listening significantly predicted the valence of their chosen selection. This finding should be explored in further research, especially given the relationships already demonstrated among initial mood, music valence, and the outcomes of listening. It is possible that the intensity of a mood state, in addition to its level of arousal and its valence, may contribute to the drive to regulate such moods and as such, relationships among mood intensity, the frequency of affect-regulatory motives for listening, the listener's musical choices, and subsequent outcomes. The more intense a mood state is, perhaps the more likely it is to occupy a central space in one's attention, and prior researchers have made the argument that the more attention that is directed to a person's mood state, the more likely they are to be driven to regulate it. For example, Flett et al. (1996) found that participants scoring high on affect intensity (conceptualized as a disposition to experience intense affective responses) were more likely to use emotion-focused or avoidance coping strategies, both

of which have been associated with negative outcomes, and also were more likely to have a pessimistic view of their own ability to repair negative moods. These results were further supported by later studies including that by Thorberg & Lyvers (2006), who found that those participants who struggled with addiction displayed both higher levels of dispositional affect intensity as well as lower confidence in their negative mood regulation abilities when compared with a sample of people without substance abuse issues.

The present study is the first known study to assess trait rumination's possible role in these relationships using Experience-Sampling Methodology (ESM), and as such, differences in results between this study and others may be due to differences in methodology. Relationships with trait rumination found in prior survey studies may be the result of memory bias on the part of those with increased tendencies to ruminate. It is well-demonstrated that ruminating while experiencing negative affect results in the retrieval of more negatively-valenced autobiographical memories (Lyubomirsky et al., 1998) and as such, accounts of music listening behavior collected via retrospective methods may place emphasis on negative outcomes if participants are in a negative mood at the time of data collection. The present study's collection of data in real-time, with mood measures taken at the onset of an ESR, both eliminate this recall bias and allow researchers to assess how mood at the time of data collection impacts responses. Furthermore, the present study involved no specific mood induction, and allowed for an assessment of the impact of naturally-occurring mood states on music listening choices.

On another methodological note, the participants in the present study interacted with their own music libraries, and no criteria whatsoever were imposed on participants'

musical choices. Other studies, like those by Garrido & Schubert (2015a; 2015b) and Larwood & Dingle (2021) have allowed participants to choose from their own libraries, but asked that participants choose songs they anticipated would make them feel either sad or happy. This music selection process may not, therefore, well-represent typical music listening scenarios. In fact, when Larwood & Dingle (2021) asked participants how likely they were to listen to the sad song they had chosen for the experiment when actually feeling sad in day-to-day life, participants in general felt they were not likely to make that particular choice. Furthermore, asking participants to select a piece of music they predict will make them feel a certain way likely also increases demand characteristics which can confound results. Further experimental or experience-sampling study of music listening situations in which participants freely guide the music listening process will be key.

Future ESM studies should look to replicate the present results and test more comprehensive models. As the present results regarding initial mood valence, music valence, and mood valence change suggest a possible mediating effect of music valence on the relationship between initial mood valence and valence change, this relationship should be assessed with specific tests of mediation effects. In particular, future replications should assess the potential impact of rumination in a moderated mediation model in which rumination is assessed as a moderator of the various pathways involved in a mediation analysis between initial valence, music valence, and valence change; a proposed moderated mediation model is presented in Figure 1. Although rumination is included in the proposed model as a between-subjects or Level 2 variable, an assessment of state rumination as a Level 1 variable may also be appropriate for inclusion in such a model.

Figure 1

Proposed Moderated Mediation Model: Rumination (Level 2 Predictor) as a Moderator of the Mediated Relationship between Initial Valence, Music Valence, and Valence Change
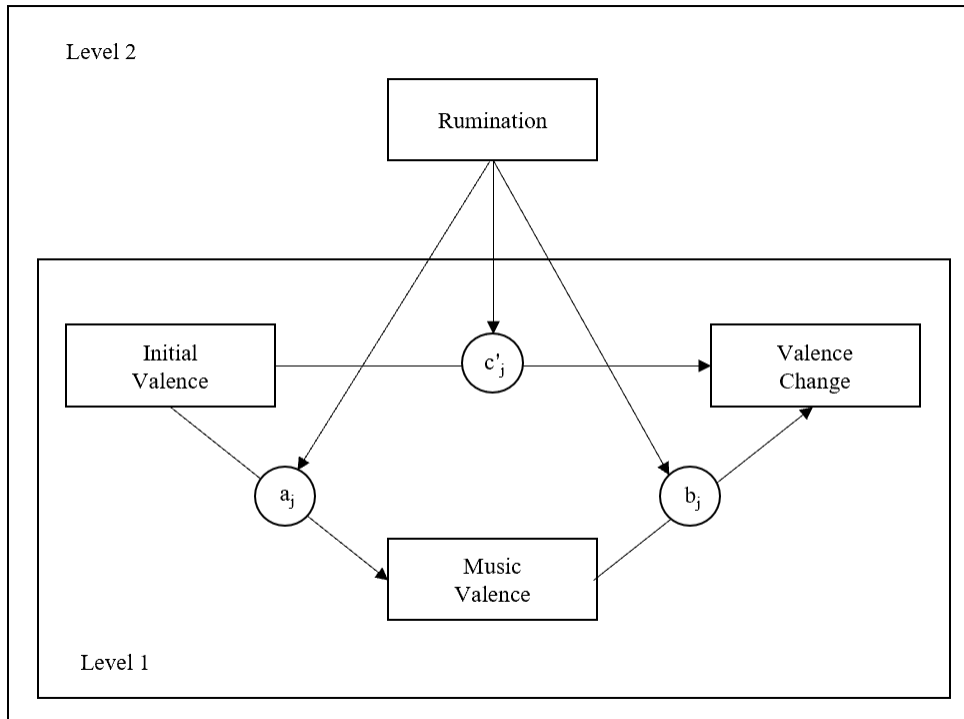
Motivations for listening, especially those related to mood and arousal, should also be examined in more detail as predictors of affective change associated with music listening. Although the present dataset was quite large, involving 1,236 individual reports, mood-related reasons only accounted for 11.2% of all listening episodes. Assessing mood-related reasons in general as a predictor of valence change has the potential to be confounding, as the category includes some specific reasons for listening that represent fundamentally competing motivations, such as the specific motives "To feel better" and "To feel worse". To delineate among specific mood-related reasons in the

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present dataset would have resulted in greatly reduced statistical power for those analyses, a somewhat unfortunate side-effect of the diversity of motives for listening and the level of detail with which motivations were assessed. Larger datasets would offer greater statistical power for comparisons, and so future research should aim to collect data from a larger sample of participants. Comparisons at this level of detail, however, would not only allow for an assessment of relationships between specific motives and outcomes, but might also identify instances in which outcomes do not match the listener's intentions; assessment of other relevant variables using modeling techniques could then explore potential interactions among motivations for listening and other contextual and individual difference variables and potentially identify moderating influences.

Rumination may also be found to relate to motivations, further justifying their inclusion in a comprehensive model including an assessment of rumination's potential impacts on listening outcomes. Some experimental studies have found that rumination status predicted the participant's mood at the onset of the session. Garrido & Schubert (2015a), for example, found that participants high in rumination rated their initial mood as significantly more negative on the valence dimension than those low in rumination. As other studies (e.g., Randall & Rickard, 2017a), have found that mood-regulatory motives for listening are significantly more prevalent when listeners are in a negative initial mood, the possibility that rumination might predict the frequency of both specific and general affect-regulatory motives should be further explored in ESM research. Furthermore, rumination's strong relationship with depression (Nolen-Hoeksema et al., 2008), which is ultimately a disorder of affect regulation (Joorman & Gotlib, 2010), highlights the need for research that assesses the potential role of rumination as a

moderator of the relationship between motivations and outcomes. The choice of listening out of boredom, too, should be specifically investigated. Factor analysis performed by Greenwood & Long (2009) suggested that the experience of boredom might be distinct from other forms of negative affect, and that rumination was related to the management of bored states via media consumption. Music listening in response to boredom also appears to be a particularly popular motivation, occupying third place in the present study's list of most commonly reported motivations.

A final set of variables that should be investigated in terms of their associations with rumination and the outcomes of music listening are the various mechanisms of music-induced emotion described in the BRECVEMA model of Juslin & colleages (Juslin, 2019; Juslin & Vastfjall, 2008; Juslin et al., 2011). Of particular interest is *episodic memory,* a mechanism whereby the music evokes an autobiographical memory which subsequently produces an emotional response. Given ruminators' propensity to retrieve negatively valenced memories when compared with those lower in ruminative tendencies, particularly when in negative moods, further exploration of these possible associations is warranted. Ruminators' persistent attraction to negatively valenced stimuli (Garrido, 2009) may also warrant an investigation of the mechanism of *emotional contagion,* wherein the emotion expressed by the music is subsequently elicited in the listener. Larwood & Dingle (2021) explored these possibilities in an online experiment. Their hypothesized model of music listening outcomes found a moderating effect of rumination on the mood effects of sad music listening, but when the mechanisms of emotional contagion, episodic memory, evaluative condition, and rhythmic entrainment were added to the model, the model fit improved and the moderating effects of

rumination were rendered non-significant. Follow-up studies should attempt to clarify these relationships.

The present study's nonsignificant results do not preclude the possibility that rumination is still involved in predicting outcomes of music listening, as different results might be obtained if rumination were assessed as a state variable rather than as a stable disposition. Studies by Saarikallio & Erkkilä (2007), Saarikallio et al. (2015), and Sakka & Juslin (2018) have provided evidence that music listening can accompany periods of ruminating on thoughts, memories, and feelings, but assessing rumination as a trait may complicate attempts to determine how this behavior relates to music listening outcomes. While trait measures of rumination give us a global sense of an individual's general ruminative tendencies, they do not necessarily indicate that a person has the habit of ruminating *with music*. It may be that some people, despite a general tendency to ruminate, may find music listening inconducive to ruminating (or inconducive in certain circumstances) and may have learned musical affect regulation behaviors that are incompatible with rumination. Nolen-Hoeksema and colleagues (Nolen-Hoeksema & Morrow, 1993; Nolen-Hoeksema et al., 2008) have often compared rumination with distraction, which they describe as a an "adaptive and instrumental alternative" to rumination (p. 401). Unlike ruminating on one's thoughts and feelings, which research has shown tends to reinforce or intensify a negative mood, distraction appears to have the opposite effect, decreasing the symptoms of negative affect for those in negative moods (Lyubomirsky et al., 1998; Lyubomirsky et al., 1999). Several studies have noted that individuals find musical engagement suitable for affect regulation through the strategy of distraction. Saarikallio (2008) identified Diversion (i.e., "For me, music is a way to forget

about my worries") as one of the seven regulation strategies included in the Music for Mood Regulation Scale (MMR), and Saarikallio et al. (2017) found that distraction was a common theme among the adolescents they interviewed regarding musical relaxation. Emotion regulation research in general suggests that the best activities for distraction are those that are pleasant and positively reinforcing (Nolen-Hoeksema et al., 2008), and those for whom music inspires a great deal of pleasure, including those who find sad music pleasurable (Schubert, 2007), may find that music provides the ideal tactic for distraction and the interruption of rumination.

Evidence for rumination on the individual ESR level might be found with a closer examination of the strategies being employed through music listening. This could be accomplished in a research design similar to the one employed in the present study if, when participants indicate an affect-regulatory motive for listening, they were subsequently prompted to provide information about the strategy they intended to enact to achieve their regulatory goal. This procedure has been employed in previous ESM research by Randall et al. (2014), who offered participants a selection of strategies that included "to focus on the situation" or "to distract from the situation". The inclusion of both rumination and distraction as strategies to be assessed at the time of listening may prove illuminating. That said, this approach rests on the assumption that people are aware of their motivations and strategy use, which they may not be (Zillmann, 1988, 2000).

While this study's central variable was the hedonic shift in mood valence that might be associated with music listening, future research should also look at rumination's impact on arousal. In addition to finding relationships with depression, research on the effects of rumination have also looked at the effects on anxiety, a negative state

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characterized by particularly high arousal. While the strongest relationships between rumination and psychopathology have been demonstrated with depression, Nolen-Hoeksema (2000) also found that rumination scores predicted the severity of anxiety symptoms. Research from social psychology has found that ruminating after stressful social events helps to maintain social anxiety (Kashdan & Roberts, 2007), and in the music realm, Nielsen et al. (2018) have found relationships among performance anxiety, post-event rumination, and performance quality. Given that music seems especially well suited for arousal modulation (Pelletier, 2004), and that motivations such as "relax" and "raise energy" are commonly reported both in this research and in prior studies (Randall & Rickard, 2017a, 2017b), these potential associations are worth closer study. Furthermore, as Randall & Rickard (2017b) also demonstrated that initial arousal can predict arousal change and also predict the energy levels/arousal of the listener's chosen music, a similar moderated mediation model to the one proposed in Figure 1 involving arousal may also be of interest.

ESM studies add a great deal to the overall picture of music listening, but causal connections should be further investigated through experimental research. Some studies, like those of Chen et al. (2007) and Larwood & Dingle (2018, 2021), have used a mood induction to induce sadness in their participants. However, no known music study has used a specific rumination induction. A suitable method for the induction of rumination has been created by Nolen-Hoeksema & Morrow (1993); this method involves asking participants to "focus on the meanings, causes, and consequences of their current feelings" for an eight-minute period. This induction has been used successfully in a number of studies that have linked rumination with symptoms of depression and other

mental health and well-being issues (e.g., Lyubomirsky et al., 1999; Watkins & Moulds, 2005). A pairing of rumination and mood induction could also be quite successful and it is not unprecedented in the music literature to pair a mood induction with another form of manipulation. For example, Chen et al. (2007) combined a sad mood induction with a manipulation of mood salience whereby some participants were instructed to focus specifically on their mood.

In addition to assessing relationships among rumination, initial valence, music valence, and valence change, the present study has contributed some rich descriptive data to the literature on everyday music listening. Prior research has found that music listening can accompany a great many activities in people's lives (Juslin et al., 2008; Randall & Rickard, 2017b; Sloboda et al., 2001). This was supported by the present findings which indicate that people reported engaging in a wide variety of daily activities while listening; furthermore, listening to accompany their daily activities was the most popular motivation for listening in the present dataset. Although music-accompanied activities were diverse and many, descriptive analysis of activity frequencies supported evidence from prior studies that activities such as traveling, walking, and working/studying are among the most common activities typically paired with music listening (Greb et al., 2019; Juslin et al., 2008; Randall & Rickard, 2017b). The present study also supports prior research on personal music listening (Randall & Rickard, 2017a; 2017b) that indicates that music listening on portable devices can take place in a variety of different locations.

Assessment of music background's associations with emotional responses to music in the literature has often been mixed, and an assessment of how music training

and experience relates to everyday music listening motivations and effects has often turned up non-significant results (e..g, Getz et al., 2014); this study has provided support to those prior findings with ESM data. Although some studies have found differences in listening behavior among trained musicians and those with no musical experience, other studies have suggested that formal knowledge of musical structures or experience playing an instrument is not a necessary prerequisite for the experience of strong emotions in response to music listening (Bigand et al., 2005). This is promising information, as it means that music listening as a resource for emotional management is available to listeners regardless of their musical background. A far more critical element to investigate, particularly in terms of listening motivations, might be importance of music in an individual's life or the degree to which they have the capacity to experience strong emotions in response to music.

A potential limitation of the present study, one that might account for differences between the present results and those obtained in other studies, may have to do with how mood state was assessed. The present study included only a dimensional assessment of mood valence, rated on a 7-point sliding scale and administered at the onset of a listening episode and again after five minutes. Dimensional models of affect like the one utilized here have been criticized for their inability to distinguish between emotional experiences that are usually located close to one another in two-dimensional space (Eerola & Vuoskoski, 2011). There are emotion/mood states that are similar to one another in terms of their valence and levels of arousal, such as fear and anger, that nevertheless represent qualitatively different experiences to the individual. Assessing affect and affective change using dimensional models cannot delineate those experiences, and this lack of

differentiation may make a difference in terms of the ways personal dispositions might affect outcomes. Rumination in particular has a significant relationship with depression (Nolen-Hoeksema et al., 2008), and studies that have found a relationship between rumination and music listening outcomes have targeted depressive symptoms and the related concept of sadness using discrete models of emotion like the POMS Depression subscale (Garrido & Schubert, 2015a) or the Discrete Emotion Questionnaire (Larwood & Dingle, 2021).

It has been further suggested in other research that the type of negative affect being experienced at the time of music listening may make a difference to the outcomes. For example, Taylor & Friedman (2014) found that people who were in disgusted and neutral moods showed a clear preference of happy-sounding music, while that preference was not demonstrated in listeners induced to feel sadness. In a questionnaire study of media use in different mood states, Greenwood & Long (2009) found evidence that people's behaviors when bored (or when attempting to regulate the experience of boredom) may function differently than when in other negative states. These authors also observed a predictive relationship between trait rumination, assessed as in the present study using the RRQ (Trapnell & Campbell, 1999), and the use of media when bored, although the form of media observed to be most popular in bored moods in their study was television, not music, while music was more popular in other negative mood states. That said, in the present study, Boredom/Habit was found to be the third most popular motivation for music listening. Although future research may wish to explore these distinctions using assessment tools of discrete affective states rather than dimensional ones, when collecting data via ESM, researchers must balance the use of tools that

provide the validity and reliability necessary to make solid inferences with a desire to reduce the onerousness of participation for respondents.

The present study was further limited in a number of ways. First, the generalizability of the present results to populations outside of adults residing in North America (or even to similar samples) may be limited. Although not all of the participants in this study were students, it is likely that many were, as recruitment endeavors, while making some use of social media (i.e., Facebook, Instagram, and Twitter), were centered around recruitment from university campuses. University students are a specific demographic and heavy reliance on them in psychological research limits generalizability to outside populations. The data pool was further limited by the fact that the MuPsych app is only available for Android devices, potentially narrowing the participant base.

The present study assessed only short-term affective outcomes, and cannot therefore draw any conclusions regarding potential long-term impacts of various music listening behaviors. While mood measures were taken at the onset of listening and again after five minutes, variables such as music valence were assessed at the five-minute mark only rather than at onset, in order to create the least disturbance to the five-minute listening period for which affective change would be evaluated. As such, those ratings may reflect what the participant was listening to at the end of the five-minute period but not the choice they had made at the onset. A five-minute period is long enough to have listened to one song in its entirety and started another, and the assessment as it was performed here does not preclude the possibility of cycling through multiple musical selections in that time period. Chen et al. (2007) found that temporal dynamics were important, and a minute-to-minute analysis of musical choices may have revealed

differences in musical behaviors between individual participants. Furthermore, as has been pointed out by others (e.g., Randall & Rickard, 2017b), a short-term decline in mood valence may not in and of itself be evidence of detrimental effects, as temporary worsening of mood may lead to beneficial outcomes if it results in feelings of catharsis or the purging of negative emotions (Larsen, 2000; Zillmann, 2000). Future studies that combine short- and longer-term mood measures can provide a more comprehensive assessment of impact.

As there was no in-person contact between researcher and participants in the present study and all data collection took place in the participants' own time, on their own personal devices, the present study is subject to the same limitations that ultimately plague internet-based research, including the possibility of non-serious responders (Reips, 2002). That said, this may have been minimized in the present research by the fact that participants were not compensated in any way for their participation and were offered the option to dismiss the prompts for ESR reports should they not wish to complete them at any time. However, should this issue be a concern for future researchers, it could be addressed by limiting all analyses, not just aggregated ones, to participants who had completed at least a minimum number of ESRs (i.e., five). As ESM studies tend to experience significant attrition rates (Hektner et al., 2007), this might be a way of maximizing the likelihood that participants who completed the full study were conscientious respondents with an investment in their participation. The massive uptick in online studies as a result of in-person testing being limited by COVID-19 lockdown restrictions since March of 2020 will undoubtedly highlight further pitfalls as well as solutions to issues created by this kind of no-contact data collection.

A final limitation has to do with the kinds of musical contexts and listening episodes sampled in the present research. Although experience-sampling methodology aims to obtain a representative sampling of a participant's daily life (Hektner et al., 2007), and although the creation of the MuPsych app greatly streamlined the process of data collection, it is still likely that there are music listening scenarios not sampled by the present study. Certain listening situations, such as while the participant is driving, for example, are likely inconducive to completing reports for information. Participants may also be less likely to respond to prompts while socializing with others out of a desire not to remove themselves from the social situation, and this may account for the relative infrequency of social motivations for listening in the present dataset. As such, interpretation of analyses that feature frequencies of various music selection behaviors and motivations for listening must keep in mind this caveat.

The present research offers insights into the everyday music listening experience, and the information presented herein makes a new and valuable contribution to the understanding of the factors that might drive various musical behaviors and influence their subsequent outcomes. Music listening via portable, personal devices is fast becoming a highly popular way of engaging with music (Randall & Rickard, 2017a, 2017b), and its potential to be a potent tool for the self-regulation of moods, emotions, and stress responses is increasingly supported by research utilizing a variety of research paradigms (Zoteyeva et al., 2016). The storage capabilities of the average personal device and the ubiquity of music streaming services such as Spotify and Pandora have rendered the music listening experience incredibly flexible, portable, and personalizable. Listeners in a variety of listening locations and social contexts can now exercise an unprecedented

degree of control over their listening experiences. Knowing, however, that prior research has suggested that music listening can have unintended outcomes (McFerran & Saarikallio, 2014), that it has the potential to be associated with a positive mood becoming negative (Randall & Rickard, 2017b), and that people are capable of reproducing generally unhelpful patterns of affect-regulatory behaviors through music listening, including the use of regulatory strategies generally deemed maladaptive (e.g., Chin & Rickard, 2013; Sakka & Juslin, 2018), the need to understand the circumstances under which music can be helpful versus unhelpful in maintaining well-being is critical.

This issue is perhaps especially critical in our current environment. The World Health Organization (WHO) declared in early March of 2020 that the spread of the COVID-19 virus had reached global pandemic standing, and worldwide, lockdown and social distancing measures, combined with the as-yet unknown trajectory of pandemic spread and subsequent effects, created serious cause for concern regarding the mental health of world citizens. Mental health issues such as depression have always been a matter of public health concern. The World Health Organization in 2015, for example, estimated that depression sufferers numbered more than 300 million people worldwide, and anxiety disorders are found to be similarly prevalent, and these two mental health issues and other related problems have grave personal, social, and economic consequences (WHO, 2017). Research is now beginning to suggest that these mental health issues have been compounded and intensified throughout the pandemic. A number of studies from different countries involving different populations of interest have suggested increases in depression, anxiety, loneliness and social isolation throughout the past year (e.g., Vinkers et al., 2020; Pieh et al., 2020; Ammar et al., 2020). Health care's

shift in focus to treatment of the virus and prevention of virus spread, combined with lockdown measures which have hindered access to traditional forms of mental health help (or altered their delivery in some way, such as the necessity of moving counseling and support group services to online platforms) have left many concerned about the degree to which individuals currently have (and have had) adequate tools with which to manage their emotional well-being (Machado et al., 2020).

Furthermore, there are educational implications as well. It has been suggested that affect regulation habits are learned, occasionally without conscious awareness on the part of the listener (Zillmann, 1988), and evidence suggests musical affect regulation habits can be acquired very young (Saarikallio, 2009). That said, studies like the present one may be used to inform educational programs targeting individuals' awareness of their own affect regulation habits enacted through music listening such as the Tuned In program designed by Dingle et al. (2016) and aimed at teaching emotion regulation skills and awareness through musical engagement. The young people who took part in the Tuned In program showed increased levels of emotional awareness and ability to regulate emotions adaptively. Furthermore, participants in studies such as that by Garrido et al. (2016) have indicated that the act of completing listening diaries or otherwise participating in research involving self-reporting on the music listening experience has the effect of increasing their awareness of their own music listening habits, and the effects the music has on them. Future studies should follow Saarikallio and colleagues lead in exploring musical agency (e.g., Saarikallio et al., 2020) and subsequent impacts on well-being.

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APPENDIX A:
RUMINATION-REFLECTION QUESTIONNAIRE
(Trapnell & Campbell, 1999)

Rumination Subscale

Participants are asked to indicate on a 5-point Likert scale (where 1 = strongly disagree and 5 = strongly agree) how well they feel each statement describes them. Reverse coded items are indicated with (-) where applicable. High scores indicate high levels of trait rumination.

1. My attention is often focused on aspects of myself I wish I'd stop thinking about.

2. I always seem to be rehashing in my mind recent things I've said or done.

3. Sometimes it is hard for me to shut off thoughts about myself.

4. Long after an argument or disagreement is over with, my thoughts keep going back to what happened.

5. I tend to "ruminate" or dwell over things that happen to me for a really long time afterward.

6. I don't waste time rethinking things that are over and done with. (-)

7. Often I'm playing back over in my mind how I acted in a past situation.

8. I often find myself reevaluating something I've done.

9. I never ruminate or dwell on myself for very long. (-)

10. It is easy for me to put unwanted thoughts out of my mind. (-)

11. I often reflect on episodes in my life that I should no longer concern myself with.

12. I spend a great deal of time thinking back over my embarrassing or disappointing moments.

APPENDIX B:
MUSEBAQ QUESTIONNAIRE
(Chin et al., 2017)

Module 1: Formal Training Subscale

Questions 1 and 3 are answered by indicating total number of years from a pull-down menu. Question 2 is assessed on a 5-point scale (where 1 = nothing and 5 = a great deal).

1. How many years of formal music training (theory) have you had?

2. How much do you know about music structure and theory?

3. How many years of formal music training (practice) have you had?

Module 1: Active Music-Making Subscale

Participants are asked to indicate responses on a 5-point scale (where 1 = never and 5 = all the time).

1. How often do you engage in professional music making (e.g., singing, playing an instrument, composing)?

2. How often did or do you practice or rehearse with an instrument or singing?

3. How often do you engage in music making as a hobby or as an amateur?

Listener Information

Who is listening?
Only me (speakers)
Only me (headphones)
Partner/spouse
Friend(s)
Family member(s)
Colleagues/workmates
Strangers/other

Listener Location

Where are you?
Home
Work
Travelling
School/university
Shops/market
Restaurant/café
Someone else's home
Other (inside)
Other (outside)

Listener Activity

What are you doing?	...cont'd
Working/studying	Cooking
Walking	Going to sleep
On a bus/train/plane	Exercising/sports
Nothing/waiting	Reading
Waking up	Physical work
In a car (commute)	Socializing (casual)
In a car (road trip)	Thinking/problem-solving
Eating	Creative arts/hobbies
Grooming/self-care	Being romantic
Housework	Dancing
Gaming/entertainment	Cycling
Relaxing/meditating	In a meeting
Focused music listening	Running/jogging
Web browsing	Shopping

Music Use Motivations

For my <Mood> →

To cope with a situation
To feel less <Mood>
To feel more <Mood>
To feel better
To maintain <Mood> mood
For comfort/support
To escape/forget my problems
To feel worse

For \<Activity\>	→	For background to \<Activity\>
		For enjoyment of \<Activity\>
		To enhance \<Activity\>
		To match energy of \<Activity\>
		For endurance
		To improve performance
		For focus/concentration
		To distract from \<Activity\>

For boredom/habit	→	To have something to do
		To keep a routine
		To pass the time

For entertainment/ enjoyment	→	For enjoyment/pleasure
		For entertainment
		To enjoy \<Activity\>

To relax/calm down	→	To lower energy of \<Activity\>
		To reduce stress/anxiety
		To calm down

To raise/ boost energy	→	To raise/boost energy
		To raise energy of \<Activity\>
		To celebrate
		To motivate myself

For thinking/ reflecting	→	For inspiration
		For motivation
		To be creative/to imagine
		To clear my mind
		To think about who I am
		To boost confidence/self-esteem
		To feel in control
		For a distraction

To focus on the music	→	For focussed music listening
		To hear music suggested to me
		To analyze the music
		To appreciate art/beauty
		To discover new music
		To hear a specific artist/album
		To immerse in the music
		To prepare for a festival/concert

To listen with <Listeners>	→	To entertain others
		To impress others
		To set the mood/atmosphere
		To introduce the music to others
		To socialize
		To bond/connect with others
		To celebrate with others
		To present an image of myself
		To express my identity/values

ELIZABETH KINGHORN

CURRICULUM VITAE

EDUCATION

PhD in Music Education (in progress)   **2015-present**
Collaborative Specialization in Music Cognition
University of Western Ontario, London, ON
- ◦ ABD as of February 2018; data collection and analysis complete, final document and defense in preparation. Anticipated defense: Summer 2021.
- ◦ Dissertation Title: "Musical Engagement, Response Styles, and Affective Outcomes: An Experience-Sampling Study of Personal Music Listening"

M.Mus in Music Education   **2013-2015**
University of Western Ontario
- ◦ M.Mus Research: "The effects of different acoustic environments on vocal intensity and perceived vocal effort in classically trained singers (a pilot study)" – collaboration with Dr. Ewan McPherson of the NCA

B.Mus in Music History/Theory   **1998-2004**
University of Toronto, Toronto, ON

TEACHING & RELEVANT WORK EXPERIENCE

Course Instructor – MUSIC 4810: Psychology of Music Education   **2018-2019**
University of Western Ontario
- ◦ Assumed all course instruction responsibilities for this pre-existing course (required for all undergraduate music education majors) during professor sabbatical for both F18 and W19 terms
- ◦ Responsible for all course curriculum delivery and assessment of student work

Course Instructor - MUSIC 3864: Music & Emotion   **2018**
University of Western Ontario
- ◦ Designed curriculum for this third-year elective course, open to music and non-music majors
- ◦ Responsible for all course curriculum delivery and assessment of student work

Research Assistant   **2016-present**
University of Western Ontario
- ◦ SSHRC-funded, multi-site research project on musical learning and practice
- ◦ Supervisors: Dr. Jonathan de Souza (Don Wright Faculty of Music), Dr. Jessica Grahn (Brain & Mind Institute), and Dr. Christine Carter (School of Music, Memorial University)
- ◦ Duties have included informally managing a small team of RAs, preparing ethics board applications at both sites, preparing experiment stimuli, recruitment and testing, co-writing a conference abstract, maintaining communication among research assistants and principal investigators, managing money for participant and other fees, and general organization

Teaching Assistant   **2014-2018/2020-2021**
University of Western Ontario
- ◦ Served as teaching assistant for MUSIC 3810/4810 (Psychology of Music Education) and MUSIC 1802 (Teaching and Learning Music)
- ◦ Supervisors: Dr. Kevin Watson (seven terms), Dr. Betty Anne Younker (two terms), Dr. Gabriela Ocadiz,(one term) & Prof. Kathleen Allan (one term)
- ◦ Duties included class attendance, grading and providing feedback on assignments and exams, lecturing/leading class discussions in person and via Zoom, and meeting with/advising students

Sessional Instructor of Voice (Department of Fine Arts & Music)   **2002-2003/2004-2014**
Algoma University, Sault Ste Marie, ON
- ◦ Taught applied voice to voice majors, minors, and non-concentration students
- ◦ Prepared students for final juries and recitals
- ◦ Served as juror for the grading of performance juries

Full-time Instructor of Voice, Piano, and Music History/Theory   **2002-2003/2004-2014**
Algoma Conservatory of Music, Sault Ste Marie, ON
- ◦ Taught voice, piano, music history and music theory to students of varying ages and skill levels
- ◦ Worked with students one-on-one and in ensemble settings in a variety of musical/vocal styles
- ◦ Maintained a full or near-full studio every year (anywhere from 30-50 students at one time)
- ◦ Prepared students for recitals, the Kiwanis Music Festival, Royal Conservatory and Conservatory Canada practical and theory/history exams, OMFA provincial competitions, and auditions
- ◦ Accompanied students for almost all performance opportunities

Part-time Instructor of Voice and Piano   **2019-2020**
Long & McQuade, London, ON
- ◦ Taught voice and piano to students of varying ages and skill levels
- ◦ Worked with students one-on-one in a variety of musical/vocal styles both in person and via Zoom and other online platforms

Director of Music   **2010-2013**
Precious Blood Cathedral, Sault Ste Marie, ON
- ◦ Served as pianist/organist and cantor for all weekly masses and special celebrations, including weddings and funerals, at the city's largest Catholic church
- ◦ Planned musical content for weekly masses including choosing hymns, mass settings, preludes, postludes, and choral anthems and worked with parishioners to choose and prepare music for funeral and wedding masses
- ◦ Conducted the choir and worked with guest soloists (vocal and instrumental)

Director of the LSSU Chorus, Adjunct Instructor of Voice (Dept of Fine Arts)   **2004-2006**
Lake Superior State University, Sault Ste Marie, MI
- ◦ Designed and delivered choral curriculum
- ◦ Instructed individual vocal students in a variety of vocal/musical styles

GRANTS

Ontario Graduate Scholarship (OGS; $15,000 annually)
◦ Awarded annually
◦ Held for the 2016-17, 2017-18, and 2018-19 academic years

UWO Musical Learning Across the Lifespan Pilot Study Award ($1,000)
◦ Funding awarded for Music, Cognition, & Brain initiative pilot study, "Pitch Discrimination is Influenced More by Timbre than Instrument Familiarity"

RESEARCH AND CREATIVE ACTIVITY

Kinghorn, E., & Randall, W. (2021). *Musical Engagement, Response Styles, and Affective Outcomes: An Experience-Sampling Investigation of Personal Music Listening.* Manuscript in preparation.

Kinghorn, E. (2019, August 5-7). *Primary and Secondary Motives for Personal Music Listening: Affect Regulation and the Question of Awareness* [Conference presentation]. Society for Music Perception and Cognition conference, New York, NY, USA.

Kinghorn, E. (2019, July 16-20). *Personal Music Listening for Affect Regulation: Distinguishing Primary from Secondary Motives* [Conference presentation]. International Symposium on Performance Science, Melbourne, VIC, AUS.

Kinghorn, E. (2017, December 3-5). *Musical Engagement and Emotion Regulation: The Role of Active Music-Making* [Conference presentation]. Australian Music Psychology Society in collaboration with the International Conference on Music & Emotion, Brisbane, QLD, AUS.

Kinghorn, E. (2017, July 30-August 3). *Musical Engagement and Emotion Regulation in Undergraduate \ Students: A Survey Study* [Conference presentation]. Society for Music Perception and Cognition conference, San Diego, CA, USA.

Kinghorn, E., MacPherson, E., & Watson, K. (2017, February 22-24). *Room Acoustics and the Singing Voice: The effects of environmental reverberation on vocal intensity and the perception of vocal effort in trained singers".* Desert Skies Symposium on Music Education, Tempe, AZ, USA.

Kinghorn, E., MacPherson, E., & Watson, K. (2016, July 24-28). *Voice & Acoustics: The effects of different acoustics environments on vocal intensity and perceived vocal effort in classically trained singers* [Conference poster presentation]. International Society for Music Education conference, Glasgow, UK.

Moore, E., Kinghorn, E., & McGarry, L. *Pitch Discrimination is Influenced More by Timbre than Instrument Familiarity.* Unpublished pilot data.

SERVICE

Society of Graduate Students in Music (SOGSIM)
University of Western Ontario
- ◦ Treasurer – September 2015-September 2018
- ◦ Graduate Student Representative, Honours & Awards Committee – 2015-16
- ◦ Program committee member, graduate student run annual conference WUGSOM – 2017, 2020
- ◦ GradPal graduate student mentor, 2019-20

Canadian Mental Health Association – Community Outreach
London, ON
- ◦ Volunteer with community outreach group "Keep the Music Playing"

Don Wright Faculty of Music/Department of Music Education
London, ON
- ◦ Volunteer with organization and execution of two major conferences, the biennial meeting of the International Society for the Philosophy of Music Education (June, 2019) and the joint Mayday Colloquium/Progressive Methods in Music Education conference (June, 2018).

PROFESSIONAL AFFILIATIONS

Society for Music Perception and Cognition (SMPC)
Member since 2015

Australian Music Psychology Society (AMPS)
Member since 2017

National Association for Music Education (NAfME)
Member since 2015

The International Society for Music Education (ISME)
Member since 2015

Ontario Music Educators Association (OMEA)
Member since 2015 (presently pending renewal)

Music, Cognition, & the Brain Initiative, Western University
Member since 2015

SPECIAL SKILLS/QUALIFICATIONS

- ◦ Excellent interpersonal skills refined over many years of teaching, directing, and engaging with music, education, and academic communities
- ◦ Computer skills include basic programming in MATLAB and Python; statistical analysis using SPSS and Mplus; Excel; use of online learning systems (e.g., OWL) and online experiment hosting sites (i.e., Pavlovia); basic video and sound recording and editing capabilities; sounda analysis using Praat and Audacity; VoiceThread, Powerpoint, Prezi, and other presentation formats