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The consoling power of music

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The Consoling Power of Music:

The Role of Emotions and Musical Aspects

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The Role of Emotions and Musical Aspects

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Father, why are all the children weeping?
They are merely crying son.
Oh, are they merely crying, father?
Yes, true weeping is yet to come.

~ The Weeping Song, Nick Cave and the Bad Seeds (1990)

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Chapter 1: Introduction

Music and Emotion

Music plays an essential role in our daily lives, and we listen to it for more reasons than mere entertainment. Humans have a predisposition for enjoying and making music from an early age to the end of their lifespan (e.g., Honing 2012; Lamont, 2008; Saarikallio, 2011; Trehub, 2001; 2003). One can think of such musical abilities as recognizing a tune, tapping and clapping along with a beat, whistling, and singing (e.g., Honing, 2018). Archeological evidence strongly suggests that humans produced musical instruments already 40,000 years ago, and it is reasonable to assume musical behavior predates those (e.g., Killin, 2018). Moreover, music is present in all cultures and plays a role in much of our daily behavior (Mehr et al., 2019). In modern days, music listening is a popular pastime (Lonsdale & North, 2011; Rentfrow & Gosling, 2003) and often occurs while engaged in other activities, such as sports, personal care, in transit, work, chores, and groceries (e.g., Juslin & Laukka, 2004; Greasley & Lamont, 2011; North et al., 2004; Sloboda et al., 2001).

Music can evoke a wide variety of positive and negative emotions in listeners, for example, happiness, wonder, and sadness, but also mixed emotional states such as being moved (e.g., Hunter et al., 2008; Hunter et al., 2010; Juslin & Laukka, 2004; Menninghaus et al., 2015; Zentner et al., 2008). This quality is one of the foremost reasons people listen to music (e.g., Juslin, 2019; Schäfer et al., 2013; Zentner et al., 2008). Moreover, these emotional responses to music tend to be experienced as stronger and more intense when people listen to self-chosen music (Blood & Zatorre, 2001; Groarke & Hogan, 2019; Liljeström et al., 2012; Lynar et al., 2017; Salimpoor et al., 2011; Völker, 2021). Technological developments, for example, the Walkman, discman, iPod, and smartphone with various applications, have made it increasingly possible for people to engage with the music of their own liking and choosing at any given time (Krause et al.,2015). Engaged listeners hear more music per week, more often listen to self-chosen songs, and do so when engaged in different activities than less engaged listeners (Greasley & Lamont, 2011). Additionally, some of these emotional musical experiences can be profound and intense and can be recalled years after they have occurred (e.g., Gabrielsson, 2011; Gabrielsson & Wik, 2003). These peak emotional experiences may be accompanied by intense physiological responses such as chills (e.g., Bannister, 2020; Panksepp, 1995; Salimpoor et al., 2011) and tears (Cotter et al., 2018; 2019).

The difficult, fundamental question of how music can evoke emotion in listeners has received considerable research attention in the past two decades. There are many general emotion theories and different ways to measure them (e.g., Scherer, 2005), and various theories,

models, and measurements are also applied to the study of music and emotion (see, e.g., Eerola & Vuoskoski, 2011; Eerola & Vuoskoski, 2012). Recent investigations have not yielded a singular explanation on how music can evoke emotion. Rather, it seems to involve multiple mechanisms or processes that work together and tend to be specific to the individual listener (e.g., brainstem reflexes, rhythmic entrainment, episodic memory), the piece of music (e.g., musical expectancy, contagion), and situational factors (e.g., Juslin & Vjästfall, 2008; Juslin, 2013; 2019; Huron, 2015). The existence of these various mechanisms[1] and their working together, in parallel or in sequence, might be the reason music can evoke mixed emotions (Juslin, 2019; Huron, 2015). One can think of a happy-sounding song that evokes feelings of nostalgia due to its connection with a pleasant experience in the past, but also sadness when it is heard at a funeral.

Music and Mood Regulation

Music's ability to evoke emotion in listeners, and its widespread availability, make it an ideal candidate as a regulator of emotion and mood (Saarikallio & Erkkilä, 2007; Schäfer et al., 2013; Van Goethem & Sloboda, 2011). Emotions can be defined as short, intense affective responses that usually relate to a direct event or stressor, while moods tend to be longer in duration, are less intense, and their causes tend to be more diffuse and less focused on singular events (e.g., Baltazar & Saarikallio, 2016; 2019; Frijda, 2008; Gross, 1998; Juslin, 2019; Juslin & Sloboda, 2010; Scherer, 2005). Mood regulation is the process of monitoring, evaluating, or modifying one's emotional experience to feel better or maintain a positive mood (Gross, 1998; 2002; Thompson, 1994). Adaptive and effective emotion and mood regulatory strategies are crucial to an individual's well-being (Aldao & Nolen-Hoeksema, 2012; Gross, 2002). In addition to music, other ways to regulate one's mood include exercising, eating something, watching a movie, engaging with others, and more (e.g., Thayer et al., 1994). People that are highly engaged with music more often use it to enhance or put themselves in a specific mood than less engaged listeners (Greasley & Lamont, 2011).

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[1] Juslin & Vjästfall (2008) and Juslin (2013; 2019) collectively refer to several of these mechanisms as the BRECVEMA-framework. This acronym stands for Brain Stem Reflex, Rhythmic Entrainment, Evaluative Conditioning, Contagion, Visual Imagery, Episodic Memory, Musical Expectancy, and Aesthetic Judgment. For a discussion of this framework and recent investigations see Juslin (2013; 2019), Juslin & Vjästfall (2008), and Völker (2021a; 2021b).

Introduction

In their seminal work, Saarikallio and Erkkilä (2007)[2] identified and characterized the following mood-regulatory strategies through music in adolescents: entertainment, revival, intense sensation, diversion, discharge, mental work, and solace. These strategies consider distinct reasons and goals for when and how to engage in mood regulation through music. Entertainment, for example, focuses on enhancing or maintaining a positive mood and atmosphere, discharge is about releasing anger and sadness through listening to music that matches these emotions, while the goal of solace (synonymous with consolation and comfort) is to feel accepted and understood when feeling sad or troubled (Saarikallio 2008; 2012; Saarikallio & Erkkilä, 2007). Recently, researchers started to investigate these strategies more systematically. Like studies into the mechanisms that elicit musical emotions (e.g., Juslin & Vjästfall, 2008; Juslin, 2013), investigations on mood-regulatory strategies focus on the mechanisms involved and their associated personal and contextual factors (e.g., Baltazar & Saarikallio, 2019; Ter Bogt et al., 2017). The present dissertation aims to expand our knowledge of how music consoles listeners.

Consolation through Music

The description of consolation as a means to heal suffering when feeling down and troubled dates back to ancient times. Historically, most literature on consolation is written in the domains of philosophy and religion and scholarly work on solace outside of these areas is limited (see Klass, 2013, 2014; Norberg et al., 2001). *Consolatio* was a literary genre in ancient Greece and Rome (e.g., Scourfield, 2015) that included writings aimed to relieve the suffering of the bereaved after the loss of a loved one and other personal losses. These writings could be both personal and of a more abstract, philosophical nature. One of the most well-known examples is *The Consolation of Philosophy* by Boethius, which he wrote while being incarcerated in the face of his eventual execution.

Similar to the *consolatio*, human history is filled with examples of music that aim to address or alleviate suffering and console listeners. One can think of the lament, and the traditional catholic requiem mass with its many magnificent iterations in the classical music repertoire: Mozart's *Requiem*, Brahms' *Ein Deutsches Requiem*, and more recently, Preisner's *Requiem For My Friend,* and John Rutter's *Requiem*. However, this is not to say that all classical consolation music is rooted in religious traditions. An example is the *Kindertotenlieder* by

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[2] Several theories and models on emotional self-regulation through music have been investigated in recent years. See Baltazar & Saarikallio (2016) for a discussion and review that focuses on their goals, strategies, tactics, and mechanisms.

Gustav Mahler. Moreover, vocal elements are not necessary; consider, for instance, Chopin's *Marche funèbre* from his second sonata, Opus 35.

Songs of solace are not limited to the classical repertoire, as demonstrated by the innumerable amount of popular music dealing with suffering, such as heartaches, loss, and more. The Beatles' *Hey Jude*, for instance, was written by Paul McCartney for John Lennon's eldest son to help him cope with his parents' imminent divorce (*Paul McCartney Breaks Down His Most Iconic Songs | GQ*, 2018). Eric Clapton wrote *Tears In Heaven* after the loss of his son (*The Truth about Clapton and the Death of Our Son*, 2000).

Given these examples, consolation can be described as finding meaning, understanding, and acceptance after the experience of a negative, possibly unchangeable, event (see Norberg et al., 2001; Ter Bogt et al., 2017). It is also clear that offering and finding solace is a profoundly social behavior. In times of great distress, humans seek out each other's company to share in their suffering and to offer support, often in the form of a ritual. A prime example are the countless memorial concerts that were held after the September 11th attacks on the World Trade Center in New York in 2001 (see Stein, 2004), but also the attempts of people to jointly make music during the global Covid-19 pandemic either online, or in improvised social settings, such as from their balconies (Hansen et al., 2021). In his recent book *On Consolation: Finding Solace in Dark Times*, historian Michael Ignatieff (Ignatieff, 2021) also emphasizes the many social aspects of consolation. Interestingly, Ignatieff's interest in this subject peaked after a profoundly moving experience during a performance of the psalms by a choir. Even though Ignatieff mainly focuses on the lyrical aspect of the psalms, the music sung by a choir forms an essential part of this experience.

The description of finding solace through music as a mood-regulation strategy by Saarikallio and Erkkilä (2007) incorporates many facets of the abovementioned examples. Based on a qualitative study among adolescents, these researchers describe finding solace through music as a state that is preceded by feeling down and troubled; that mainly occurs when listening to music as opposed to making music; when listening in solitude; and listeners tend to put a lot of emphasis on the lyrics (Saarikallio & Erkkilä, 2007).

Several researchers investigated this characterization further. Recent findings by Ter Bogt and colleagues (2017) demonstrate that consolation through music is a common regulation strategy among young adults and adolescents. It is sought after hardships and when dealing with daily hassles and stressors, and women tend to employ this strategy more often than men

(Ter Bogt et al., 2017). These gender differences are, however, small or absent in other studies (Saarikallio, 2008; 2012). Research conducted during the Covid-19 pandemic also shows that music is used as a source of solace during these trying times (Fink et al., 2021). A further finding by Fink and colleagues is that people who experience a (sudden) increase in negative emotion tend to turn to music for consolation more than those who experience a decrease in positive emotion (Fink et al., 2021). The use of music during the corona pandemic further confirms recent findings that music can serve as a social surrogate, i.e., music can serve as a substitute for social interactions when direct contact with others is not possible (Fink et al., 2021; Schäfer & Eerola, 2020; Schäfer et al., 2020). Solace seeking might furthermore be a healthier mood-regulatory strategy than other strategies, such as discharge, i.e., the venting of negative emotions (Carlson et al., 2015). A potential explanation that follows from Saarikallio and Erkkilä (2007) is that discharge often goes hand in hand with increased negative emotions (anger, sadness) that are subsequently vented. The core of consolation is accepting and finding meaning to counter negative feelings that are associated with a particular situation.

Listeners that use music for consolation prefer familiar and favored songs for this purpose, and they value these for their aesthetic qualities and the feelings they evoke (Baltazar & Saarikallio, 2019; Saarikallio et al., 2013; Ter Bogt et al., 2017). Consolatory music may mostly be sad as opposed to happy (Taruffi & Koelsch, 2014). Listeners attach much value to the lyrics of a song (Baltazar & Saarikallio, 2019; Ter Bogt et al., 2017; Van den Tol & Edwards 2013; 2015) and memories that are associated with the music (Baltazar & Saarikallio, 2019; Taruffi &Koelsch, 2014; Van den Tol & Edwards, 2015). These lyrics and memories may also help them feel more connected to significant others (Van den Tol & Edwards, 2015).

The studies above provide valuable insights into music and consolation, but multiple questions and gaps in our knowledge remain. Most of these studies have focused on adolescents and younger adults (Baltazar & Saarikallio, 2019; Saarikallio, 2008; Saarikallio & Erkkilä, 2007; Ter Bogt et al., 2017), while there is evidence that, as people age, the role of music, and mood regulation through music specifically, changes (Groarke & Hogan, 2016; Leipold & Loepthien, 2015; Saarikallio, 2011; Shiffris et al., 2015). More precisely, while younger adults focus more on mood regulation and social connections through music, older adults value eudaimonic functions more (Groarke & Hogan, 2016). These eudaimonic functions include peak emotional experiences, flow, transcendence (Groarke & Hogan, 2016),

and nostalgia (Sedikides et al., 2016) and represent some form of personal relevance and meaning.

Furthermore, several aspects of the emotions and feelings that are associated explicitly with listening to music when seeking solace remain unclear. We also have little insight into the properties of crying over music. This peak emotional experience often occurs in response to music and is potentially self-soothing (Gračanin et al., 2014). However, until recently, crying over music has received little research attention (Cotter et al., 2018; 2019).

Lastly, musical and lyrical characteristics reportedly play a crucial role when using music to experience solace, but there appears to be little insight into the relevant song elements or lyrical properties. An additional question is how these relate to music and song texts not (often) used for consolation. A prime example of music used for consolation is its application during funeral rites, but there was until recently little attention for the properties of the music used at funerals (see Mollenhorst et al., 2016).

Dissertation Goals and Research Questions

The studies in this dissertation aim to further explore the role of music listening in consolation. The general objectives are to better understand this mood-regulatory strategy, its associated behavior, and the characteristics of the music we use for this purpose. Several questions are central to this investigation:

- How common is listening to music to find solace, and how does it relate to other self-soothing behaviors?
- In what kind of situations do we seek consolation through music, and what are the associated listening behavior and emotional experience characteristics?
- What are the properties of crying over music, and does crying over music differ from crying over actual events?
- What are the specific, possibly distinctive, musical and linguistic features of funeral music?
- With regard to other self-soothing behaviors; is there an association between consolation through music and emotional eating?

Taken together, the studies presented in this thesis may contribute to our understanding of when and how people can successfully apply music to feel consoled. Furthermore, they may prove helpful in understanding more general emotional behavior, such as consolation itself,

but also crying, which is common in our daily lives but of which our knowledge is still limited.

Dissertation Outline

This dissertation consists of one literature review, four empirical studies, and a concluding chapter. **Chapter 2** provides a general introduction into music and emotion, several of its functions and uses, and an overview of several research papers discussing music's power to influence perception. A key concept in this chapter is how music is a powerful emotional stimulus that affects how we perceive and experience our inner and outer world. Listeners actively and subconsciously use music to manage their emotions and moods. They use music to express their thoughts and feelings, and to connect with others, for instance, through the music played during specific rituals, e.g., weddings and funerals.

The focus of **Chapter 3** is on music listening to seek consolation. People often turn to music when feeling down and troubled, and there are various strategies through which they can engage with music to feel better. This chapter explores what antecedents make listeners look for solace in music, compares music listening to potentially other sources of comfort, investigates the situational context, and describes the emotional experience.

Crying (i.e., the shedding of tears for emotional reasons) is often mentioned as a response to music and can be (self-)soothing (Gračanin et al., 2014). Until recently, tears in response to music received little research attention (Cotter et al., 2018; 2019). **Chapter 4** delves deeper into the phenomenon of crying over music and investigates antecedents, frequency, time of day, the self-reported accompanying emotional and physiological experiences, response of others to these tears, and lastly, differences between men and women.

Lyrics are often said to play a central role in a person's liking of a specific song and why this song is listened to in certain situations. Listeners often seek consolation through music after losing a loved one, and, unsurprisingly, music therefore plays an inextricable part during funeral rites. However, few studies have addressed funeral music, and we know little about the musical and lyrical characteristics of popular, often heard songs (see Mollenhorst et al., 2016). **Chapter 5** considers the musical and linguistic properties of a selection of songs popular during Dutch funeral rites.

Most of the previous chapters considered music listening as consolation in a fundamental way. **Chapter 6** focuses on a potential practical application of music and solace and music

and mood regulation in general. Listening to music is only one way for people to regulate their mood. Another strategy might be eating; consider, for instance, the term comfort food. That expression is well-known in popular media. A recent commercial on Dutch television, for example, portrays a woman with a heartache shopping for sweets, such as chocolate and ice cream, to handle her grief. The advert ends with the sentence 'At Aldi, you pay a lot less for the comfort/consolation you deserve' ('Bij Aldi betaal je een stuk minder voor de troost die je verdient.'; *ALDI – Net Zo Liefdesverdriet, Maar Dan Goedkoper.*, 2022). However, repeated emotional eating is a stress response that may have long-term adverse effects on one's health. Chapter 6 reports the results of a study that investigated whether listening to music can serve as a potential alternative to emotional eating. In this study, possible associations between the various mood-regulatory strategies through music as identified by Saarikallio and Erkkilä (2007), and measures of emotional eating and well-being, are explored.

Lastly, **Chapter 7** provides a general discussion of the findings of the empirical studies in this dissertation and discusses the implications. In addition, suggestions for further research are provided.

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Chapter 2: Music Influences Ratings of the Affect of Visual Stimuli[3]

Abstract

This review provides an overview of recent studies that have examined how music influences the judgment of emotional stimuli, including affective pictures and film clips. The relevant findings are incorporated within a broader theory of music and emotion, and suggestions for future research are offered.

Music is important in our daily lives, and one of its primary uses by listeners is the active regulation of one's mood. Despite this widespread use as a regulator of mood and its general pervasiveness in our society, the number of studies investigating the issue of whether, and how, music affects mood and emotional behavior is limited, however. Experiments investigating the effects of music have generally focused on how the emotional valence of background music impacts how affective pictures and/or film clips are evaluated. These studies have demonstrated strong effects of music on the emotional judgment of such stimuli. Most studies have reported concurrent background music to enhance the emotional valence when music and pictures are emotionally congruent. On the other hand, when music and pictures are emotionally incongruent, the ratings of the affect of the pictures will in- or decrease depending on the emotional valence of the background music. These results appear to be consistent in studies investigating the effects of (background) music.

Music Influences Ratings of the Affect of Visual Stimuli

Music plays an important part in many people's lives. This is the case for all of the world's cultures and has been so since the early development of mankind as a social species (e.g., Cross, 2003; Dissanayake, 2006, 2008). Many of our daily activities are accompanied by music in both social and work settings. In fact, most of the time music is listened to, it is heard as background during other activities (Juslin & Laukka, 2004; Sloboda et al., 2001). With the development of mobile sound carriers since the late 1970s from walkmans to mp3-players and smart phones today, it is now possible to listen to music at any moment of the day, and music is therefore more salient in our daily lives than ever before.

It has been established that music can have substantial effects on mood and behavior (e.g., Saarikallio, 2010), in consumer behavior (see Garlin & Owen, 2005 for a review), and in music therapy (see Aldridge, 2004 for a review). However, despite music's many uses and its pervasiveness in our society, there is no consensus as to its origins and evolution. While some scholars view music as an evolutionary by-product of language (e.g., Pinker, 1997), others point out the important roles music has played throughout the ages in our history and still plays in our current society, particularly music as an instrument to promote social cohesion (see Cross, 2003; Huron, 2003 for reviews). It was recently established that newborn infants already possess the ability to recognize the beat in music (Winkler et al., 2009) and this skill may be crucial to the further development of music in our species (Honing, 2012). The ability to recognize beat at birth supports the idea that the competence to perceive and enjoy music is innate to our species (see Trehub, 2001). It is important to realize that musical behavior encompasses much more than the predominantly western view of professional musicians and performers i.e., that making music requires special talents. In a broader perspective, musical behavior involves the ability to recognize and sing along with tunes, to enjoy melodies and to respond rhythmically by, for instance, dancing or clapping along (e.g., Dissanayake, 2008).

Musical experiences are often described as very rewarding in nature, and the ability of music to evoke emotion in its listeners may contribute greatly to its appeal (Zentner et al., 2008). In fact, one of the most important reasons for listening to music is its ability to elicit strong emotion in listeners (Juslin & Laukka, 2004; Sloboda & O'Neill, 2001). The areas of the brain that are activated by emotional music are similar to those associated with such strongly rewarding activities and stimuli as games, drugs, food and sex (e.g., Blood & Zatorre, 2001; Brown et al., 2004; Mitterschiffthaler et al., 2007; Salimpoor et al., 2011). A recent study by Molet et al. (2013) suggested that this ability to enjoy music may be unique to humans.

Despite music's widespread use as a regulator of mood (e.g. Saarikallio, 2010), and as a source of emotion in many areas of life, there is still discussion as to how and why music elicits emotion in listeners (see Sloboda & Juslin, 2001; Zentner et al., 2008), and even if emotion in music is not only recognized rather than actually felt by listeners (Scherer & Zentner, 2001). This problem may in part be due to the ongoing discussion of what an emotion is (Sloboda & Juslin, 2001) and due to the fact that current theories of emotion may not be ideally suited to describe the emotions expressed or induced by aesthetics (Frijda & Sundararajan, 2007) and particularly music (Dissanayake, 2006; Zentner et al., 2008).

The dimensional model of emotion is currently one of the dominant models (Russell, 1980), and it is also widely used in the study of musical emotions. This model suggests two orthogonal dimensions of emotion, valence and arousal, which together form four quadrants of affective space. Categorical descriptions of emotion are often used in combination with the dimensional model to describe affect, for instance, happy and excited correspond to high valence and high arousal, while depression and sadness are examples of emotional states low in both valence and arousal. There are, however, some limitations concerning the dimensional model when it comes to studying music, for instance, sadness and depression take up similar positions within affective space but are qualitatively different emotions (see Juslin & Laukka, 2004). In addition, the dimensional model may not be sufficiently sensitive to differentiate between the nuances of musical emotion (see Juslin & Laukka, 2004; Zentner et al., 2008). More precisely, although it may be able to differentiate between basic perceived emotions, it is probably unfit to detect subtle differences within those emotions. Not all emotions are perceived or felt when listening to music, and there is still discussion on what emotions can be expressed or induced. Jealousy is an example of an emotion that is hardly ever experienced through music. Juslin and Laukka (2004) established that the emotions of happiness, sadness, tenderness, anger, pride and fear are the most often expressed by music, while being moved, curiousness, amazement, enchantment, nostalgia, solemness, happiness, tenderness, and sadness are the emotions commonly induced by music. Zentner et al. (2008) listed the following nine emotions as being generally induced by music, some of which overlap with those of Juslin and Laukka (2004): wonder, transcendence, tenderness, nostalgia, peacefulness, power, joyful activation, tension and sadness.

Despite their findings and suggestions for a more refined labelling of musical emotions, Zentner et al. (2008) note that the use of categorical labels of emotion and the dimensional model may suffice when describing perceived affect in music. In turn, happy, sad and fearful

emotion in western music can be recognized cross-culturally (Fritz et al., 2009). Furthermore, affect in music can be recognized in very short excerpts. There is even no difference in the accuracy of judgment between excerpts as short as 300ms and longer passages (Bigand et al., 2005; Krumhansl, 2010). Music is therefore a powerful elicitor of emotion, and pervasive in our daily lives in many situations. The goal of this contribution is to discuss the research on how music influences ratings of affect of visual stimuli, mainly emotional pictures, and to place these findings in a broader framework of emotion.

Effects of Music on the Perception of Affective Pictures

The number of studies investigating the issue of whether, and how, music affects perception of emotion is limited. This is even more surprising, since the practice of studying the combined presentation and integration of auditory and visual information has been going on for several decades (De Gelder & Vroomen, 2000; McGurk & MacDonald, 1976). In addition, it has been repeatedly demonstrated that an emotional stimulus, including music, can effectively influence one's perception, even when this percept is not emotional in nature (Jolij & Meurs, 2011; Zadra & Clore, 2011). Studies investigating affective integration from different modalities have mainly focused on combining emotionally spoken words with facial expressions (e.g., De Gelder & Vroomen, 2000). The past decade has witnessed an increase in studies using music as the source of emotion in the auditory domain. An overview follows of the experiments that have explored the effects of music on the evaluation of pictures (Table 1 provides a schematic overview of the studies used in this review). Studies are discussed in terms of their methodology, findings and conclusions. We made a distinction between experiments presenting music at the same time as the visual stimulus, and studies that use music as an emotional prime. Another recurring methodological theme is congruence/incongruence, i.e., if the emotions of the visual and auditory stimulus match or do not match each other. Unless specifically stated otherwise, all music discussed in this review is instrumental without vocals or text.

Music Presented while Rating Pictures

Baumgartner and colleagues (2006a) established that music can enhance the experienced emotion of affective pictures. These investigators used musical stimuli of 70s in length representing fear, sadness and happiness, with visual stimuli selected from the same discrete categories of the International Affective Picture System (IAPS; Lang et al., 1995). All pictures contained humans or human faces. These investigators recorded the EEG while

participants were asked to rate the fear, sadness and happiness of each picture and participants' involvement, on 5-point Likert-scales. In addition, heart rate, skin conductance, respiration and skin temperature were recorded. A mood induction procedure was used in which participants were instructed to place themselves in the same mood as represented by the emotional stimuli (both music and pictures), and all stimuli were rated in separate music and picture conditions as well as a condition in which music and pictures were presented together. Self-reported ratings of happiness, sadness, fear and involvement demonstrated an enhanced effect of music on the judgments made by participants on all three picture categories in the combined condition. Psychophysiological findings and alpha-power-density as measured by EEG in particular, revealed increased effects for the combined music and picture conditions compared to pictures or music alone, suggesting music enhanced the experience of the affective pictures.

This finding that music enhances the experienced emotion induced by affective pictures was replicated by Baumgartner et al. (2006b). Sad, happy and fearful pictures were presented to participants while they were listening to congruent sad, happy and fearful music excerpts of 44s in length or in a condition with pictures alone. Participants were again instructed to try to feel the depicted moods of both music and pictures. Compared to a condition with just pictures, affect was enhanced in a picture and music condition. Musical stimuli were the same as those used in Baumgartner et al. (2006a), and pictures originated from the IAPS or were collected by the authors (Lang et al., 1995) and contained humans or human faces. Self-reported measures of discrete emotions demonstrated an enhanced emotional experience and increased involvement in the combined music and picture condition compared to pictures alone. fMRI revealed increased activation in areas of the brain associated with emotion processing for the combined condition, most importantly in the fusiform gyrus (FG) and areas involved in auditory processing like the superior temporal gyrus (STG). In the picture only condition, increased activation in areas of the brain associated with cognitive processes including the dorsolateral prefrontal cortex was evident. However, no fMRI-scans were made for a music only condition, so there was no certainty as to whether the findings could be attributed to music alone or to the combination with pictures. The investigators concluded that the combined congruent presentation of emotional auditory and visual stimuli automatically arouses strong feelings and emotional experiences in listeners, whereas the picture only condition leads to a more cognitive evaluation of the percept.

Jeong et al. (2011) also explored self-ratings of valence and neurophysiological (as measured by fMRI) effects of both congruent and incongruent happy and sad music on happy and sad facial expressions. Participants made judgments on a scale ranging from -7 (saddest) to +7 (happiest) for music, picture and combined conditions. Their results revealed a significant effect of music on ratings, demonstrating that judgments were more positive with happy music than with sad music and vice versa. In agreement with Baumgartner et al. (2006b), this study also demonstrated increased activation in the fusiform gyrus (FG) and the superior temporal gyrus (STG), while activation of the FG was found to be the greatest for incongruent conditions. The authors suggested that during incongruent conditions there is a shift to the regions involved with processing facial information, while the congruent conditions result in increased activation in areas relating to auditory stimuli, i.e., music.

The modulating effect of music on the rating of facial expressions is not limited to measurements of valence or arousal. A recent study demonstrated music to affect empathy-related judgments for pictures of individuals that were either crying or angry (Hanser et al., 2015). In this study, participants rated crying, angry, yawning and smiling facial expressions on a 9- point scale on dimensions of kindness, pleasantness and attractiveness, while simultaneously listening to sad, calm, angry and happy music. When criers were rated with sad and calm music, they were judged as being kinder and more pleasant than with no music, while calm music made angry people look less kind, pleasant and attractive. These investigators suggest that their findings may help explain why sad or soothing music is used during rituals of loss. The effect of calm music on the rating of angry faces emphasizes the importance of investigating non-congruent music and picture combinations. No effect of music was reported on ratings of smiling and yawning pictures.

Music as the Emotional Prime

The four previously discussed experiments all presented music simultaneously with the visual stimuli. Music has, however, also been used as an emotional prime played before a series of affective pictures are presented. Logeswaran and Bhattacharya (2009) gathered valence ratings as well as ERP-data on how happy and sad music influenced happy, sad and neutral faces in both congruent and incongruent combinations. Participants made judgments on a 7-point scale rating the perceived valence of the facial stimuli and were instructed to try and feel the emotion of the musical stimulus. Unfortunately, the valence of the musical stimuli (happy, sad) was not measured in this experiment. Results showed that when happy music preceded a happy/sad picture, this picture was rated as more positive than with sad music and vice versa.

This effect was largest when judging neutral pictures. The observation that neutral stimuli are more affected by the emotion of a consecutive stimulus was established previously with voices and faces (Massaro & Egan, 1996), and with emotional words and faces (De Gelder & Vroomen, 2000). Explicit emotional judgments were not measured during the ERP-part of their experiment, but instead, participants had to respond when the face was that of a woman. ERP-data revealed effects in the early stages of information processing which the authors attribute to an early integration of the auditory and visual stimuli.

Chen et al. (2008) also reported an early, possibly subconscious, integration of happy and sad affective pictures with happy and sad classical music as emotional primes, while Spreckelmeyer and colleagues (2006) reported such early ERP-components for IAPS-pictures that were combined with voices.

Even though affective space consists of the two dimensions valence and arousal (Russell, 1980), the latter has largely been neglected in the current line of cross-modal research with music, despite findings that suggest that the rewarding nature of music is directly linked to the arousal dimension (Salimpoor et al., 2011). Marin and colleagues (2012) explored effects of music on ratings of arousal and valence of IAPS-pictures (Lang et al., 2005), with music as an emotional prime. In addition, this is the first study to date to explore all four quadrants of affective space instead of just happiness and sadness. These investigators carried out three experiments in which participants judged musical excerpts (romantic piano music) and pictures on 7-point Likert scales. Experiment I served as careful pretesting of stimuli while experiments II and III explored effects of music on the IAPS-pictures. The authors reported effects for arousal but, surprisingly, not for emotional valence. Shifts in arousal reflected the emotional quality of the music, i.e., high arousing music increased perceived arousal of pictures, while less arousing music decreased arousal ratings. In addition, while pleasantness ratings were not significantly affected, unpleasant music led to higher arousal ratings of visual stimuli. The lack of effect for emotional valence is attributed to the selection of musical stimuli that varied less in valence than in arousal, the IAPS-pictures that were visually complex, or the specific combination of the music and the visual stimuli. In combination with previous research (e.g., Logeswaran & Bhattacharya, 2009), the authors put forth the highly interesting hypothesis that it may be easier for music to affect the valence of facial expressions compared to complex IAPS-pictures due to the highly social nature of both music and these expressions. The authors further make a strong case for careful monitoring and (pre-)testing of stimulus materials due to possible effects of gender, musical expertise, and

familiarity, or effects that are specifically related to the stimulus material. They reported higher levels for arousal in unpleasant musical stimuli when this was coupled with formal musical training. Men also provided higher ratings of arousal than women in this study.

Table 1. Schematic overview of the Reviewed Studies.

Authors	Stimuli and Design	Findings	Conclusions
(1) Baumgartner et al., 2006a	Participants: 24 women	Combined congruent conditions	Music enhances the emotional
	Stimuli: 3 pieces of classical music	increased experienced affect as well	experience of affective pictures.
	(happy, sad, fearful) and 48 pictures	as involvement compared to music	
	in the same categories.	or pictures alone. This is supported	
	Measures: ratings of happiness,	by EEG Alpha-power density.	
	sadness, fearfulness and		
	involvement on 5-point scales.		
	EEG-recordings and additional		
	psychophysiological measurements.		
	Design: congruent pictures (shown		
	for 4.375s) were rated while		
	listening to music (70s). Music and		
	picture control conditions were		
	measured.		

(**Table 1**. Continued)

Authors	Stimuli and Design	Findings	Conclusions
(2) Baumgartner et al., 2006b	Participants: 9 women Stimuli: 3 pieces of classical music (happy, sad, fearful) and 54 pictures in the same categories. Measures: ratings of happiness, sadness, fearfulness and involvement on 5-point scales. fMRI-scans were made during presentation of stimuli. Design: pictures (shown for 4.8s) were rated alone or in combination with congruent music (presented for 44s).	Combined congruent conditions increased experienced affect as well as involvement compared to pictures alone. fMRI-scans showed increased activation in areas of the brain associated with emotion processing in the combined condition, while pictures alone mainly activated areas of the brain associated with cognitive evaluations.	Music enhances the emotional experience of affective pictures. The combined congruent presentation of music and affective pictures may automatically evoke strong emotions, while pictures alone may trigger a cognitive approach towards the perception of emotion.

Authors	Stimuli and Design	Findings	Conclusions
(3) Jeong et al., 2010	Participants: 15 (10 women) who took part in the fMRI, and 11 of them completed the behavioral section. Stimuli: happy and sad faces, happy and sad music Measures: fMRI and valence (scale - 7 to +7) Design: combined congruent and incongruent presentation of music (30s) and faces (3s) and only music/picture control conditions.	Happy music made happy faces happier and sad faces less sad, and the opposite was found for sad music. BOLD-levels as measured by fMRI revealed increased activation in the superior temporal gyrus when music and picture were congruent. Incongruent stimuli yielded greater activation in the fusiform gyrus.	Valence ratings of pictures are directed towards the affect of concurrently presented music. Congruent music and pictures increase activity in auditory regions of the brain, while incongruent pairs may cause an increase in regions of the brain associated with facial processing.
(4) Hanser et al., 2015	Participants: 366 (209 women) Stimuli: 24 crying, angry, yawning and smiling faces and sad, angry, calm and happy music Measures: kindness, pleasantness and attractiveness on 9-point scales Designed: combined congruent and incongruent combination of music (+/- 120s) and faces (2s) and only music/picture control conditions	Calm and sad music made crying faces kinder and more pleasant. Calm music made crying faces more attractive. Calm music made angry faces less kind, pleasant and attractive. Sad and angry music made angry faces less pleasant.	Calm and sad background music may be helpful in boosting social bonding and empathy when people are in tears.

(**Table 1**. Continued)

Authors	Stimuli and Design	Findings	Conclusions
(5) Logeswaran & Bhattacharya, 2009	This study consisted of two experiments: 1) Participants: 30 (15 women) Stimuli: 90 happy, sad and neutral faces, 90 pieces of classical music 15s in length. Measures: valence on a scale of 1 to 7 Design: Pictures were rated in congruent and incongruent conditions after being primed with music. 2) Participants: 16 (8 women) Stimuli: 120 happy, sad and neutral pictures 120 pieces of classical music 15s in length Measures: ERPs Design: Pictures were primed with congruent and incongruent music. Participants pushed a button when a female was seen.	More positive ratings were obtained when happy music primed a picture, while more negative judgments were made when pictures were primed with sad music. ERP-data revealed early components.	Musical primes in- or decrease valence ratings of facial expressions. This effect is largest for neutral faces. ERP- data suggests that integration of visual and auditory stimuli occurs automatically in the early stages of information processing.

(**Table 1**. Continued)

Authors	Stimuli and Design	Findings	Conclusions
(6) Marin et al., 2012	This study consisted of three experiments. Experiments 2 and 3 were the same. 1) Participants: 32 men and women Stimuli: 120 IAPS pictures from all quadrants of affective space and 120 pieces of music (average length 32s) in similar categories Measures: valence and arousal ratings on a 7-point scale. Design: Pictures were primed by congruent and incongruent music. 2) Participants 40 (20 women) 3) Participants: 14 Stimuli: 20 pictures presented four times and 80 pieces of music (both selected from study 1) Measures: Valence and arousal on a 7-point scale	Men reported higher levels of arousal than women, and more musical training was related to reports of higher arousal to unpleasant stimuli. No effect of music was found on ratings of valence, though unpleasant musical stimuli led to higher ratings of arousal in visual targets. Ratings of arousal were influenced by musical primes, and the shift in arousal ratings reflected the emotional category of the musical stimulus.	Cross-modal transfer of arousal is possible and may differ from the transfer of valence depending on the visual stimulus.

Simultaneous Playback of Music Versus Music as a Prime

To summarize, two global strands of research in terms of effects of music on affective pictures can be discerned. Firstly, studies that explore the effects of concurrently played (background) music on the judgments of emotional pictures (Baumgartner et al., 2006a, 2006b; Jeong et al., 2011), and secondly, experiments that use music as an affective prime before subsequently presented images (Logeswaran & Bhattacharya, 2009; Marin et al., 2012). As discussed by Marin et al. (2012), both of these methods have different theoretical backgrounds and differ in their presentation of stimuli. The concurrent exposure to visual and auditory stimuli may in fact be considered as one integral stimulus, while the priming experiments present two subsequent stimuli. Effects may thus be explained by theories of cross-modal integration on the one hand, and evaluative priming on the other (Marin et al., 2012). Studies that use music as a prime also generally have a short presentation of the auditory stimulus (e.g., Chen et al., 2008; Logeswaran & Bhattacharya, 2009), while concurrently presented auditory stimuli are usually presented for a longer time-interval (e.g., Baumgartner et al., 2006a, 2006b). In the latter studies, mood induction may be more likely than the much shorter induction of emotion that is presumed to underlie the effects of priming (Marin et al., 2012; Scherer, 2004; Scherer & Zentner, 2001). We could find only two studies in which the presentation time of music for priming (Marin et al., 2012) and concurrent presentation (Jeong et al., 2011) was close to similar. Despite these theoretical and practical differences, there is some overlap between findings meriting comparisons between studies using either of these two methods. Furthermore, both of these methods occur in real life situations. An interesting and valuable experiment would thus be to combine these two strands of research into a single study or a series of experiments using the same musical and visual stimuli (comprised of both IAPS- pictures and facial expressions), matching rating scales for both methods, and a comparison of presentation times in order to draw conclusions on what these methods have in common and what disparities exist in both self-reported ratings as well as psychophysiological data. The results could provide helpful information on whether one or the other or both methods could be used in a practical setting.

Can the Perceived Emotion in Music be Affected by Visual Stimuli as Well?

A logical assumption that follows from the consistent finding of effects of music on the perception of emotion in another modality is that emotional stimuli in other modalities will also have an effect on the judgments made of the emotional properties of the music that is heard. This question remained unaddressed until recently. Spreckelmeyer et al. (2006) demonstrated that happy voices are rated as happier when concurrently presented with happy IAPS-pictures, and vice versa for sad pictures. Kamiyama et al. (2013) investigated the effects of happy and sad facial expressions on happy and sad musical excerpts using an affective priming paradigm with visual stimuli preceding the musical stimulus. ERPs were recorded while participants judged the picture and music congruence/incongruence in terms of valence. Study participants made faster judgments in congruent conditions than when music and picture were a mismatch. The ERP-data suggested a facilitation of integration of congruent music and picture combinations, while data on incongruent pairs suggested an inhibition of integration. The authors also compared non-musicians to participants with formal musical training but found no differences between both these groups. While stimuli were pretested in order to ascertain that they induced the assumed emotions, Kamiyama et al. (2013) included no ratings of how sad/happy the pieces of music were after priming. This is unfortunate because it would have been helpful in determining if the music affect is enhanced/diminished by a congruent/incongruent visual prime.

Maes and Leman (2013) demonstrated that it is possible to alter children's perception of emotion in emotionally ambiguous pieces of music by teaching them happy/sad dance moves to these pieces of music. When taught happy (sad) moves, children perceived a piece of music as happier (sadder) than when not taught the dance, or when coupled with emotionally opposite dance moves. The authors have some reservations as to the possibility of the effect in adults, since more experienced listeners may have been conditioned to hear certain emotions in pieces of music via, for instance, the tempi. In addition, the possibility could not be ruled out that some of the effects were not only due to the children performing the conditioned dance moves themselves, but also were caused by observing others dancing and by the act of dancing as part of a group. While this study is different from the other experiments in that a form of emotional conditioning is present, it demonstrates that it is possible to alter the perceived emotion in a piece of music.

Taken together, these three studies suggest that emotions evoked by music are susceptible to the influence of emotional stimuli in other modalities. This leads to questions as to what kind of stimuli and which emotions will affect the perceived emotion in music. Will there be carry-over effects from a piece of music to a subsequently presented piece of music, and will all emotional categories of affective pictures influence judgments of music one is being exposed to?

Cross-modal Emotion Effects in Film

One of the main uses of music in film is to evoke emotion in viewers (e.g., Cohen, 2001). Despite the obvious overlap between the experience of film and studies of cross-modal emotion perception, there are some differences that make a direct comparison between these two fields of research difficult. First, studies of cross-modal emotion perception have generally used static visual images (faces or complex affective photographs, such as IAPS-pictures) as opposed to moving film clips. Second, the movie clips are often established or assumed to be emotionally neutral; there is therefore no cross-modal interaction of emotion, but only the affect from the music (see Pavlović & Marković, 2011 for an exception). Nevertheless, several studies of film music and movie clips have yielded interesting results and insights, confirming music's affective power. Music has been demonstrated to provide film clips containing poor or neutral affect with an enhanced emotional experience (Eldar et al., 2007). Furthermore, music can be used as an affective prime both before and after a scene to influence a viewer's evaluations about a character's emotions and expected intentions (Tan et al., 2007). Finally, Hoeckner et al. (2011) demonstrated that music modulated empathy-related judgements of film characters, with viewers rating characters as more likeable when watched with melodramatic background music than during thriller (tense) music. This study thus demonstrates that music contributes significantly to the experience of film, and it has yielded further evidence that it can dramatically alter one's perception of emotion. In addition, over a hundred years of film has provided us with many scenes and situations that warrant further analysis. For instance, viewers' responses to severe incongruence between film and music, as exemplified by very happy music accompanying extreme violence in Stanley Kubrick's A Clockwork Orange (1971), has, thus far, received little research attention. A recent study by Pavlović and Marković (2011) highlights the importance of investigating these incongruent pairings. These authors reported, among others, increased levels of disgust when 'trustful' music was paired with a disgusting film clip.

Summary, Implications, and Suggestions for Future Research

The research until now suggests strong emotional effects of music on the perception of affective pictures, facial expressions and film. Concurrently presented as well as primed congruent music both influence the perceived and experienced emotion as measured by self-ratings of affective pictures (e.g., IAPS), facial expressions (Baumgartner et al., 2006a, 2006b; Jeong et al., 2011; Logeswaran & Bhattacharya, 2009; Marin et al., 2012; Spreckelmeyer et al., 2006), and film clips (Eldar et al., 2007). In incongruent conditions the ratings are directed towards the emotional properties of the music. These effects become stronger when visual stimuli are more emotionally neutral or ambiguous. Self-reported ratings of enhanced affect are supported by psychophysiological measurements of Alpha- Power Density in EEGs (Baumgartner et al., 2006a) and increased BOLD levels in fMRI-studies (Baumgartner et al., 2006b; Eldar et al., 2007; Jeong et al., 2011). Furthermore, the integration of visual and auditory emotional information appears to happen automatically and relatively fast after stimulus presentation as established via ERPs (Kamiyama et al., 2013; Logeswaran & Bhattacharya, 2009; Spreckelmeyer et al., 2006). Note that this priming effect is bi-directional, i.e., it has been demonstrated with music as a prime before faces (valence) and IAPS- pictures (arousal), and with music as the target of primed faces. Music thus not only influences ratings of pictures, but pictures can influence the rating of music as well. Some recent findings by Maes and Leman (2013) and Spreckelmeyer et al. (2006) suggest that emotions perceived in music may also be influenced by the exposure to emotional stimuli in other modalities, such as kinesthetic. Lastly, the effects of music are not limited to just measures of valence and arousal but extend (in film) to measures of the personality of the character, motivation and empathy-related ratings (Hanser et al., 2015; Hoeckner et al., 2011; Tan et al., 2007).

Results obtained in these studies may in part be understood in the light of music's communicative and social functions. Indeed, the observed enhancement of emotion and faster reaction times when visual and auditory stimuli are congruent can be explained as an emotional message becoming clearer with more information available from multimodal sources. There are various ways through which music can elicit emotion in listeners and these can all be active at the same time (see Huron, 2012; Scherer & Zentner, 2001). These include: (1) association/memory (music may have been associated with an emotional memory experienced in the past); (2) empathic responses (acoustic features in music may reflect emotional responses, for instance, certain sounds may be perceived as laughter and arouse

happiness); (3) and cognitive evaluation (acoustic features are interpreted to have concrete meaning which in turn evokes emotion). Huron (2012) recently suggested a fourth mechanism based on ethological theories of emotion: (4) signaling. Ethological theory suggests that facial expressions and other manifestations of emotion are not necessarily intended to communicate what someone is feeling but are actively used to evoke a response in observers. The suggestion of signaling is appealing since it emphasizes the social use of music and its effects on emotion perception and may in part explain why certain rituals are so often accompanied by music (Dissanayake, 2006, 2008). Perhaps one of the best examples is the use of music during funeral rites (see also Huron, 2012 on grief).

Behavior during rituals of loss is aimed at relief from grief and receiving empathy from others. Music has been demonstrated to modulate empathy-related measurements in film (Hoeckner et al., 2011) and may thus promote pro-social behavior and bonding during these rituals. Like directors of films (e.g., Cohen, 2001; Hoeckner et al., 2011; Tan et al., 2007), individuals may thus actively shape their own and others' responses to, and interpretation of their actions by others through the music they play. More research is needed to further explore the empathy enhancing properties of certain types of music.

In summary, consistency is found in the literature in terms of the overall effect music has on the rating of pictures. There are also differences between studies however, in particular with regard to effect-strength when rating IAPS-pictures (Baumgartner et al., 2006a, 2006b; Marin et al., 2012), rating scales, and different musical and visual stimuli. A systematic comparison using similar stimuli (e.g., IAPS-pictures and facial expressions), methods (concurrent presentation, priming), presentation times and rating-scales might yield helpful information to enable drawing clearer conclusions on how exactly music affects visual stimuli and if these effects differ, for instance, for faces and IAPS-pictures. Furthermore, Marin et al. (2012) emphasized that controlling and pre-testing both visual and musical stimuli is an important issue, since (null) findings may be specific to the nature of the stimuli or groups of stimuli used. The musical stimuli used so far in literature were mostly western classical music. However, within classical music, like in any genre, there is a wide variety in subgenres. Since effects may be specific to certain types of music, it is necessary to be specific and replication studies may be needed with different types of music.

While it may be helpful in the design of some experiments, it may be feasible not to specifically instruct participants to try to feel the emotions heard and displayed. Rather, it

seems more ecologically valid not to give instructions that make participants attentive to the music, since it is most often heard in the background while being otherwise engaged. This may be especially true since it has been established that the auditory stimuli influence judgments even when subjects are specifically instructed not to attend to it (Van den Stock et al., 2009) and any effects of music thus happen either automatically or very early in the information processing hierarchy, as suggested by ERP-data in various experiments (Chen et al., 2008; Kamiyama et al., 2013; Logeswaran & Bhattacharya, 2009). Participant characteristics such as gender and musical education should be considered as well (see also Marin et al., 2012). Most of the studies have only used female participants (Baumgartner et al., 2006a, 2006b) or did not specifically look at gender differences (Jeong et al., 2011). The few experiments that have looked at this found differences in ratings of arousal between men and women, with higher levels of arousal reported by men (Marin et al., 2012). Furthermore, formal musical training may not affect the music's effects on emotion perception (Kamiyama et al., 2013), which suggests that recognition of emotion in music is a basic skill present in everyone, but formal training may play a role in identifying emotions in more complex pieces of music (see Marin et al., 2012 for a discussion). Personality may be another variable that is worth looking at in future experimentation.

Research into cross-modal emotion perception may benefit general theories of emotion and may help gain a better understanding of what musical emotions exactly are, and how they are, or can be induced. Pieces of music particularly suited to induce music-specific emotions as suggested by Zentner et al. (2008) should be further investigated. In addition, it may be helpful to explore each quadrant of affective space separately and to attempt to identify musical stimuli that reflect each of the emotions (for example, sad and depressed) that are assumed to lie close together, but that actually differ subtly in nature.

Practical Relevance

Afflictions and disorders in which emotion recognition is impaired or otherwise distorted may benefit greatly from the finding that music enhances affect, while treatments involving desensitisation may find help in music's ability to decrease perceived and/or experienced fearfulness and sadness. Carefully controlled testing with patient groups in cross-modal emotion tasks may thus lead to new insights, easily accessible and cost-effective therapies. In addition, these tests may provide valuable information on how emotions are processed when suffering from certain (affective) disorders. Cross-modal emotion studies with individuals

afflicted by amusia, i.e., a condition that is characterized by an inability to enjoy music and recognize familiar tunes, may provide helpful insights into the nature and implications of this disorder, since the ability to recognize self-rated emotion in music is diminished, but still present in amusical people (Ayotte et al., 2001). In addition to their theoretical relevance, the present findings may thus contribute to a better understanding and possibly even treatment of several psychiatric disorders (see also Jeong et al., 2011).

Conclusion

The experiments discussed in this review clearly demonstrate the emotional power of music and may help us in understanding why music is so pervasive in our daily lives. Its ability to influence perception of emotion in others may be the reason why humans have been using music since ancient times in rituals meant to increase social bonding and to promote empathic responses from others. Investigating and understanding this capacity may prove valuable for the future, not just from a theoretical standpoint, but with numerous practical applications as well. A more systematic approach that allows for a direct comparison between methods of music presentation should yield a greater understanding of the findings. The continued study of the effects of music on the perception of emotion should strive towards answering the important question of whether and how the findings from the laboratory are also applicable and relevant to real life situations.

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Chapter 3: Consolation through Music: A Survey Study[4]

Abstract

Even though music is widely used as a source of solace, the question as to how and why music offers consolation remains largely unexplored. The aims of the present study are as follows: (a) to compare listening to music versus other self-soothing behaviors, (b) to explore when music is used as a means for solace, (c) to identify aspects of music that are important for providing solace, and (d) to explore behavior while listening to consoling music. Participants completed an internet survey distributed through the websites of Dutch National Radio 2 and Radio 4 ($N = 445$). The survey consisted of the Geneva Emotion and Music Scale (GEMS), the solace-scale from the Music in Mood Regulation questionnaire (MMR), questions concerning means of solace, situations requiring comfort, song aspects, and feelings and activities during music listening. The main findings indicate that: (1) music is the most important source of consolation compared with other soothing behaviors, (2) situations in which people have experienced loss and sadness are the primary situations in which music offers solace, (3) consoling music induces a feeling of being moved and a mixture of both positive and sad emotions; the most important aspects of a song for soothing purposes are the music itself and the lyrics, and (4) music for comfort is listened to predominately in solitude, as the sole activity. On the basis of these findings, a characterization of listening to consoling music is compiled. Behavior and song aspects are discussed in terms of how and why they are helpful in providing solace.

Consolation through Music: A Survey Study

Consolation (comfort, solace) is behavior with the sole aim of reducing emotional stress after a loss or disappointment ("Consolation", n.d.). It has been an important concept in various branches of healthcare and philosophy throughout history, mainly as a remedy against suffering (e.g., Emanuel, 1977; Norberg et al., 2001). Its main goal is not to take away the source of distress but rather to counter negative feelings and restore a sense of community and meaningful belonging (Norberg et al., 2001; Ter Bogt et al., 2017).

Mood management is one of the primary functions of music listening (Schäfer et al., 2013), and solace through music has been identified as one of several mood-altering strategies (Saarikallio, 2008, 2010; Saarikallio & Erkkilä, 2007; Saarikallio et al., 2013; Schäfer et al., 2013; Shifriss et al., 2015; Ter Bogt et al., 2017). Other strategies include entertainment, distraction and discharge (Saarikallio & Erkkilä, 2007). There is a rich history in classical (e.g., the requiem and lament), popular and, "folk" music (i.e., parents comforting their children by singing) to sing away one's sorrows.

Saarikallio and Erkkilä (2007) and Saarikallio (2011) identified several characteristics of mood regulatory strategies from in-depth interviews with music listeners. They concluded that seeking solace through music is preceded by a sad and troubled mood, much attention is given to the lyrics, and the music is often listened to alone. Solace shares characteristics with discharge in that it is preceded by a negative mood. However, although discharge aims at venting negative, mainly angry emotions, when music is used to console, the listener feels comforted.

Recently, Ter Bogt et al. (2017) suggested a model of consolation through music in which they explored the importance of lyrics, the way the music sounds, and "feeling at one with fans and/or the artist". Their study involved 981 adolescents and young adults (aged 13–30) who completed an online survey on consoling aspects of music, personality, music involvement and preference. Their results revealed an important role for the way music sounds and its lyrics (lyrics were less important to jazz and classical music, which is likely due to the more instrumental nature of these styles). Interestingly, the findings in this study reveal weak but significant relationships between song aspects important to offering consolation and gender, music genre, and age. Because their sample focused on adolescents and young adults, differences in later life could not be examined.

Thayer and colleagues (1994) investigated a large number of general mood-regulatory behaviors, including listening to music, and reported little or no male/female differences. In terms of age, Saarikallio (2010) interviewed participants of different ages and reported no substantial differences in mood-regulation strategies with music throughout life, although at the same time the study suggested that music may fulfill different functions during various stages of life.

Although situations in which music is used as comfort have not yet been properly categorized, suffering and negative life events have generally been linked to a need for consolation (e.g., Norberg et al., 2001; Van den Tol & Edwards, 2013, 2015; Van den Tol et al., 2016). In general, adults, sad listeners, and individuals seeking comfort prefer mood- congruent music (Hunter et al., 2011; Saarikallio, 2010; Saarikallio et al., 2013; Van den Tol & Edwards, 2013). It is therefore likely that most comforting music sounds sad. Moreover, people who listen to sad music when feeling sad often explain their reason for doing so in terms of the music portraying affect and lyrics with which they can identify, a concept that Van den Tol and Edwards (2015) defined as "connection".

Although listening to sad music while feeling sad to lift one's spirits or cope with problems may seem paradoxical, recent research suggests that many people listen to sad music as a way to be in touch with these negative emotions because they believe that they benefit from such music in a variety of ways (e.g., Swaminathan & Schellenberg, 2015; Van den Tol & Edwards, 2013, 2015). Recent research demonstrates that listening to self-identified sad music may serve functions of promoting acceptance-based coping and consolation during aversive life situations. This enables one to feel, be in touch with, and experience one's own sadness (Van den Tol et al., 2016). In addition, it has been shown that self-selected sad music not only evokes sadness in its listeners, but positive and mixed mood states as well (e.g., Taruffi & Koelsch, 2014; Weth et al., 2015).

Although few studies have used the specific word *consolation* in combination with music research, the studies mentioned above demonstrate that the concept of feeling comforted through listening to music has received considerable interest. Music is often heard in the background in combination with other activities (e.g., Sloboda et al., 2001). It remains unclear, however, if this is also the case when the purpose of listening to music is for comfort/solace. Additionally, although most of the studies that have assessed mood changes with music have focused on adolescents and young adults (e.g., Miranda & Claes, 2009;

Saarikallio & Erkkilä, 2007; Ter Bogt et al., 2017), recent evidence (Saarikallio, 2010; Shifriss et al., 2015) suggests overall mood regulation using music remains the same across the lifespan, but few studies have specifically explored these concepts in later life. Furthermore, it remains to be explored whether people listen in solitude when seeking comfort.

Current study

The current study had four main aims: (1) to compare music as a means of solace to other sources of consolation, (2) to identify occasions in which music is used as a source of comfort, (3) to explore aspects of a song that are important for providing solace, and (4) to investigate behavior that accompanies listening to comforting music. In addition, we explored the roles of gender, music genre and age.

Method

Design

The research involved an online survey that included both Likert scales and open-ended questions. It was a cross-sectional, between-subjects design.

Participants

Our participants were recruited via the websites of Dutch National NPO Radio 2 (popular music) and NPO Radio 4 (classical music) during a three-week period. From a total of 862 respondents, 417 participants were excluded from further analyses due to (1) participants being underage ($n = 9$), (2) not providing written consent ($n = 12$), (3) clicking the link but choosing not to fill in the questionnaire, or (4) completing less than 25% of the questions ($n = 396$). This resulted in 445 participants (see Table 1 for a detailed overview). The participants were divided into two groups of listeners: those preferring classical music and those preferring popular music during their most recent consoling event. This division was made on the basis of a participant-reported piece of music. Eleven participants provided no piece of music and were reported as "undefined."

Table 1. Detailed overview of participant information.

	Popular music	Classical music	Undefined	Overall
Number of participants via Radio 2 website (popular)	221	17	6	244
Number of participants via Radio 4 website (classical)	21	175	5	201
Men	97	85	7	189
Women	145	107	4	256
Total	242	192	11	445
Mean age (*SD*)	42.0 (14.3)	57.0 (11.8)	59.9 (11.3)	48.9 (15.3)
Age range	18–74	21–81	36–78	18–81
Aged 18–30	64	6	0	70
Aged 31–60	162	100	5	267
Aged 60–81 (missing *n* = 1)	16	85	6	107

Materials

Consoling activities. The participants were asked to indicate their usage of 19 potential consoling activities (see Table 2 for the full list) that were previously identified as mood regulators (Gračanin et al., 2014; Thayer et al., 1994) on 5-point Likert scales ranging from 1 (*does not apply at all*) to 5 (*applies completely*).

Situations triggering self-consolation and music used. The participants were asked to provide situations in which they used music for consolation. One question asked about situations in general (there was room to report three situations), and one question asked about the most recent situation in which music was used as a source of solace. The participants were further invited to report the title of the piece of music and accompanying artist/composer they had listened to on that occasion. These pieces of music were encoded into two broad categories of popular (e.g., pop, popular rock) and classical (e.g., classical, jazz) music on the basis of entries in the Allmusic.com database (https://www.allmusic.com). Three Likert scale questions ranging from 1 (*does not apply at all*) to 10 (*applies completely*) followed the open-ended questions and inquired further about the participants' reported music: (1) *Do you consider this to be your favorite music?* (2) *I only want to listen to this song when I'm feeling blue*, and (3) *This is music that I need to listen to with full concentration*.

Consolation by music. A scale of nine items (Ter Bogt et al., 2017) measured the following three aspects of consolation by music: (1) *Consolation through music* (α = .84), (2) *Consolation through oneness with fans or artist* (α = .75), and (3) *Consolation through lyrics* (α = .84). An additional item not in the original questionnaire was added for this study and measured *Consolation through evoked memories*. The response options ranged from 1 (*does not apply at all*) to 5 (*applies completely*).

Music in Mood Regulation. The participants provided ratings from 1 (*strongly disagree*) to 5 (*strongly agree*) on six solace items of the Music in Mood Regulation Scale (MMR; Saarikallio, 2008). The internal consistency in the current sample was α = .83.

Listening behavior. Seven items measured listening behavior (see Table 4). The participants were asked to rate these items on scales ranging from 1 (*does not apply at all*) to 5 (*fully applies*). Four additional items measured the emotional properties of the music that participants listen to.

Geneva Emotional Music Scale. The participants were asked to think of the previously reported con- soling song, and then provide ratings from 1 (*not applicable at all*) to 5 (*fully applies*) on 14 items with α = .81 (see Table 5) from the Geneva Emotional Music Scale (GEMS; Zentner et al., 2008; see also Zentner & Eerola, 2011; Vuoskoski & Eerola, 2011, for a discussion on the GEMS). The GEMS was specifically designed to evaluate musical emotion, with items mainly focusing on aesthetic emotions (i.e., emotions evoked by art without direct utilitarian functions).

Music qualia. The participants were asked to provide indications of several opposite emotional states on how they were *feeling* while listening to comforting music on 5-point Likert scales (see Table 5).

Table 2. Overview of possible self-consoling activities.

	Men (*SD*)	Women (*SD*)	Effect size
Listen to (special) music	4.45 (.80)	4.54 (.71)	
Comfort from others	3.59 (1.1)	3.84 (1.0)	
Crying	3.26 (1.1)*	3.92 (.94)	0.10
Pleasant memories	3.43 (1.1)	3.41 (1.1)	
Creative activities	2.78 (1.4)*	3.24 (1.4)	0.03
Reading stories or poems	2.86 (1.2)	3.20 (1.2)	
Bathing or showering	2.50 (1.2)*	3.31 (1.2)	0.09
Eating or drinking	2.51 (1.2)*	3.16 (1.2)	0.07
Sleeping	2.62 (1.1)*	3.02 (1.2)	0.03
Dress warmly	2.14 (1.1)*	3.16 (1.3)	0.15
Comfort from a pet	2.15 (1.3)*	2.84 (1.5)	0.06
Watch television or film	2.29 (1.2)	2.58 (1.3)	
Spend money	2.06 (1.1)*	2.58 (1.2)	0.05
Pray, turn to God	2.12 (1.3)	2.25 (1.4)	
Ritual activities	2.17 (1.2)	2.13 (1.2)	
Cherish a specific object	1.76 (.94)*	2.17 (1.1)	0.03
Alcohol and drugs	2.04 (1.2)	1.81 (1.1)	
Massage, beauty treatment	1.47 (.84)*	2.08 (1.2)	0.08
Sauna	1.56 (.83)*	1.90 (1.1)	0.03

Note. Items were rated from 1 (does not apply at all) to 5 (applies completely); *significant gender difference at $p < .0015$; effect size = η_p^2.

Procedure

The research was announced on the Dutch Radio 2 and Radio 4 websites via news articles asking for volunteers on a study into music and solace (Dutch: Troost) of approximately 20 minutes in length. The questionnaire was programmed in Qualtrics and was preceded by an information and consent form. All participants included in the analyses provided consent.

The survey consisted of questions presented in the following order: mood-managing behaviors, situations requiring comfort, song aspects, listening behavior, the Geneva Emotion and Music Scale (GEMS), emotional qualities, and the solace-scale from the Music in Mood Regulation questionnaire (MMR).

Statistical Analyses

All analyses were carried out using SPSS 21.0. Consoling activities and GEMS ratings were investigated with MANOVAs with a Bonferroni correction of α = .0015 (.05/34) for post hoc tests, and effect sizes are reported as partial eta squared (η_p^2). The possible effects of gender, music genre and age were explored through regression analyses for the other scales. Only the significant findings of p = .005 or smaller are reported for the regression analyses, and effect sizes for significant findings are given as R^2. Findings from the total group of participants will be dealt with first, followed by an exploration of the variables gender, music genre and age.

<div align="center">

Results

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Consoling Activities

To obtain insight into the kind of activities that participants used for self-consolation, mean values were calculated for all items. Out of 19 items "listening to music" was chosen as the most frequently employed self-soothing behavior, followed by "crying", "comfort from others", and "pleasant memories".

A MANOVA was carried out to identify gender differences. The MANOVA revealed a significant difference between men and women: Wilks' Λ = .68, $F(19, 425)$ = 10.7, p < .001, η_p^2 = .32. Bonferroni-adjusted post-hoc tests (α = .0015) were carried out to determine which behaviors differed significantly (Table 2).

There was no difference between men and women for "listening to music", although most other consoling activities revealed distinct male/female differences. These gender-specific patterns appeared to be largest for "crying", "dressing warmly", "comfort from a pet", and "bathing or showering". The "listening to music" item was subsequently investigated in more detail. There was no overall difference between music types for "listening to music"; however, when taking age into account, the regression analysis revealed a weak decrease of "listening to music" with age β = −.10, $t(442)$ = −2.07, p = .039, R^2 = .01, $F(1, 442)$ = 4.29, p = .039. The "listening to music" item correlated substantially with the MMR solace-scale, $r(420)$ = .58, p < .001 and the consolation through music subscale, $r(445)$ = .39, p < .001. The MMR solace-scale and the consolation through music subscale correlated significantly as well, $r(420)$ = .46, p < .001.

Situations Triggering Self-consolation and Information about most Recent Consoling Events

The participants reported three situations triggering self-consolation. These situations were labeled according to their contents. The mean frequencies across the three reported occasions were calculated and are reported in Table 3.

The participants reported a variety of mainly negative life events for which they turned to music as a source of comfort for situations in general as well as recent events. These situations ranged from dramatic occurrences to daily sorrows.

Table 3. Situations in which music is used as comfort and general information on most recently used comforting music.

Situations in which music is used as solace	Situations in general	Most recent situation
The loss of a loved one or a pet	25.3%	33.9%
Sad, lonely, depressed, misunderstood	16.8%	15.5%
General stress, "things aren't going as planned"	15.2%	6.5%
Problems in a relationship, arguments	17.0%	17.3%
Suffering of (significant) others	7.9%	9.2%
Health problems (self)	7.1%	< 5%
Rest category: e.g., overwhelming emotions, recalling memories	< 5%	< 5%
	Popular music (*SD*)	Classical music (*SD*)
Do you consider this to be your favorite music?	7.7 (2.0)	8.0 (1.7)
I only want to listen to this song when I'm feeling blue	3.9 (2.9)	3.1 (2.5)
This is music that I need to listen to with full concentration	5.0 (2.9)*	6.1 (2.7)

Note. The last three items were rated from 1 (*does not apply at all*) to 10 (applies completely).*$p = .001$.

The participants also reported a wide variety of artists, songs, and composers when asked to provide a song that accompanied their most recent solace situation, including a substantial number of musical pieces particularly composed for memorial services (i.e., requiem) as well as popular songs dealing with sadness.

The results further indicated that participants rated this music as their favorite and that they used this music when seeking comfort but listened to it on other occasions as well. This music required some concentration to listen to (see Table 3). A multiple regression analysis with predictors of age, gender and music genre revealed that music genre significantly predicted these levels of concentration, $\beta = .19$, $t(429) = 3.43$, $p = .001$, $R^2 = .04$, $F(3, 429) = 6.55$, $p <$ .001. The mean values demonstrated that in comparison to listeners of popular music, classical music listeners stated that their music required more concentration.

Consolation by Music

The participants reported the way music sounds, the lyrics, and the memories that the music evokes as important for providing comfort (Table 4). A sense of oneness with other fans or artists was not seen as important. Multiple regression analyses with predictors of age, gender and music genre revealed several effects. Music genre significantly predicted ratings on the way the music sounds, $\beta = .18$, $t(429) = 3.21$, $p = .001$, $R^2 = .03$, $F(3, 429) = 4.78$, $p = .003$, an emphasis on lyrics, $\beta = -.44$, $t(429) = -9.08$, $p < .001$, $R^2 = .22$, $F(3, 429) = 40.89$, $p <$ .001, and evoked memories, $\beta = -.21$, $t(429) = -3.92$ $p = < .001$, $R^2 = .05$, $F(3, 429) = 6.78$, p $< .001$. The mean values showed that the way the music sounds was more important to classical music, whereas lyrics and evoked memories were more important to popular music Although oneness (i.e., feeling at one with the artist or with other fans) was not regarded as important, gender predicted oneness, $\beta = -.14$, $t(429) = -3.21$, $p = .001$, $R^2 = .04$, $F(3, 429) =$ 5.72, $p = .001$. Men provided higher ratings for oneness than women.

Table 4. Overview of mean values on the consolation by music scale, listening behavior and MMR.

Can you indicate how you were comforted by music while listening	Popular Music		Classical Music		Sig. difference between music styles
	Men (*SD*)	Women(*SD*)	Men (*SD*)	Women(*SD*)	*p*
Consolation by music itself	4.10 (.72)	4.15 (.72)	4.22 (.62)	4.44 (.52)	.001
Consolation by a sense of oneness	1.93 (1.0)	1.77 (.99)	1.79 (.83)	1.40 (.63)	
Consolation by lyrics	3.52 (1.2)	3.89 (1.0)	2.45 (1.1)	2.54 (1.3)	< .001
Consolation by evoked memories	3.73 (1.3)	3.42 (1.4)	3.19 (1.5)	2.92 (1.5)	< .001
MMR Solace-scale	4.08 (.55)	4.13 (.61)	4.08 (.58)	4.23 (.64)	
Listening behavior When I listen to music to console myself:					
I turn up the volume	3.99 (.92)	4.16 (1.0)	3.47 (1.1)	3.74 (1.0)	< .001
I do nothing other thanlistening to music	3.75 (1.1)	3.75 (1.0)	3.32 (1.3)	3.50 (1.2)	
I shut out my surrounding environment	4.04 (1.1)	3.97 (1.0)	3.60 (1.1)	3.79 (1.1)	
I put on a headset	2.82 (1.5)	2.37 (1.5)	2.21 (1.4)	2.01 (1.4)	
I need to listen to a specific song	3.45 (1.3)	3.48 (1.3)	2.86 (1.4)	2.77 (1.3)	< .001
I keep listening to the same music	2.95 (1.4)	3.32 (1.3)	2.53 (1.2)	2.81 (1.3)	
I really need to be alone	3.45 (1.3)	3.59 (1.4)	3.22 (1.2)	3.60 (1.3)	
When I need comforting, I mostly listen to sad music	2.91 (1.3)	3.03 (1.3)	3.24 (1.2)	3.07 (.97)	
When I need comforting, I mostly listen to happy music	2.50 (1.1)	2.62 (1.1)	2.29 (.98)	2.53 (.92)	
Most of my favorite music sounds happy	3.04 (1.1)	3.16 (1.0)	2.56 (.93)	2.74 (.90)	< .001
Most of my favorite music sounds sad	2.69 (.94)	2.75 (.96)	3.09 (1.0)	3.09 (.96)	< .001

Note. Items were rated from 1 (*does not apply at all*) to 5 (*applies completely*).

Listening Behavior

When using music for consoling purposes, the participants reported that they turned up the volume, listened alone, or shut out their environment. Listening to music was their sole preoccupation. The participants further preferred listening to the same music for extended periods of time (Table 4). The regression analyses revealed that listening to popular music predicted a greater increase in volume than classical music, $\beta = -.20$, $t(427) = -3.80$, $p < .001$, $R^2 = .06$, $F(3, 427) = 9.29$, $p < .001$. The need to listen to a specific song is predicted by music genre and was more common for listeners of popular music, $\beta = -.23$, $t(427) = -4.30$, $p < .001$, $R^2 = .06$, $F(3, 427) = 9.10$, $p < .001$. Finally, the need to be alone decreased with age, $\beta = -.18$, $t(427) = -3.24$, $p = .001$, $R^2 = .03$, $F(3, 427) = 5.16$, $p = .002$. A paired samples t-test revealed that participants preferred to listen to sad rather than to happy music when wanting solace $t(418) = 5.87$, $p < .001$ (see Table 4 for mean values). There is a significant negative correlation between listening to happy and sad music (-.37, $p < .001$), which suggests that both types of music are used for self-comfort, though not interchangeably. Listeners of popular music reported a preference for happy music, $\beta = -.25$, $t(403) = -4.50$, $p = .001$, $R^2 = .06$, $F(3, 403) = 8.22$, $p < .001$, whereas classical music listeners preferred sad music as their favorite, $\beta = .26$, $t(403) = 4.69$, $p < .001$, and this preference for sad sounding music decreased with age, $\beta = -.15$, $t(403) = -2.67$, $p = .008$, $R^2 = .05$, $F(3, 403) = 7.40$, $p < .001$.

Geneva Emotional Music Scale and Music Qualia

We compiled an emotional profile of consoling music on the basis of the responses on the GEMS and items on experienced feelings (Table 5).

For both genres, being moved emerged as the most important feeling when listening to comforting music. This was followed by sadness, beauty, fascination, tenderness, peacefulness and being filled with wonder. Comforting music is further seen as powerful. A MANOVA on the GEMS items yielded a significant difference for music genre, Wilks' $\Lambda = .75$, $F(14, 408) = 9.86$, $p < .001$, $\eta_p^2 = .25$. Bonferroni-adjusted ($\alpha = .0015$) post-hoc tests were carried out to see which emotions differed significantly and are reported in Table 5. Beauty and transcendence are more important to classical than to popular music listeners, whereas nostalgia and joyful activation are more important to popular than to classical music listeners.

Qualia items on feelings revealed a similar pattern to the GEMS. Consoling music is mostly experienced as positive, calming, sad, moving and somewhat empowering. Several emotions were reported more strongly with increasing age. The regression analyses demonstrated that

age predicted an increase in feeling positive, $\beta = -.25.$, $t(408) = -4.59$, $p < .001$, $R^2 = .10$, $F(3, 408) = 14.81$, $p < .001$, calm, $\beta = .16$, $t(408) = 2.91$, $p = .004$, $R^2 = .06$, $F(3, 408) = 8.03$, $p < .001$, and awake, $\beta = .16$, $t(408) = 2.92$, $p = .004$, $R^2 = .04$, $F(3, 408) = 4.99$, $p = .002$ when listening to music.

Table 5. Overview of reported GEMS ratings and music qualia feelings.

GEMS	Popular music (*SD*)	Classical music (*SD*)	Effect size
Filled with wonder	3.48 (1.2)	3.73 (1.1)	
Transcendence	2.97 (1.3)*	3.63 (1.3)	0.06
Beauty	3.48 (1.3)*	4.22 (1.0)	0.09
Fascinated	3.74 (1.2)	4.03 (1.0)	
Tenderness	3.57 (1.2)	3.65 (1.2)	
Nostalgic	3.73 (1.1)*	3.03 (1.3)	0.08
Peaceful	3.46 (1.1)	3.53 (1.0)	
Powerful	3.68 (1.2)	3.55 (1.2)	
Energized	3.19 (1.3)	3.05 (1.2)	
Joyful activation	2.33 (1.3)*	1.86 (1.0)	0.04
Tense	1.53 (.90)	1.28 (.68)	
Sad	3.80 (1.1)	3.60 (1.2)	
Moved	4.19 (.96)	4.35 (.82)	
Bored	1.20 (.63)	1.04 (.32)	
Music qualia feelings			
Positive – Negative	2.15 (1.1)	1.68 (.88)	
Excited – Calm	3.70 (1.1)	4.08 (.95)	
Tired – Awake	3.46 (.97)	3.67 (.92)	
Moved – Indifferent	1.61 (.70)	1.49 (.69)	
Weak – Strong	3.66 (1.1)	3.69 (.97)	
Happy – Sad	3.37 (1.1)	3.31 (.98)	
Tense – Relaxed	3.72 (.98)	4.00 (.92)	
Fascinated – Bored	1.99 (.76)	1.87 (.83)	

Note. *significant music genre difference at $p < .0015$; effect size = η_p^2, GEMS items were rated from 1 (does not apply at all) to 5 (applies completely). Qualia items were rated from 1 (leftmost) to 5 (rightmost).

Discussion

The current study had the following four aims: (a) to compare the use of music versus other options as a means for providing solace, (b) to explore when music is used as a means for solace, (c) to identify emotional and aspects of songs that are important for providing solace, and (d) to examine behavior accompanying music listening for comforting purposes. We further explored data for possible influences of age, gender and music preference.

Concerning our first research question, participants rated "listening to music" at the top of their consoling behaviors, confirming music's important soothing and mood-managing functions (e.g., Schäfer et al., 2013; Thayer et al., 1994; Van Goethem & Sloboda, 2011). Unlike several of the other rated behaviors, there are no effects of gender or music genre for using music for consoling purposes. These results are similar to the findings on general mood-managing strategies by Thayer et al. (1994) who also reported little to no differences in music usage, whereas other behaviors show gender-specific patterns.

In addition, there were no differences on the MMR solace-scale (Saarikallio, 2008), that correlated highly to "listening to music", for any background characteristic or music style. Taken together, these findings support the idea that music is used by many people for similar purposes irrespective of gender and music preference (Ter Bogt et al., 2017).

Regarding the second research question, situations triggering the use of music included: losses, grief over loved ones, problems with relationships, ill health of oneself or a significant other, periods of sadness and general stress. These situations are very similar to situations in which sad music is listened to (Taruffi & Koelsch, 2014; Van den Tol & Edwards, 2013), and confirm the notion that solace is mainly sought in situations that can be characterized as daily setbacks or unsolvable and hard to cope with (Norberg et al., 2001; Saarikallio & Erkkilä, 2007; Ter Bogt et al., 2017). Emotion-focused or, in specific instances, acceptance-based coping rather than problem-focused coping seems more relevant in these situations (Van den Tol, 2012; Van den Tol et al., 2016). A common reason for listening to comforting music was feeling misunderstood, validating findings by Van den Tol and Edwards (2013) in which participants indicated that listening to sad sounding music when feeling sad can provide listeners with a feeling of acceptance or understanding (similar to a trusted friend) when real social support is lacking. In general consolation theory (e.g., Rasmussen et al., 1997), the "genuine presence of others" is assumed to be crucial to the consoling experience. The current study did not, however, directly measure social support. However, items from the solace-scale

of the MMR (Saarikallio, 2008) on which participants in this study scored high, inquire about viewing music as an understanding friend.

We further found that the songs that are listened to for self-comfort purposes are not limited to this use. In line with previous research on people's motivations for listening to sad music (Van den Tol & Edwards, 2013, 2015), the participants reported not only listening to comforting music while in distress but also valuing these pieces of music in general. Classical music required more concentration while listening than popular music. It remains to be determined however, if the ratings on concentration are higher or lower compared with listening to music for purposes other than solace. Additionally, there was not much overlap in reported artists and songs/musical pieces between participants from either the classical or popular music population. This illustrates the importance of personally relevant music for mood-regulating purposes. Personally selected music appears to be more likely to enhance mood than music selected by others (e.g., Saarikallio et al., 2013; Swaminathan & Schellenberg, 2015).

The third research question inquired about song aspects and emotions important for providing solace. The way that the music sounds, its lyrics (though only for popular music) (Ter Bogt et al., 2017), and the memories it evokes are important for music to provide solace. The evoked memories are more important to listeners of popular music than to classical music listeners. The importance of music itself, lyrics and not feeling at one with the artist or other fans, closely resembles the recent findings by Ter Bogt et al. (2017). The lyrics may play a less important role in classical music because of the emphasis on instrumental elements in this genre. In addition, the vocals may be hard to understand, because of the way that they are sung or because they are in a foreign language. A study into the structural nature of soothing music may be of interest here.

The emotional ratings provided on the GEMS revealed that "being moved" is the highest ranked emotional experience while listening to consoling music. This makes sense because there needs to be an emotional response for mood management to happen (Van Goethem & Sloboda, 2011). Comforting music is also experienced as aesthetically pleasing, sad, calming and somewhat empowering, but not as tense or boring. The items on the qualia music-scale once more confirmed that listening to comforting music gives participants a mixture of sad, calming and positive feelings. Recent findings by Weth and colleagues (Weth et al., 2015) show that the seemingly contradictory finding of experiencing both sad as well as positive

feelings is particularly salient for self-selected sad music. In previous research, the experience of positive affect and enjoying the listening experience were identified as the most important emotional reasons for listening to music (Saarikallio & Erkkilä, 2007; Van Goethem & Sloboda, 2011).

The differences between classical and popular music in reports of transcendence, beauty and nostalgia may be mainly due to the genre of music listened to and not a specific soothing quality. Popular music may often refer to more worldly affairs than classical music, whereas classical music traditionally has a more spiritual connotation and an emphasis on reflective emotions (Zentner et al., 2008), which explains the higher scores on both beauty and transcendence. On the other hand, popular music is often heard throughout the day in combination with a range of other activities (e.g., Schellenberg & von Scheve, 2012) and may thus induce more feelings of nostalgia as witnessed in the current study. The latter is further supported by the reported greater emphasis on evoked memories for consolation with popular music.

It should be noted, however, that the construction of the GEMS is mainly based on results with listeners of classical music and may thus be particularly suited for measuring emotions associated with classical music rather than with other music styles (Swaminathan & Schellenberg, 2015; Zentner et al., 2008). The current sample, however, shows no anomalous ratings for popular and classical music that cannot be explained with the specifics of these gen- res in mind.

Sad sounding music is preferred over happy music when in need of solace, and listeners of classical music prefer sad music in general. This confirms previous findings (Hunter et al., 2011) demonstrating that individuals in a sad mood looking for comfort search for mood-matching music (Saarikallio et al., 2013). This may likely be explained by the strong connection that people feel between the mood of the music and their own (Van den Tol & Edwards, 2013). Another explanation may be that sadness is an integral part of the aesthetic experience of classical music (Eerola & Vuoskoski, 2011; Vuoskoski et al., 2011) or that classical music is more associated with music training. Increased music training, in turn, is associated with greater emotional experiences with sad sounding music and may thus explain several of the stronger emotional responses with classical music (Park et al., 2014).

The desire to listen to sad music, and to a lesser extent, listening to music when seeking comfort in general, decreased with age. In addition, older participants reported feeling more

positive, awake and calm than younger respondents. A possible explanation may be that older individuals are occupied with other activities in later life, or that the focus on negative events and consequently the need for consolation lessens with age. A decrease of listening to sad music with increasing age has recently also been reported by Shifriss et al. (2015). These authors attributed this to a positivity bias in later life, when people tend to focus on positive events and avoid negative situations, the so-called socioemotional selectivity theory (Carstensen et al., 2011). Even though some the effects of age found in the present study were small, why listening to music when seeking comfort decreases with increasing age requires further investigation. The respondent sample in the current study consisted mainly of middle-aged and older participants (restricted range). Developments across the lifespan may become clearer with the inclusion of a larger sample of younger individuals (adolescents and young adults).

Finally, in terms of behavior while listening, the current data suggest that music was often listened to in solitude, as the sole activity, and with a focus on the self. In addition, there is a tendency for participants to listen to a specific song and the same type of music repeatedly during a consoling episode. The finding that music providing solace is often listened to in solitude confirms reports by Saarikallio and Erkkilä (2007). Listening to it as a sole activity seems unique to mood management because most other music listening occurs in combination with other activities (Sloboda et al., 2001). Solace situations probably require a focus on the self and the mood that individuals are in (Van den Tol, 2012). However, it may also be that listening to comforting music makes it easier to focus on oneself.

Limitations

All data were self-reports by radio listeners looking for information on the website of their radio station. They may therefore have a greater interest in the music that they listen to than individuals not visiting these sites. Furthermore, participants may have overstated the importance of music as a means of consolation because it was clear from the outset that this was a questionnaire on music and solace. In addition, these self-reports rely on the ability to recall instances requiring solace provided by music. Our sample may thus be biased towards participants with a greater disposition to listen to music in times of distress than the general population, as well as towards people who generally have a more positive outlook on the use of music for regulation of psychological states. These limitations should be taken into account when interpreting the results of the current study.

Several recent papers indicate a link between depression, anxiety and rumination and the use of music for emotion regulation (Randall et al., 2014; Thomson et al., 2014). Moreover, research has indicated that depressed individuals, ruminators or individuals suffering from negative emotions or life circumstances are more likely to listen to sad music when feeling sad, or perceive this behavior to be beneficial (Garrido, & Schubert, 2011, 2013; Matsumoto, 2002). However, while some listeners believe listening to sad music is helpful to them, they actually receive little to no benefit from listening to it (e.g., Garrido & Schubert, 2013). In the current study, we did not investigate possible negative effects of consolation through music; however, recent findings by Carlson et al. (2015) suggest solace to be an effective mood regulator and not to be correlated with anxiety or neuroticism, unlike the strategy of discharge.

More structured self-report measurements during comforting episodes may be possible through the use of large-scale studies that apply Experience Sampling Methodology (ESM) (Christensen et al., 2003; Randall et al., 2014; Reis & Gable, 2000). ESM has been used successfully in music research to catalogue musical emotions in everyday life and may thus be well-suited to investigate consoling episodes as well (Juslin et al., 2008; Juslin et al., 2011; Sloboda, 2011; Sloboda et al., 2001). Modern technologies such as smartphones and smartwatches, allow for easy-to-use ESM with fairly non-invasive timed surveys with additional features, such as graphic representations to present valence and arousal and heart-rate measurements (Rachuri et al., 2010, Randall et al., 2014). An ESM study aimed at collecting data during episodes of (self-)consolation via music or other sources among a broader population may provide valuable insight into the exact nature of the episode, its emotional contents, and additional activities.

Future studies may want to include measures of personality because it has been shown that personality may play a role in both solace seeking (Ter Bogt et al., 2017) and music preference (e.g., Rentfrow & Gosling, 2003). Emotional engagement with music and formal music training may further moderate the use of music as a source of solace (Park et al., 2014; Saarikallio et al., 2013; Shifriss et al., 2015; Ter Bogt et al., 2011; Ter Bogt et al., 2017). Moreover, motivation for selecting specific pieces (e.g., beauty, nostalgia, connection) of music has also been found to be important in explaining self-regulatory motivation and effects of music listening (Van den Tol & Edwards, 2014; Van den Tol & Ritchie, 2014). An additional goal of future research should be to determine the duration of the comforting episode by music and how long its subsequent effect lasts. Is music as solace only used as a

short-term relief of distress, or does music provide longer periods of comfort? Finally, how does music relate to other forms of consolation? Are other comforting behaviors used less when using music, or do individuals use several of these behaviors consecutively or at the same time? These are some questions with important implications for everyday life that should be addressed in future research.

Conclusion

As illustrated by the large number of different artists, composers and pieces of music reported by respondents in this study, a characterization of consoling music itself is difficult to provide because personal meaning of music is derived from past experiences, personality, exposure and other factors. Rather, this survey provides insight into how listeners experience and engage episodes of consolation through music.

The present study largely confirms the findings of Saarikallio and Erkkilä (2007), which showed that consoling music is preceded by negative life events, is listened to in solitude, and is listened to with some focus on lyrics (here only found for popular music). In addition, we identified song aspects and behaviors important to music's consoling abilities, including the way that music sounds, the memories that it evokes, an emotional pattern of being moved, sadness, positive affect, nostalgia, transcendence and calmness, as well as a tendency to listen to the same piece of music repeatedly during a consoling episode as a single activity. Several of these properties, such as lyrics, may be more important to some genres of music than to others, meriting a more in-depth study of these variables. Other factors, particularly age, also warrant further exploration.

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Chapter 4: Everyday Crying over Music: A Survey[5]

Abstract

Human emotional weeping, or crying, occurs in response to a wide array of antecedents. Although music is often mentioned specifically as a stimulus that may make individuals cry, few studies have systematically explored the characteristics of these crying episodes. The present study examines crying over music. Participants ($N = 2778$; 1716 women) completed a survey asking about the last time they cried while listening to music, their associated emotions and physical experiences, details of the song they were listening to, time of day, presence of others, and the overall experience of the crying episode itself. Crying over music appears to be relatively common and occurs mainly when the person is alone during the afternoon and evening. Participants cried over a wide variety of songs, and they attributed their crying to sad memories, nostalgia, the music itself, and the lyrics. They often experienced being moved, sadness, powerlessness, and nostalgia while crying over music. These findings are discussed in the context of music listening and how they compare with the findings of research on crying in general.

Everyday Crying Over Music: A Survey

Introduction

Shedding emotional tears[6] appears to be a common, pervasive, and uniquely human behavior (Gračanin et al., 2018; Vingerhoets, 2013). Vingerhoets (2013) proposes the following types of emotional tears: (1) physical pain tears, (2) attachment-related pain tears, (3) empathic pain tears, (4) societal pain tears, and (5) sentimental tears. This latter category includes, among others, art-elicited tears (Wassiliwizky et al., 2017), and differs from the other types in that it does not seem to involve any sort of pain and suffering, and an evolutionary function is unclear. Of all art forms, music is specifically mentioned as a stimulus that may often make people cry (e.g., Trimble, 2012), but few studies have systematically investigated this particular connection. The goal of the current study is to explore the experience of crying over music more thoroughly and compare these findings to what is known about shedding tears for other emotional reasons.

Emotional Tears

Recent explorations of the functions of weeping have highlighted the importance of shedding tears as a strong signal to others that one needs instrumental and/or emotional support (see Gračanin et al., 2018 for an overview and in-depth argument). This help-soliciting function is particularly obvious in human infants, who are born extremely helpless. They use vocal weeping primarily to notify their caregivers of their need for warmth and/or food as well as to express pain and discomfort. As humans grow older, weeping evolves as part of their physical and socio-emotional development. In short, as one ages, weeping becomes less vocal and more visual (i.e., with tears), sex differences emerge, and the antecedents of weeping show notable changes (e.g., Gračanin et al., 2018; Vingerhoets, 2013). The reliance on others for the fulfillment of all kinds of physical needs is strongly reduced in adults, while social interaction and the relevance of conveying one's thoughts and emotions become more important. The mainly vocal weeping of infants thus changes into a more subtle, visual signal that can be specifically directed at those individuals who will most likely provide the needed support, without notifying the wider environment (including predators and possible assailants)

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[6] We use both "crying" and "weeping" as synonyms for "shedding emotional tears" throughout the paper. For clarity, whenever we use "weeping" we refer to crying in general. When we refer to crying over music, we use the word "crying."

of one's weakness and distress. Vocal weeping in adults may also be suppressed to adhere to social display rules or the social context (see Vingerhoets & Bylsma, 2016 for examples).

When people grow older, their reasons for weeping become more diverse and complex. Adult weeping is most often interpreted as a strong signal of sadness (Zeifman & Brown, 2011), even though it also occurs in response to joyous events (Gračanin et al., 2018). At its core, weeping appears to be a behavior that is particularly associated with helplessness, aimed at social bonding, that can serve some important interpersonal functions such as soliciting emotional sup- port from others, appeasement, and adhering to social norms (see Balsters et al., 2013; Gračanin et al., 2018; Vingerhoets, 2013). The postulated intra-individual functions, including catharsis and self-soothing (Bylsma et al., 2008; Gračanin et al., 2014), may be considered a secondary effect of these functions (Gračanin et al., 2018). The latter intra-individual beneficial effects of weeping appear to depend on individual characteristics, situational circum- stances, and the reactions of observers (Gračanin et al., 2015; Rottenberg et al., 2008).

Tears and Emotions in the Context of Music Listening

One of the foremost reasons for listening to music is its ability to evoke strong emotions in listeners (Schäfer et al., 2013). How music does this is still under investigation. It is clear, though, that there may be multiple functions and mechanisms involved, pertaining to the listeners, the properties of the music itself, and the circumstances in which it is heard (e.g., Garrido, 2017; Juslin et al., 2010). People typically report a wide variety of positive, negative, and mixed emotions in response to music (e.g., Hunter et al., 2010; Juslin & Laukka, 2004). Strong experiences of music are often marked by crying or feeling like crying (e.g., Cotter et al., 2018, 2019; Eerola & Peltola, 2016; Gabrielsson & Wik, 2003; Pelowski, 2015; Sloboda, 1991; Trimble, 2012), chills and thrills (Bannister, 2018, 2019; Goldstein 1980; Panksepp, 1995), and complex emotional states such as being moved (Menninghaus et al., 2015). Despite their relatively short-lived nature, crying episodes are often very intense and can be described in some detail years after they have occurred. Emotional tears in response to music can thus be considered a peak emotional state (Mori & Iwanaga, 2017). Music's ability to evoke strong and diverse emotions has led to the use of music as a mood regulator (e.g., Saarikallio, 2011; Saarikallio & Erkkilä, 2007; Van Goethem & Sloboda, 2011).

Scherer (2005) made a distinction between utilitarian and aesthetic emotions. Whereas utilitarian emotions are regarded as adaptive, by definition, and have some sort of functional

relevance to real-world situations, aesthetic emotions do not seem to fulfill direct behavioral needs and, by contrast with utilitarian emotions, refer specifically to the experience and appreciation of art. An important notion is that, while all music-evoked emotions are generally considered as art-elicited emotions, not all of these feelings can be qualified as exclusively aesthetic emotions. This distinction is illustrated by examples of triggers for emotional sensations, including the lyrics, memories associated with the music, and contextual factors, such as hearing a song at a funeral or wedding (Juslin et al., 2010).

Several theories on (feeling like) crying in response to art have been developed (Miceli & Castelfranchi, 2003; Pelowski, 2015; Pelowski & Akiba, 2011). These models and general crying theories all name feelings of helplessness as the basis of these experiences. However, whereas general crying theories focus on perceived helplessness in interpersonal relationships (e.g., Gračanin et al., 2018; Miceli & Castelfranchi, 2003; Vingerhoets, 2013), helplessness in the context of aesthetic crying finds its origin in an inability to understand the "sublime" aesthetic experience. This leads to frustration, perceived feelings of helplessness and people giving up on the effort of making sense of the experience, which ultimately leads to tears (Miceli & Castelfranchi, 2003). In this context, being overwhelmed by the beauty of music, and specifically art, can also be considered as some sort of helplessness. Pelowski and Akiba (2011) and Pelowski (2015) propose similar but more elaborate and more cognitive models that mainly focus on crying over visual art. Cotter and colleagues (2018) suggested that there are several reasons as to why the models of appraisal previously outlined might be less applicable to crying over music, including the dynamic nature of music, for example, as opposed to the static properties of paintings.

Braud (2001), by contrast, proposes "tears of wonder-joy" (p. 100) that are common but not limited to the experience of art. According to this theory, as opposed to the appraisal theories of Pelowski and Akiba (2011) and Pelowski (2015), tears of wonder-joy occur relatively automatically as a response to "encountering and appreciating what is truly important" (Braud, 2001, p. 106). This spontaneous shedding of tears and the profound nature of emotional tears have also been reported in music therapy settings (Albornoz, 2013).

Theories of crying in an aesthetic context focus mainly on positive and pleasant experiences, even though weeping episodes are often accompanied by a wide variety of positive as well as negative emotions (Miceli & Castelfranchi, 2003; Vingerhoets, 2013). Recent work by Cotter and colleagues (2018) addresses a previous lack of insight into the emotions that accompany

feeling like crying when listening to music. They used a latent class analysis on ratings made by a large sample of adults of their felt emotions during a crying episode. This resulted in two major clusters (or classes), awe-filled and sad experiences, that fit well with qualitative reports on crying episodes. The awe-inspired class is characterized by feelings of euphoria and happiness, inspiration, amazement, and chills, while the sad class is marked by anger, anxiousness, feeling upset and out of control, depression, and sadness. Personality was found to influence the likelihood of recalling a type of crying episode: individuals who scored high on measures of neuroticism were more likely to recall a sad experience, while those who scored high on measures of openness were more likely to recall an awe-like event.

In a follow-up study, Cotter et al. (2019) replicated their previous finding of a two-class model of aesthetic crying and explored the musical and situational features associated with crying episodes. Differences between episodes characterized by awe and sadness were found for the genre of the music people listened to (awe: classical, gospel, and religious music; sadness: pop, country, and soul or R&B; no difference for rock music), and music that led to an awe-like episode was reported to be more complex and beautiful, while music that led to a sad episode was more likely to be experienced as colder, unpleasant, familiar, personally meaningful, and with an emphasis on lyrics. In addition, awe events were more likely when others were present and when listening to live music. The authors suggest that, in awe-inspired episodes, crying is triggered more often by the music itself, while, in the case of sad events, crying is triggered not so much by the music itself, but by external factors such as memories of someone.

The Present Study

The present study was designed with two goals: (1) to investigate crying episodes specifically associated with listening to music, and (2) to compare these findings to what is known on the basis of the pertinent literature about weeping in general. The current body of work is largely exploratory, and we hope that it will lead to more direct hypothesis testing in future research. Specifically, we looked at the recency, frequency, intensity, duration, and timing of the musical crying episode, its associated feelings and physical sensations, and the presence and response of others. Further, we report on several music-related variables. In addition to providing descriptive information on our variables, we looked at potential sex differences. As guidance, we used the published literature on weeping in which these differences play a central role. Female weeping tends to be more recent, more frequent, and more intense than

male weeping (Vingerhoets & Scheirs, 2000). Men also tend to cry more than women for positive as opposed to negative reasons, and there are differences between men and women as to how often they report specific emotions such as anger and powerlessness (e.g., Vingerhoets, 2013; Vingerhoets & Bylsma, 2016). We expected to find similar differences between the sexes in relation to crying over music.

Method

Sample

A convenience sample of 2778 people (1716 women) aged 18–66 years ($M = 38.9$, $SD = 10.7$ years) took part in the study following a call for participants in a study of music and tears on the website of Dutch National Radio NPO 2 during the annual Top 2000 in 2006. This radio event at the end of the year lets listeners vote on their favorite popular music. The selected songs are subsequently played on national radio between Christmas and New Year's Eve. Further participant details are provided in Table 1.

Table 1. Overview of participant information.

	Men	Women	Total
N	1062	1716	2778
Age range in years	18-68	18-68	18-68
Mean age (*SD*)	39.68 (11.14)	38.38 (10.42)	38.87 (10.71)
Level of education			
Primary school	22	23	45
Secondary school	415	691	1106
Lower vocational	39	50	89
Higher vocational	404	647	1051
University level	182	305	487
Hours of music listening per week	11.99 (13.46)	12.79 (13.77)	12.49 (13.66)
Music expertise			
Playing an instrument	.78 (.97)	.75 (.90)	.76 (.92)
Singing*	.93 (.89)	1.14 (.91)	1.06 (.90)
Composing*	.32 (.66)	.18 (.48)	.23 (.56)

Note: 1) SD given in parentheses. 2) Music expertise: Participants were asked if they had knowledge of or practiced any of the proposed music activities. 3) * Denotes a significant difference of $p < .001$ between men and women.

Measures

Background Information. Participants were asked about their sex, age, highest level of completed education, and music-related activities. These latter activities, rated on a Likert-type scale from 0 (*no knowledge*) to 3 (*expert*) included playing an instrument, singing, and composing. Lastly, participants estimated how many hours they listen to music, on average, each week.

The Adult Crying Inventory. We used a questionnaire that was based on the Adult Crying Inventory (ACI; Vingerhoets, 1995; Vingerhoets & Cornelius, 2001). Some questions were reworded in order to ask about crying to music specifically, such as "The following questions refer to the last time you cried when listening to music," with crying being defined as having moist eyes with an emotional cause. We supplemented the questions on crying with several questions that inquired specifically about the song and its characteristics (see Appendix).

Crying in General. The first two questions were about emotional weeping in general. Participants were asked how often they had cried in the four weeks preceding the questionnaire ("Could you estimate how often you've cried during the past four weeks?"), and also on how recent their last emotional weeping episode was in general (Likert-type scale: less than a day ago; 2–5 days; 6–10 days; 11–30 days; 1–6 months; 7–12 months; over a year ago).

Crying Over Music. Participants were then asked to focus on the last time they cried over music ("The following questions refer to the last time you cried when listening to music").

The Crying-Over-Music Episode. Participants were asked how recently they had cried while listening to music (response alternatives: less than a day ago; 2–5 days; 6–10 days; 11–30 days; 1–6 months; 7–12 months; over a year ago), and to also give the approximate time of day that this episode occurred (00.00–24.00). They further indicated how long this episode lasted (response alternatives: less than 5 minutes; 5–15 minutes; 16–30 minutes; 31–60 minutes; more than 60 minutes; it consisted of multiple recurring, short-lived, episodes). Finally, they provided information on the intensity of crying (moist eyes; moist eyes and sobbing; moist eyes, sobbing, louder crying; moist eyes, sobbing, louder crying, bodily movements or wailing).

Song Characteristics. Participants reported the specific artist and song (free response) that they had heard during their most recent crying over music episode. They then selected the

genre of this piece from a list, and were asked if the music was instrumental, vocal, or music that had both vocal and instrumental components. They further indicated if they had chosen to listen to this song, specifically, or if listening to it was coincidental. Lastly, participants selected what made them cry about the song (response options: the beauty of the music itself; lyrics; happy memories; sad memories; nostalgia; something else, labeled "other," with a free response option).

Presence and Response of Others While Crying. Participants indicated whether they listened to the music in solitude or with (a significant) other(s) present. If applicable, they reported on their relationship with the other(s) present and if these individuals were crying as well. Finally, they provided information on the responses of the other(s) to their crying (response options: ignoring; comfort with words; comfort by putting an arm around me; angry; didn't know how to react; showed understanding; also cried; or something else/free response). This last question was answered separately for familiar and unfamiliar others who were present.

Associated Feelings and Physical Sensations. Participants rated their mood preceding the episode on a 5-point Likert-type scale ranging from *very sad* to *very happy*. They were asked if crying influenced their physical and mental wellbeing ("How did you feel mentally/physically after crying in comparison to how you felt before?": worse than before; the same, better than before), and how they experienced crying (I found it pleasant; I found it uncomfortable; something else). They also indicated the emotions and physical sensations that they experienced while crying (see Tables 7 and 8 for response options).

Procedure

Participants completed the web-based survey on the Top 2000 website in Dutch while the event was aired on radio. The survey was available for two weeks. An introductory text informed participants that this was a study of music and crying, that participation was anonymous and voluntary, and that the data were to be used for scientific purposes only. Participants were also informed that they could discontinue their participation at any time without any negative consequences. Completing the survey in full took approximately 20 minutes. The data were collected in 2006 (see previously) at a time when it was not necessary in the Netherlands to obtain ethical approval to recruit participants to such research, although approval was obtained from the research ethics committee of Tilburg University to analyze the data and publish the results of the study.

Statistical analyses

Descriptive analyses included means, percentages, and standard deviations of all variables. We compared men and women on various scales with the Chi-squared test for categorical data and ANOVA. Several potential associations were explored through (nonparametric) correlations. We also calculated effect sizes. We report the φ and Cramer's V (φ$_c$) coefficients for the Chi-squared test (φ = weak .1, moderate .3, strong .5, and df-adjusted for φ$_c$; Cohen, 1988) and η$_p^2$ (weak .01, medium .06, strong .14; Cohen, 1988) for the ANOVA. To provide some protection against Type I errors, findings were considered significant at an alpha of $p \leq$ .001. Analyses were carried out using IBM SPSS 23.0.

Results

The most recent general weeping episode

Women (M = 3.59, SD = 2.63) had cried almost twice as often as men (M = 2.06, SD = 2.37) during the previous four weeks $F(1, 2776)$ = 241.62, $p <$ .001, η$_p^2$ = .08. As many as 60.49% of women and 53.77% of men reported weeping between one and four times, while 32.11% of men as opposed to only 8.92% of women stated that they had not cried at all. Female weeping episodes were generally also more recent than those of men: 69.29% of women had cried between 0-5 days ago as opposed to 42.18% of men (see Table 2). There was a substantial difference between men and women as to how recently they had cried, $\chi^2(6, N = 2778)$ = 309.66, $p <$ .001, φ$_c$ = .33.

The crying-over-music episode

A similar pattern of women having cried more recently than men was found for crying over music, but the effect size was substantially smaller than we found for weeping in general, $\chi^2(6, N = 2778)$ = 80.39, $p <$ .001, φ$_c$ = .17. Data also showed that crying over music was common with 50.82% of women and 37.76% of men having cried while music played during the past 0-5 days (see Table 2). This suggests that some of the crying-over-music episodes overlapped with the most recent general weeping episodes mentioned above. This was confirmed by a substantial, significant correlation between recency of crying over music and weeping in general, $r_s(2778)$ = .66, $p <$ .001.

Crying over music mostly occurred in the evening between 8pm and 12 midnight (37.37%). Crying increased during the day gradually with peaks around 11am to 12 noon (6.41%) and between 2pm and 6pm (26.28%). Regarding duration, most episodes lasted less than five

minutes (see Table 2). There was a small-to-medium effect for sex: women cried somewhat longer than men, $\chi^2(5, N = 2778) = 31.36$, $p < .001$, $\varphi_c = .11$. Episodes that lasted longer than 15 minutes, or that recurred over a longer period of time were rare for both sexes. Concerning crying intensity, most of the episodes consisted of having only moist eyes, followed by having moist eyes and some sobbing (see Table 2). There was a medium-sized significant effect for sex: women reported crying more intensely than men, $\chi^2(3, N = 2778) = 66.38$, $p < .001$, $\varphi_c = .16$.

Table 2. Overview of the Recency of the Last Weeping in General and Crying-Over-Music Episodes, as well as the Duration and Intensity of the Most Recent Crying-Over-Music Episode.

Time since weeping in general							
	< 1 day	2-5 days	5-10 days	11-30 days	1-6 months	7-12 months	> 1 year
Women	31.58	37.70	13.23	9.91	5.19	1.05	1.34
Men	18.64	23.54	12.71	14.97	16.95	3.86	9.32
Total	26.64	32.29	13.03	11.84	9.69	2.12	4.39

Time since crying over music							
	< 1 day	2-5 days	5-10 days	11-30 days	1-6 months	7-12 months	> 1 year
Women	21.56	29.25	13.87	13.64	13.17	2.68	5.83
Men	16.85	20.90	11.68	15.44	17.98	5.18	11.96
Total	19.76	26.06	13.03	14.33	15.01	3.64	8.17

How long did the crying-over-music episode last?					
	< 5 min.	5-15 min.	16-30 min.	31-60 min.	> 60 min.	Recurring episodes
Women	79.55	16.20	2.10	.41	.35	1.40
Men	86.72	9.70	1.13	.75	.66	1.04
Total	82.29	13.71	1.73	.54	.47	1.26

How intense was the crying-over-music episode?			
	Moist eyes	and sobbing	and loud crying	and bodily movements/screaming
Women	47.61	43.71	6.12	2.56
Men	63.47	30.70	4.14	1.69
Total	53.67	38.73	5.36	2.23

Note: 1) Values are percentages. 2) Min. stands for minutes

Table 3. Distribution of the music genres participants cried over.

Genre	Percentage	Genre	Percentage
Classical music	6.30	Blues	3.85
Country	1.66	Disco/dance	0.47
Folk music	4.39	Rap/Hip-hop	0.18
Soul/funk	2.20	Religious/gospel	2.70
Alternative music	5.44	Jazz	1.33
Rock	10.73	Pop music	46.83
Heavy Metal	0.61	Soundtrack/theme	5.76
Tearjerker/schlager	7.20	Party music	0.36

Song characteristics

Participants reported crying to nearly 800 different artists, musicians, and composers (exact number unknown due to typographical errors or incomplete information), and an even greater number of different songs and pieces of music. Most participants classified the music they cried to as pop (see Table 3 for the genre distribution). They indicated that most of this music consisted of vocal and instrumental components (92.21%), while only a few pieces were a cappella (3.82%) or instrumental (3.97%). The song that was cried over had been chosen specifically by 48.63% of participants, while 51.37% indicated that crying to it was coincidental. Men (56.40%) chose the song they cried over more often than women (43.60%), $\chi^2(1, N = 2778) = 41.56$, $p < .001$, $\varphi = .12$, but this effect was small.

As to why participants cried over music, they reported it was mostly because of sad memories, the lyrics of the song, nostalgia, and the beauty of the music itself (see Table 4). There was a significant, medium-sized effect for sex, $\chi^2(5, N = 2758) = 54.44$, $p < .001$, $\varphi_c = .14$, such that men reported crying because of the beauty of the music more often than women. On inspection of the free responses, several reactions stood out. A large proportion of participants attributed their crying to a combination of several factors, such as a combination of the lyrics, the music, the situation, and their feelings. Also, they often mentioned the situation the song was heard in and memories of a specific person.

Table 4. Overview of what most often makes participants cry about music.

	Beauty of the music	Lyrics	Happy memories	Sad memories	Nostalgia or longing	Something else
Women	11.56	18.54	6.75	29.34	20.72	13.09
Men	21.82	15.56	5.31	25.33	19.07	12.90
Total	15.48	17.40	6.20	27.81	20.09	13.02

Note: Values are percentages.

The presence of others while crying

Most participants reported crying in solitude (64.25%). When others were present, the company was generally small (1 = 19.98%, 2 = 4.72%, 3 = 2.30% other(s) present). A minority cried in the presence of a group of ten or more people (6.08%). Their relationship to others present was as follows: in the presence of a partner/significant other 55.77%, in mixed company 14.97%, with their own children 11.45%, friends 6.56%, strangers 5.38%, parents 3.42% and siblings 2.45%. Participants only noticed others crying too in 7.20% of cases. Observers responded to criers in a variety of ways: familiar others mostly offered understanding and physical comfort, while strangers were more likely to ignore the crying episode, although 20.64% of strangers also showed understanding (see Table 5). The descriptions given in the free-response options of this last question revealed several further interesting reactions. A large proportion of respondents reported that the familiar others present did not notice (as opposed to actively ignore) their tears or laughed. Sometimes the other present acknowledged their crying, but did not interfere, because that was what the participant preferred. In the case of strangers, a large proportion of participants also said that their crying was apparently unnoticed by bystanders.

Table 5. Crying in the presence of others and their responses.

Crying in the presence of	Familiar others		Strangers	
	N	%	*N*	%
Total	2778		2778	
Missing	268	9.65	387	13.93
Does not apply	1647	59.29	2110	75.59
Response of others present	863		281	
They ignored my crying	97	11.24	68	24.20
They comforted me with words	43	4.98	23	8.19
They comforted me by putting an arm around me	201	23.29	24	8.54
They got angry with me	8	.93	4	1.42
They did not know how to respond	30	3.48	21	7.47
They showed understanding	230	26.65	58	20.64
They were also crying	118	13.67	35	12.46
Something else	136	15.76	48	17.08

Note: The reported percentages for the responses are based on the number of people who received a reaction from others: *N* = 863 for familiar others, and *N* = 281 for strangers.

Emotions and physical sensations experienced during the crying-over-music episode

Before the onset of crying, a large proportion of participants were in a neutral mood, about a third were (very) sad, while around a quarter were (very) happy (see Table 6). There was no difference between men and women (*p* = .095). Regarding the question as to whether they experienced any change in their mental wellbeing (see Table 6), around half of the participants reported no change, while a substantial portion said they felt better. A small group felt worse. In terms of physical wellbeing an even larger group reported no change, and the group that reported improvement was only half the size of that which reported a change in mental wellbeing. Again, a small group felt worse. For both mental, $\chi^2(2, N = 2778) = 24.64$, $p < .001$, $\varphi_c = .09$ and physical, $\chi^2(2, N = 2778) = 24.93$, $p < .001$, $\varphi_c = .09$ wellbeing, men said they felt better more often and worse less often than women, but these effects were small. As to how they experienced the crying-over-music episode, the majority of participants said it was pleasant while far fewer felt uncomfortable (see Table 6). On inspection of the free responses, several other sensations stood out: for example, the crying felt unavoidable, necessary, and cathartic. Some people also had no special feelings about their crying, reporting that it was something that just simply happens.

In addition, participants indicated the emotions they experienced while crying over music by selecting them from a list provided by the investigators (see Table 7). Being moved, sadness, powerlessness, and nostalgia were the foremost emotions reported when crying over music. Other notable feelings were relief, dismay, and rapture. Reports of highly negative interpersonal emotions (e.g., contempt, humiliation, disgust, guilt) were rare. There were few significant differences between men and women. Males reported significantly less sadness and somewhat more positive emotions than women, but these effects were small.

We examined the associations between the four most frequently reported emotions to see if they often occurred simultaneously. Sadness was negatively correlated with being moved $r(2778) = -.18$, $p < .001$ and positively correlated with powerlessness $r(2778) = .30$, $p < .001$, while being moved was negatively correlated with powerlessness $r(2778) = -.18$, $p < .001$ and positively correlated with nostalgia $r(2778) = .10$, $p < .001$. Nostalgia and powerlessness were not correlated significantly, $r(2778) = -.05$, $p = .01$. There was thus some indication that participants reported less sadness when they experienced more feelings of being moved.

Finally, participants reported their physical sensations (see Table 8). The sensations reported most often were feeling/being quiet, goose bumps, respiratory changes, hair standing on end, and cold shivers. In a result similar to that found for reported emotions, there were few differences between men and women in their reporting of physical sensations. Where differences were statistically significant, effect sizes were minimal.

Table 6. Overview of several questions on pre- and post-crying mood and feelings.

What was your mood before hearing the music?

	Very Sad	Somewhat sad	Neutral	Somewhat happy	Very happy
Women	5.19	27.33	41.08	20.80	5.65
Men	6.78	24.29	44.26	19.11	5.56
Total	5.76	26.17	42.30	20.16	5.62

How did you feel mentally after crying compared to before?

	Worse	The same	Better
Women	10.66	52.74	36.60
Men	6.87	48.12	45.01
Total	9.22	50.97	39.81

How did you feel physically after crying compared to before?

	Worse	The same	Better
Women	10.61	72.44	16.96
Men	5.56	73.54	20.90
Total	8.68	72.86	18.47

How did you experience crying?

	Pleasant	Uncomfortable	Something else
Women	61.60	13.55	24.85
Men	65.18	17.03	17.79
Total	62.97	14.88	22.15

Note: Values are percentages.

Table 7. Reported frequencies of experienced emotions while crying over music.

Reported emotions	Women (N=1716)	Men (N=1062)	Total (N=2778)	Effect size φ
Sadness	58.28	46.61	53.82*	.11
Being moved	65.27	65.07	65.19	.00
Powerlessness	25.12	23.07	24.33	.02
Anger	8.16	7.63	7.96	.01
Relief	10.66	15.35	12.45*	.07
Dismay	13.22	13.65	13.39	.01
Rapture	7.93	16.48	11.20*	.13
Frustration	8.97	9.23	9.07	.00
Fear	5.59	3.95	4.97	.04
Disgust	.87	1.04	.94	.01
Guilt	2.97	3.95	3.35	.03
Contempt	.47	1.13	.72	.04
Joy	5.65	13.28	8.57*	.13
Humiliation	.93	1.22	1.04	.01
Elation	4.31	7.16	5.40*	.06
Satisfaction	3.85	10.26	6.30*	.13
Nostalgia	29.37	27.40	28.62	.02

Note: Values are percentages. *Significant difference between men and women at $p \leq .001$.

Demarcations for effect sizes φ = weak .1, moderate .3, strong .5.

Table 8. Reported frequencies of experienced physical sensations while crying over music.

Physical Sensations	Women (N=1716)	Men (N=1062)	Total (N=2778)	Effect size φ
Respiratory changes	29.55	23.26	27.14*	.07
Cold shivers	16.03	19.59	17.39	.05
Feeling dizzy	.52	1.04	.72	.03
Cold	11.71	8.66	10.54	.05
Warm	14.92	14.60	14.79	.00
Goosebumps	41.32	50.00	44.63*	.09
Hair standing on end	17.54	23.52	19.76*	.07
Faster heartbeat	10.37	7.72	9.36	.04
Feeling quiet	47.26	42.47	45.43	.05
Laughing	2.45	3.58	2.88	.03
Muscle relaxation	10.61	11.96	11.12	.02
Muscle tension	9.50	5.46	7.96*	.07
Headaches	6.12	3.20	5.00*	.07
Chest pressure	6.24	3.77	5.29	.05
Shaking	1.63	2.82	2.09	.04
Sexual arousal	.87	1.13	.97	.01

Note: Values are percentages. *Significant difference between men and women at $p \le .001$.
Demarcations for effect sizes φ = weak .1, moderate .3, strong .5.

Discussion

This study was designed to obtain a better understanding of episodes of crying over music and to compare these findings to what is known about weeping in general. The current survey was guided by previous research using the ACI, particularly the International Study on Adult Crying (ISAC; Becht & Vingerhoets, 2002; Van Hemert et al., 2011; Vingerhoets, 2013).

In line with recent work by Cotter et al. (2018, 2019), our data suggest that crying is a common and frequent response to music. Episodes are generally short, and mostly limited to moist eyes and occasionally some sobbing. Women cried more, longer, and more intensely over music than men. This corresponds with what is found in the literature on weeping in general (e.g., Vingerhoets, 2013; Vingerhoets & Scheirs, 2000). Smaller effect sizes were

found for differences between the sexes in terms of frequency, crying duration, and intensity for crying over music than for weeping in general.

There was a gradual increase in crying over the course of the day, peaking late in the day and particularly in the evening, reflecting the increase and evening peak shown in the ISAC database (Vingerhoets, 2013). People tend to listen to music during the evening, whether they are at a concert or at home. If they are at home, they can choose to listen to music that is relevant to them personally and use it to relax, reflect on the past day, or for other mood-regulatory purposes. Furthermore, fatigue may lower the individual's weeping threshold (Gračanin et al., 2018; Vingerhoets, 2013). Since we did not specifically ask what people were doing at the time they cried, we do not know the reason for these peaks or whether they were linked to emotionally significant events, for instance, during the day. Understanding the situations in which people cry over music would be an interesting avenue for future research, since the emotional experiences of crying episodes appear to depend on their environmental context (Cotter et al., 2019).

Like general weeping episodes, most crying over music happens in solitude. If others are present at all, they are generally few. Crying over music, as opposed to weeping in general (Vingerhoets, 2013), is less common in the presence of parents, but more so in the company of a partner. Consequently, comfort provided while weeping over music is more physical and less vocal in nature when compared with weeping in general. Tears in general and while listening to music are rarely shed in the presence of strangers. Unfamiliar observers seem to be somewhat more willing to comfort and show understanding, albeit less so than familiar observers, when they witness tears shed while listening to music than when tears are shed without music. This may be the result of being exposed to the same music and experiencing the same feelings as the crier. In addition, the cause of tears may be clearer to the observer in the case of crying over music, and it may be easier and safer for them to engage with the crier since there is no direct risk to the observer. Yet, somewhat paradoxically, tears shed while listening to music are ignored to a greater extent by both familiar and unfamiliar observers than by the observers recorded in the ISAC database (Vingerhoets, 2013). This may be because observers do not consider music to be a genuine source of stress evoking the need for comfort and support.

Thus, although weeping is thought to signal a request for help from observers (Gračanin et al., 2018; Vingerhoets, 2013), most crying over music occurs when the individual is alone. Music

can, however, be experienced as a nonjudgmental, understanding friend (e.g., Hanser et al., 2016; Van den Tol & Edwards, 2013), and may serve as a substitute for personal contact when others are unavailable or unwanted. Recent work by Aucouturier and Canonne (2017) further demonstrates the ability of listeners to identify social relational intentions in improvised musical interactions, and self-selected music reduces feelings of loneliness in listeners (Schäfer et al., 2020). The prosocial intentions commonly sought by criers may thus also be found in music, probably in particular by those who were already in a low mood before they listened to the music. Another reason for crying in solitude with music may be that there are no interpersonal distractions and listeners can fully focus on their own affective experience (Zhang et al., 2018). This may also help to understand why consolation and other music and mood-regulatory strategies (Hanser et al., 2016, Saarikallio & Erkkilä, 2007) are mostly applied when alone. It may be easier to work through and re-evaluate emotional concerns with the help of music without any distraction from other people. In turn, confronting emotional concerns while listening to an emotionally laden song may evoke tears. Since people strongly believe that weeping serves self-soothing functions (Gračanin et al., 2014) this may be a specific goal of some listeners. However, there is currently no understanding of the nature of the mood-elevating mechanism(s) that may be involved in self-soothing weeping. The findings of both the present study and a recent survey (Cotter et al., 2018) revealed that approximately half of the participants in both studies chose the specific music they cried to. While this does not necessarily imply that they had the intention of crying, it is well documented that people generally have a clear understanding of the music they wish to listen to in certain situations and how their preferred music influences them emotionally (e.g., Schäfer et al., 2013).

Given our method of recruitment, it is unsurprising that most respondents cried over popular music and nearly all the music included a vocal element. The presence of vocals or an instrument that resembles them may be crucial in evoking tears, perhaps because people find it easier to relate to or make social connections with voices. Vocal elements are also important in the experience of other strong experiences with music such as chills (Bannister, 2018). Furthermore, participants attributed some of their crying to specific song lyrics. Future work could focus on which aspects of the lyrics make listeners cry, such as their meaning, the presence of a voice, its timbre, or the performer's sex. Another intriguing finding that deserves more research attention is that men reported crying over the beauty of the music

itself more often than women, while both sexes reported crying equally often because of sad memories, nostalgia, and the lyrics of the song.

A recent study also found that lyrics and memories of people or events played important roles in crying over music, as well as specific music-evoked emotions and personal meaning of the music to the individual (Cotter et al., 2019). These authors also found that awe-inspired crying episodes were more often triggered by factors related to the music, such as the beauty of it, while sad episodes were more often related to extra-musical associations, such as memories. From the general weeping literature, it is known that men cry over positive events more often than women (Vingerhoets, 2013; Vingerhoets & Bylsma, 2016). We do not know if this finding reflects reality adequately or if men are biased in their recall or reports of emotional episodes such that they are more likely to recollect positive experiences than negative experiences.

In the current study, most participants described their crying-over-music episode as a pleasant experience, regardless of whether they were men or women. Even though the experience might have been pleasant, crying over music mostly did not lead to improved mental let alone physical wellbeing. When interpreting this finding, some caution is advised, however, since recent work suggests that the potential positive or negative outcome of a weeping episode relies heavily on the presence and response of others, the psychological condition of the crier (Rottenberg et al., 2008), and the study methodology (Gračanin et al., 2015).

Further support for crying over music as a mostly positive experience comes from the reported emotions associated with the crying episode. Nearly two-thirds of participants reported being moved. There is evidence that art-elicited tears can be viewed as a physiological expression of being moved (e.g., Kuehnast et al., 2014). The study of this complex feeling is relatively new (Menninghaus et al., 2015) and there is an ongoing discussion in the literature as to whether it should be regarded as a mixed state of feelings (Menninghaus et al., 2015), sometimes described as "moving sadness" (Eerola et al., 2016, p. 4) or as a separate, positive emotion (Seibt et al., 2017). Whatever its precise nature, it is clear that being moved plays a major role in the experience of music and peak emotions in particular (Bannister, 2018). Moreover, being moved in daily life is often associated with the direct experience or the observation of prosocial behavior and interpersonal closeness (Menninghaus et al., 2015; Seibt et al., 2017). The present positive association between being moved and nostalgia, and the negative association with sadness and powerlessness suggests

that being moved can be seen as a positive emotional construct, even though some crying episodes are characterized by an overlap with a feeling of sadness. The current findings support the view that tears do not signal only sadness (Gračanin et al., 2018; Vingerhoets, 2013; Vingerhoets & Bylsma, 2016).

Sadness played a part, however, in nearly half of the crying episodes that were reported and is thus an important emotion when crying over music (Cotter et al., 2018). Nearly one-fourth of the participants also experienced helplessness. Whether this should be considered as an inability to understand the musical experience, a feeling of being overwhelmed by the beauty of the music (Miceli & Castelfranchi, 2003), or related to extra-musical events should be explored in future research. The latter explanation seems more likely.

Crying over music is most different from weeping in response to other antecedents because of the emotions experienced while crying. In the ISAC database, being moved is reported far less frequently, while powerlessness and other strong negative emotions such as anger and frustration, sometimes combined with powerlessness, are more prevalent when weeping in general (Vingerhoets, 2013). Strongly negative interpersonal sensations such as humiliation, con- tempt, and disgust are almost absent when crying over music. The literature backs this up: individuals rarely or never experience negative interpersonal emotions while listening to music (see Juslin & Laukka, 2004). Positive emotions such as joy and relief are reported equally often in the ISAC database, with the exception of rapture, which is more common when crying over music. When designing experimental studies of emotional weeping, further consideration should be given to the difference between being moved when crying over music and when weeping in general. Tears evoked by emotional stimuli involving music, but perhaps also other forms of art, may result in entirely different prosocial responses from observers than tears in real-life situations.

While crying over music, goosebumps and feeling quiet are the physical sensations reported most frequently. These bodily feelings are associated with weeping in general (Vingerhoets, 2013) and being moved (Menninghaus et al., 2015; Seibt et al., 2017; Wassiliwizky et al., 2017), and differ from the peak experience of chills, which is marked by warm sensations (Bannister, 2018). This finding supports the idea that tears and chills are separate phenomena (Bannister, 2018; Mori & Iwanaga, 2017) that may occur simultaneously, however, or follow each other in close succession (Bannister, 2019; Wassiliwizky et al., 2017). The overlap between tears, feeling quiet, and goosebumps suggests that the traditional view of the

sympathetic and parasympathetic nervous systems as functioning antagonistically might be obsolete and that it is possible for both branches of the autonomic nervous system to be activated at the same time. More physiological research, such as that by Wassiliwizky et al. (2017), is needed to further our understanding of the physiological responses associated with peak emotional experiences. As pointed out by others (e.g., Cotter et al., 2018), the relationships and discrepancies between peak emotional states (chills, crying), and complex emotional constructs (awe, being moved, nostalgia) deserve more research attention, since they seem to occur in a wide variety of both positive and negative situations.

A further point of interest is that we found few significant differences between the reported emotions and physical sensations of men and women while crying over music, with small effect sizes. Differences between men's and women's reports of helplessness and fear when weeping in general (Vingerhoets, 2013) disappear when they are crying over music. Taken together with the smaller differences we found between men and women in their reports of recency, duration, and intensity of crying-over-music episodes, these findings suggest that men and women are more similar than dissimilar when crying over music than when weeping in general. How they engage with music and what makes them cry over it may differ, however.

Finally, despite the evident trends described previously, there were substantial differences between the participants in this study in terms of the recency and frequency of crying-over-music episodes, the components of the music that make them cry, the emotions they experienced, and their physical responses. This is further exemplified by the large number of different songs and artists over which the participants cried. Crying over music is therefore not a uniform behavior and seems to depend to a great extent on personal, situational, and musical variables.

Limitations

The current body of work is one of the few studies that investigate crying over music and one of the first to make a comparison between crying over music and weeping in general. Another strength is the large sample size. Several limitations should be considered, however, when interpreting the current findings. First, all responses were self-reports by individuals who were mainly referred to the survey through the website of a popular music radio station. Participants can thus be assumed to have an interest in and preference for specifically popular music and their responses may suffer from self-report bias. Second, data were collected

during and immediately after a major radio event at the end of the year. This may have had an effect on the recency and frequency of crying episodes that were reported, and the feelings that were associated with them. Men in particular reported crying more often than expected, according to the general weeping literature (Vingerhoets, 2013). Third, participants included in the ISAC database were not asked if any music was present when they were weeping over general antecedents, although they were given the opportunity to indicate that the direct cause of their weeping was music. Finally, many intra-individual, interpersonal, and intercultural differences exist within general weeping behavior (see Vingerhoets, 2013) so the findings of the present study may not apply to other populations. These issues could be countered by collecting data on multiple crying episodes throughout the year from a sample representative of the general population, rather than just listeners to a specific event on the radio, in several countries, using methods such as diary or panel studies. Such research could provide valuable insight into the question of how listeners engage with music they have cried over in the past. This would also help our understanding of individual differences between weeping in general and crying over music.

Conclusion

The present study furthers our understanding of human emotional crying over music and demonstrates that it is a common, but diverse experience. Crying over music is different from weeping in general in respect of: (1) smaller differences between women and men in frequency, intensity, and experienced emotions, (2) affective experiences, namely the frequent experience of being moved and the absence of strongly negative feelings, and (3) presence (of a partner) and response of observers (more physical for familiar others, and more often understanding, although crying over music is more often ignored by familiar others and strangers alike). Music may help to establish a safe environment in which listeners can give in to or work through their emotions without feeling judged. It may serve as an understanding friend in this context. Crying is not always directly related to feelings of sadness and may have numerous antecedents and consequences that depend to a large extent on the specific situation, the person, and the presence of others. The current findings are particularly relevant to studies in which music is used as a stimulus to induce crying.

Acknowledgements

<div align="center">**References**</div>

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Appendix

Music and Crying Questionnaire

Deel 1/ Section 1

De volgende vragen gaan over muziek, emoties en huilen. Met huilen bedoelen wij dat de ogen betraand zijn om emotionele redenen en niet vanwege oogirritatie. Snikken en hardop huilen is dus niet echt noodzakelijk. / The following questions are about music, emotions and crying. By crying we mean having moist eyes for emotional reasons and not because of irritation to the eyes. Sobbing and crying out loud are thus not strictly necessary.

Q1. Wat is uw geslacht? - Man/vrouw / What is your sex? - Male/female

Q2. Wat is uw leeftijd? / What is your age? - (Free response)

Q3. Wat is uw hoogst afgeronde opleiding? - Lagere school /Lager beroepsonderwijs/Middelbaar beroepsonderwijs/Hoger beroepsonderwijs/Universitair / What is your highesst completed level of education? - Primary school/Secondary school/Lower vocational/Higher vocational/University

Q4. In welke mate beheerst u de volgende muzikale vaardigheden? - Bespelen van een muziekinstrument/Zingen/Componeren (Schaal van *helemaal niet* (0), tot aan *expert* (3)). To what extent have you mastered the following music skills? - Playing an instrument/Singing/Composing (Scale that ranged from *not at all* (0), to *expert* (3)).

Q5. Hoeveel uur luistert u gemiddeld genomen per week naar muziek? / How many hours a week do you on average listen to music? - (Free response)

Q6. Kunt een schatting geven van hoe vaak u de afgelopen 4 weken gehuild hebt? / Could you estimate how often you have cried during the past four weeks? - (Free response)

Q7. Wanneer hebt u voor het laatst gehuild? - Minder dan 1 dag geleden/2-5 dagen geleden/6-10 dagen geleden/11-30 dagen geleden/1-6 maanden geleden/7-12 maanden geleden/meer dan 1 jaar geleden. / When was the last time you cried? - Less than 1 day ago/2-5 days ago/6-10 days ago/11-30 days ago/1-6 months ago/7-12 months ago/over 1 year ago.

Deel 2/ Section 2

De onderstaande vragen hebben betrekking op de laatste keer dat u gehuild hebt toen u naar muziek luisterde. / The following questions refer to the last time you cried when listening to music.

Q8. Welk nummer hoorde u toen u huilde? - (artiest & titel) / What song did you hear when you cried? -(free response - artist & title)

Q9. Wat was het genre? - Klassiek/Blues/Country/Disco, dance/Folk/Rap, hiphop/Soul, funk/Religieuze muziek, gospel/Alternatieve muziek/Jazz/Rock/Pop/Heavy metal/(film)Soundtrack, thema/Smartlap, schlager/Feestmuziek / What was the music's genre? - Classical/Blues/Country/Disco, dance/Folk/Rap, hiphop/Soul, funk/Religious music, gospel/Alternatieve music/Jazz/Rock/Pop/Heavy metal/(movie) soundtrack, theme/Tearjerker, schlager/Party music.

Q10. Wat voor soort muziek was het? - Alleen zang/instrumentaal/zang en instrumenten / What kind of music was it? - Only vocal/instrumental/both vocals and instrumental

Q11. Wanneer heeft u gehuild? - Minder dan 1 dag geleden/2-5 dagen geleden/6-10 dagen geleden/11-30 dagen geleden/1-6 maanden geleden/7-12 maanden geleden/meer dan 1 jaar geleden. / When was the last time you cried? - Less than 1 day ago/2-5 days ago/6-10 days ago/11-30 days ago/1-6 months ago/7-12 months ago/over 1 year ago.

Q12. Hoe laat was het ongeveer? / What was the approximate time of day? - (00.00-24.00)

Q13. Hoe was uw stemming juist voordat u de muziek hoorde? - Zeer somber/Enigszins somber/Neutraal/Enigszins vrolijk/Zeer vrolijk / What was your mood before hearing the music? - Very sad/Somewhat sad/Neutral/Somewhat happy/Very happy.

Q14. Hoe lang duurde de huilbui? - Minder dan 5 minuten/5-15 minunten/16-30 minuten/31-60 minuten/meer dan 60 minuten/het waren steeds weer terugkerende (korte) huilbuien / How long did your crying episode last? - Less than 5 minutes/5-15 minutes/16-30 minutes/31-60 minutes/more than 60 minutes/It consisted of multiple recurring (short-lived) episodes.

Q15. Hoe intens huilde u? - Alleen vochtige ogen/Vochtige ogen en zacht snikken/Vochtige ogen, snikken en luid huilen/Vochtige ogen, snikken, luid huilen, lichaamsbewegingen en schreeuwen. / How intense was your crying? - Moist eyes/Moist eyes and some soft sobbing/Moist eyes, sobbing, crying out loud/Moist eyes, sobbing, crying out loud, bodily movements and screaming.

Q16. Ik hoorde deze muziek, omdat ik - die bewust had gekozen/heel toevallig. / I heard this music, because I - specifically chose to listen to it/by chance.

Q 17. Wat maakte u aan het huilen? - De muziek/De teksten/Herinnering aan een gelukkige gebeurtenis/Herinnering aan een droevige gebeurtenis/Gevoelens van nostalgie/Iets anders (indien iets anders, kun u dan aangeven wat?) / What made you cry? – The beauty of the music itself/The lyrics/Memories of a happy event/Memories of a sad event/Nostalgia/Something else (if something else, could you then specify what? – free response option).

Q18. Hoe ervoer u het huilen? - Ik vond het wel prettig/Ik voelde me opgelaten/Iets anders, namelijk… (indien iets anders, kun u dan aangeven wat? / How did you experience crying? - I found it pleasant/I found it uncomfortable/Something else, namely (Free response option)

Q19. Hoeveel andere mensen waren erbij? / How many other people were present? - (Free response)

Q20. Kunt u aangeven wie erbij aanwezig waren? - Niet van toepassing/partner/ouders/broers, zussen/eigen kinderen/vrienden/collega's/onbekenden/gemengd gezelschap/ Could you indicate who were present? - Not applicable/Partner/Parents/Siblings/Own children/Friends/Colleagues/Unfamiliar others/Mixed company

Q21. Waren er anderen die ook huilden? - Ja/Nee/Weet ik niet/ Were the present others crying as well? - Yes/No/I don't know

Q22. Indien een vertrouwd persoon aanwezig was toen u huilde, hoe reageerde zij/hij? (in het geval dat er meerdere personen aanwezig waren, beperk dan uw antwoord tot degene, die u het meest vertrouwd is) - Niet van toepassing/de persoon negeerde mijn builde/de persoon troostte met woorden/de persoon troostte door een arm om me heen te slaan/de persoon werd kwaad op me/de persoon wist niet hoe te reageren/de persoon voelde zich in verlegenheid gebracht/de persoon toonde begrip/de persoon stopte met vervelend doen/de persoon werd vriendelijker/de persoon huilde ook/de persoon merkte niet dat ik huilde/iets anders, namelijk… / If a familiar person was present at the time of your crying, how did they respond? (If more people were present, please limit your answer to the one dearest to you) – Not applicable/they ignored my crying/they comforted me with words/they comforted me by putting their arm around me/they got angry at me/they did not know how to respond/they felt embarrassed/they showed understanding/they stopped being mean/they became friendlier/they also cried/they didn't notice me crying/something else, namely… (Free response option)

Q23. Indien een of meer onbekende personen aanwezig waren toen u huilde, hoe reageerden zij? (in het geval dat er meerdere onbekenden aanwezig waren, beperk dan Uw antwoord tot degene, die het dichtst bij U stonden) - Niet van toepassing/de persoon negeerde mijn builde/de persoon troostte met woorden/de persoon troostte door een arm om me heen te

slaan/de persoon werd kwaad op me/de persoon wist niet hoe te reageren/de persoon voelde zich in verlegenheid gebracht/de persoon toonde begrip/de persoon stopte met vervelend doen/de persoon werd vriendelijker/de persoon huilde ook/de persoon merkte niet dat ik huilde/iets anders, namelijk… / If unfamiliar others were present at the time of your crying, how did they respond? (If more people were present, please limit your response to the one in closest proximity to you) - Not applicable/they ignored my crying/they comforted me with words/they comforted me by putting their arm around me/they got angry at me/they did not know how to respond/they felt embarrassed/they showed understanding/they stopped being mean/they became friendlier/they also cried/they didn't notice me crying/something else, namely… (Free response option)

Welke emoties of gevoelens ervoer u tijdens het huilen? / Which of the following emotions or feelings did you experience while crying?

Q24. Opluchting / Relief - Yes/No

Q25. Plezier / Joy - Yes/No

Q26. Minachting / Contempt - Yes/No

Q27. Droefenis / Sadness - Yes/No

Q28. Angst / Fear - Yes/No

Q29. Vernedering / Humiliation - Yes/No

Q30. Machteloosheid / Powerlessness - Yes/No

Q31. Bevrediging / Satisfaction - Yes/No

Q32. Boosheid / Anger - Yes/No

Q33. Walging / Disgust - Yes/No

Q34. Schuld / Guilt - Yes/No

Q35. In de wolken zijn / Elation - Yes/No

Q36. Frustratie / Frustration - Yes/No

Q37. Verslagenheid / Dismay - Yes/No

Q38. Ontroering / Being moved - Yes/No

Q39. Extase, vervoering / Rapture - Yes/No

Q40. Nostalgie – Nostalgia - Yes/No

Welke lichamelijke reacties ervoer u tijdens het luisteren naar deze muziek? / What physical reactions did you experience while listening to the music?

Q41. Verandering van ademhaling / Respiratory changes - Yes/No

Q42. Koude rillingen / Cold shivers - Yes/No

Q43. Duizeligheid /Feeling dizzy - Yes/No

Q44. Het koud krijgen / Cold - Yes/No

Q45. Het warm krijgen / Warm - Yes/No

Q46. Kippenvel / Goosebumps - Yes/No

Q47. Haren die overeind gaan staan / Hair standing on end - Yes/No

Q48. Versnelling van de hartslag / Faster heartbeat - Yes/No

Q49. Helemaal stil worden / Feeling quiet - Yes/No

Q50. Lachen / Laughing - Yes/No

Q51. Ontspanning van de spieren / Muscle relaxation - Yes/No

Q52. Toename van spierspanning / Muscle tension - Yes/No

Q53. Hoofdpijn / Headaches - Yes/No

Q54. Druk op de borst / Chest pressure - Yes/No

Q55. Trillen / Shaking - Yes/No

Q56. Seksuele opwinding/ Sexual arousal - Yes/No

Q57. Hoe voelde u zich geestelijk na uw huilbui in vergelijking met de periode daaraan voorafgaand? - Slechter dan daarvoor/Hetzelfde als daarvoor/Beter dan daarvoor/ How did you feel mentally after crying in comparison to how you felt before? Worse than before/The same/Better than before

Q58. Hoe voelde u zich lichamelijk na uw huilbui in vergelijking met de periode daaraan voorafgaand? - Slechter dan daarvoor/Hetzelfde als daarvoor/Beter dan daarvoor/ How did you feel physically after crying in comparison to how you felt before? Worse than before/The same/Better than before

Chapter 5: Music and Lyric Characteristics of Popular Dutch Funeral Songs[7]

Abstract

This study compared the characteristics of 150 songs (Dutch lyrics, $N = 47$, English lyrics, $N = 103$), popular at Dutch funerals, to an equal number of non-funeral songs. The variables explored included those linked with the music (valence, energy, danceability, acousticness, key, and tempo); and lyrics, namely: linguistics-related (first-person singular/plural, second-person pronouns; past, present, future tense; expressed emotion (positive, negative words; and the discrete emotional categories anger, anxiety, sadness); and category words (those relating to family, friends, death, religion). Funeral music was lower in valence, energy, and danceability and higher in acousticness than non-funeral music. Furthermore, English funeral music lyrics contained more second-person pronouns and were more future-focused than comparison songs. Funeral lyrics were not particularly negative, but English texts contained more words relating to sadness. In conclusion, funeral music differs in severable notable respects from general popular songs that may reflect the special purpose of this music.

Music and Lyric Characteristics of Popular Dutch Funeral Songs

Music is an inextricable part of current Dutch funerals. Since the end of the 20th century, the selection of music played during cremations in the Netherlands has become increasingly personalized and thus more diverse (Bruin-Mollenhorst & Hoondert, 2018; Bruin-Mollenhorst, 2020). This development is partly due to technical improvements in crematoria that enable them to meet personal music requests by the deceased and bereaved more easily than before when standard sets of songs were more commonplace (Bruin-Mollenhorst & Hoondert, 2018). Music selection is currently a standard part of most funeral planning. Funeral homes offer advice on how and what music to select and even provide playlists and multimedia links on their websites as examples. The bereaved can experience the music selection process, sometimes after the wishes of or in agreement with the deceased, as comforting (Viper et al., 2020).

Funeral music may serve different purposes during the ceremony. Bruin-Mollenhorst (2020) distinguishes the following (1) those that serve the ceremony itself (background music when entering or leaving the ceremony room, or while watching pictures of the deceased), (2) music in between speeches that illustrates or empowers their contents, (3) music that gives expression to the identity of the deceased (the favorite music of the deceased; music that represents aspects of the relationship of the bereaved to the deceased or aspects of the deceased's identity), (4) emotional control and evoking emotions (music that allows the bereaved to give in to their emotions, or to regain their composure) and (5) lastly, music that we listen to without any discernible objectives. These goals fit in well with general psychological functions of music (Schäfer et al., 2013), more precisely: music listening (1) as self-awareness (e.g., music expresses or confirms some part of one's identity), (2) to bolster social relatedness (e.g., to feel connected with other people), (3) as mood and emotion regulation (e.g., to feel relaxed).

Most music in modern funerals in some way represents the deceased and honors their memory. In these cases, it serves as a musical eulogy (Bruin-Mollenhorst, 2020). Bruin-Molllenhorst (2020) argues that, although lyrics may play a role in the music selection process, for the musical praise, the song texts are often less important than the song as a whole and even less so than the way the entire song connects to the deceased. Contrary to speeches, popular song lyrics are not written explicitly for the deceased, implying that, at most, only some words, a mere sentence, the title, or nothing of the lyrics at all may directly

associate with the deceased (Bruin-Mollenhorst, 2020). This does, however, not exclude the possibility that there are recurring words, linguistic properties, or themes that are common in the lyrics of popular funeral music that may make some songs particularly suited to serve this function. Furthermore, it does not explain why certain songs are, despite the increasingly personalized nature of funerals (Bruin-Mollenhorst & Hoondert, 2018), used quite frequently during funerals. In addition to investigating musical aspects, a linguistic analysis of the song texts may reveal why some songs more often serve as funeral music than others. The aim of the current study is twofold, (1) we seek to replicate and expand upon previous findings on the characteristics of funeral music, and (2) we analyze the lyrics of a selection of funeral songs popular in the Netherlands.

Music Characteristics and Lyrics

Recently, Mollenhorst and colleagues (2016) examined music characteristics (valence, energy, and tempo) of often-used songs in Dutch crematoria. Based on data from audio analyses, funeral music ($N = 3703$ songs) was shown to be lower in valence, tempo, and energy than two popular comparison playlists (Top 40 and Top 2000). This resulted in the characterization of funeral music as solemn, serene, and tender. It is, however, unclear which specific parts of a song evoke these emotions since these investigators considered the songs as a whole and did not study the lyrics separately. Analyzing the song as a whole may make sense because, as a listener, it is difficult to separate the impact of the melody from the lyrics. However, considering song texts separately may also prove valuable since the lyrics can substantially contribute to the emotional experience of music and are a way for listeners to relate to songs.

Previous studies have yielded mixed results regarding the question as to whether the melody or the song text is mainly responsible for the emotions reported while listening to music (see Ali & Peynircioğlu, 2006 for an overview). However, the research findings of these authors suggested that a song's melody is the dominant determinant, though lyrics can contribute substantially to the emotions perceived in the song. More specifically, they demonstrated that emotion in response to sad and angry music accompanied by emotionally matching lyrics is more intense. In contrast, in the case of happy and calm music, emotionally congruent lyrics may reduce the intensity of the feelings. Brattico and colleagues (2011) replicated the finding that happy music without lyrics results in stronger positive emotions than happy music with lyrics. In an fMRI study, Brattico et al. (2011) further found more extensive brain activation,

particularly in the limbic system, when listening to sad music with lyrics as opposed to without, and happy music without as opposed to with lyrics. Lyrics seem to play a more prominent role when listening to sad music, while music characteristics may be of greater importance when listening to happy music. Lastly, the processing of lyrics may be deeper when accompanied by sad music than in the case of happy music (Fiveash & Luck, 2016).

Emotionally congruent lyrics thus intensify sad music, while the opposite is true for happy music. This intensification may partly explain the attraction most people have for sad music for mood-regulatory purposes (e.g., Garrido, 2017; Van den Tol & Edwards, 2013; Van den Tol, 2016). Individuals apply mood regulation techniques to improve their moods. When employing music for this purpose, listeners typically prefer music that best reflects the mood they are in (e.g., Van den Tol, 2016). It is mainly the lyrics of sad music that help listeners to relate and connect to it (Eerola et al., 2015; Van den Tol & Edwards, 2013; Van den Tol, 2016). In general, lyrics may thus be particularly salient to the listeners' mood, and they may strongly reflect the situation the music is heard in (Baltazar et al., 2019). Funeral music's lower valence, energy, and tempo than popular music (Mollenhorst et al., 2016) suggests it will sound *sad* (Schellenberg & Von Scheve, 2012). Funeral music lyrics may follow this trend and contain more negative words and more words that express sadness.

Several recent survey and interview studies further exemplify the importance of lyrics to mood regulation through music and specific peak emotional experiences. Song texts are particularly relevant to listeners who seek consolation through music, although the melody and music characteristics are more important (Hanser et al., 2016; Saarikallio & Erkkilä, 2007; Ter Bogt et al., 2017). Lyrics further play a role in the experience of chills (Bannister, 2020) and crying over music (Cotter et al., 2019; Hanser et al., 2021), especially when negative emotions accompany the crying episodes (Cotter et al., 2019). This further exemplifies a connection between sadness and the relevance of lyrics. Personal meaning or memories triggered by a song may contribute more to crying over music than its music characteristics or its lyrics separately (Cotter et al., 2019; Hanser et al., 2021). The studies mentioned above, however, did not investigate the properties of song texts.

Linguistic Properties and Lyrical Content of Popular Music

Song texts thus certainly play a significant role in the emotions evoked by and perceived in music. However, their linguistic properties and content have received little attention from researchers, particularly when considering specific situations, such as funeral rites, or for

personal uses like mood regulation. Yet, an analysis of happy and sad song texts with Linguistic Inquiry and Word Count software (LIWC; Pennebaker et al., 2015) revealed several intriguing differences. More precisely, sad songs contained more negatively valenced words, particularly expressions of sadness and anger, while happy songs included more positively valenced words. Further, happy songs had more words in the present tense than sad songs (Garrido, 2017, p. 24-25).

The use of specific personal pronouns may be of further relevance to the (social) functions of popular music lyrics. Specifically, more second-person pronouns (you, yours) have been linked to increased song liking and commercial success, primarily when these second-person pronouns refer to 'you' as the object of a sentence (Packard & Berger, 2020). The underlying idea is that 'you' makes listeners think of a person significant to them, which may, in turn, help lyrics bolster social relatedness (Packard & Berger, 2020). Alternatively, the use of first-person singular pronouns (I, me, mine) in lyrics and personal writing is associated with a focus on the self, while first-person plural pronouns (we, us) are an indicator of emphasis on social relationships (DeWall et al., 2011; Rude et al., 2004; Tausczik & Pennebaker, 2010). DeWall and colleagues (2011) showed an increase in first-person singular pronouns, a decrease in first-person plural pronouns, and a reduction in positive and social words in lyrics between 1980 and 2007. This finding suggests that song texts became more individualistic and less positive as popular music evolved. First-person plural pronouns are, however, in general not used very often in song texts of popular music (DeWall et al., 2011; Packard & Berger, 2020).

Thematically, the lyrics of most popular music deal with romantic relationships (Christenson et al., 2019), while only roughly ten percent of songs cover topics surrounding family and friends. Songs that explicitly mention death and dying are rare, although these topics are dealt with more frequently as popular music evolves. Funeral music is likely to contain references to romantic relationships or family and friends.

The Present Study

The present study looks at both the music and linguistic characteristics of frequently used songs during Dutch funerals. We compare the properties of funeral song texts to a control selection that consists of popular songs by the same artists. To this end, we formulated the following research questions and related hypotheses:

- The first focus was on music characteristics. We expect to replicate findings by Mollenhorst et al. (2016) on music characteristics. We thus expect to find lower valence, energy, tempo, and danceability values and higher values of acousticness for funeral music than for control songs. Funeral music will further consist of more songs in major than minor key. These values on music characteristics correspond more to sad than to happy music.

We additionally analyzed the lyrics. Regarding linguistical properties, we assume lyrics of funeral music to resemble lyrics of sad music. Given the social role of music during funerals, we further expect pronouns, temporal focus, and specific topics to reflect this function.

- Funeral music contains more negative and less positive words than control songs. Funeral music further focuses less on the present and more on the past than control music.
- We hypothesize that funeral music contains fewer first-person singular pronouns and more first-person plural and second-person pronouns than control songs. Family and friends, as well as topics surrounding death and religion, are expected to be mentioned more often in funeral songs.

Lastly, since popular music often focuses on romantic relationships, we anticipate frequent words related to this subject. We have no reason to expect a difference between these words for funeral or control songs.

Method

Materials

Song Selection and Lyrics

The selection of songs was based on lists of frequently used songs during funerals, burials, and other farewell rites. These lists are from Dutch websites[8] of (insurance) companies (Dela, 2021; RVS Grafmonumenten, 2021; Uitvaartverzekering Vergelijken Loont, 2021) that provide services to organize or finance funerals. We consulted these websites in 2017, 2020, and 2021. We limited our selection to songs with Dutch or English lyrics.

The control selection contained songs by the same artists as the funeral-song selection. This selection was based on a song's popularity on Spotify: we picked (according to Spotify) the most popular song by the same artist. If this piece of music was also present in the funeral selection, the second-most popular was chosen. We have attempted to always use a target and a control song by the original artist in the case of cover songs. Our primary focus was on English songs since they formed a more significant part of the popular funeral songs than Dutch ones. The complete selection consisted of 206 songs with lyrics in English (103 funeral and 103 control) and 94 songs with lyrics in Dutch (47 funeral and 47 control).

We gathered the song lyrics from Genius.com (Genius, 2021) or comparable lyric depositories if the texts were not available from this website (e.g., Muzikeum.eu; Muzikum, 2021). Texts were manually spell-checked and prepared for analyses through LIWC and *tidytext* (e.g., *goin'* was changed into *going*). The total number of words was: English funeral 22098, English control 26563 (Total 48661), Dutch funeral 11531, Dutch control 12445 (Total 23976).

Software

Music characteristics: Data on music characteristics were collected from the Spotify website (Spotify for Developers, 2021) through the Application Program Interface (API). Similar to the Mollenhorst and colleagues (2016) data, these audio analyses consider songs as a whole. The API was accessed through the R-package *spotifyR* (Thompson et al., 2017). We collected information on a track's acousticness ('a measure from 0.0 to 1.0 of the degree to which the track is acoustic'), danceability ('a value from 0.0 to 1.0 that measures how danceable a track is based on several factors, including tempo, rhythm, beat'), energy ('perceptual measure from

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[8] We refer to these specific webpages, but similar list(s) can be found on comparable Dutch websites.

0.0 to 1.0 on how intense and active a track is'), tempo ('the overall estimated track tempo in beats per minute (BPM)'), mode ('track modality 0 = minor, 1 = major'), and valence ('measure from 0.0 to 1.0 on musical positiveness conveyed by a track') (Spotify, 2021).

Lyrical properties: Lyrics were analyzed using the Linguistic Inquiry and Word Count software (LIWC2015; Pennebaker et al., 2015). LIWC counts words based on classifications in a dictionary with reliable psychometric properties and returns these values as percentages of the word total (Pennebaker et al., 2015). This program has been used before in the analyses of song lyrics (e.g., DeWall et al., 2011; Garrido, 2017; Packard & Berger, 2020; Petrie et al., 2008). We used the in-built English dictionary to analyze English lyrics (Pennebaker et al., 2015), whereas Dutch lyrics were assessed with the available Dutch dictionary (Boot et al., 2017). Due to these dictionary differences, we considered Dutch and English songs separately. The word categories we investigated were: pronouns (first-person singular/plural, second person), temporal orientation (past, present, future), emotional valence (positive, negative), discrete emotional categories (anger, anxiety, sadness), and specific topics (friends, family, death, religion).

We explored word sentiment with the R-package *tidytext* (Silge & Robinson, 2016) and the NRC Word-Emotion Association Lexicon (Mohammad & Turney, 2013). *Tidytext* assigns words into emotional categories based on a lexicon and returns these values as word frequencies. Our focus with *tidytext* is on words responsible for positive and negative affect.

Statistical Analyses

We performed a series of independent sample t-tests to look for differences between the two selections. We additionally report the effect-size Cohen's *d* (small 0.2, medium 0.5, and large 0.8; Cohen, 1988). Analyses were carried out using IBM SPSS 23.0 and R 4.0.4 (R Core team, 2021).

<div align="center">

Results

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Music Characteristics

The analyses of the music characteristics (see Table 1) revealed several significant differences between funeral music and control songs. Valence, energy, and danceability were significantly lower for the funeral songs than for the control selection. Funeral songs were also more acoustic and more often in a major key than control songs. The effect- sizes varied from medium to large. There were no statistically significant differences in tempo.

Music characteristics of the Dutch selection followed a similar pattern as the English-sung tracks. However, most effects were smaller: Dutch funeral songs also scored lower on valence, energy, and danceability. Acousticness and tempo did not differ significantly, although a similar pattern as in the English selection with funeral music being more acoustic was observed. There was no difference between the distribution of major and minor key for Dutch songs.

Table 1. Overview of the music characteristics of funeral and control songs.

	Funeral	Control	*t*	df	*p*	Cohen's *d*
English	*N* = 103	*N* = 103				
Music Characteristics						
Valence *	0.28 (.16)	0.54 (.24)	-9.19	177.56	< .001	-1.28
Energy*	0.39 (.18)	0.56 (.24)	-5.85	192.11	< .001	-0.82
Tempo (BPM)	113 (29.10)	118 (26.23)	-1.44	201.84	.151	-0.20
Acousticness*	0.51 (.32)	0.34 (.30)	4.00	203.58	< .001	0.56
Danceability*	0.44 (.14)	0.55 (.15)	-5.22	200.89	< .001	-0.73
Key: % major key	85.44%	69.90%				
	Funeral	Control	*t*	df	*P*	Cohen's *d*
Dutch	*N* = 47	*N* = 47				
Music Characteristics						
Valence*	0.34 (.18)	0.57 (.27)	-4.90	81.02	< .001	-1.01
Energy*	0.40 (.20)	0.52 (.22)	-2.74	90.82	.007	-0.57
Tempo (BPM)	114 (29.47)	116 (30.81)	-0.33	91.82	.739	-0.07
Acousticness	0.51 (.32)	0.47 (.28)	0.72	90.41	.474	0.15
Danceability*	0.51 (.12)	0.57 (.13)	-2.50	90.50	.014	-0.52
Key: % major key	83.98%	85.11%				

Note: 1) The music characteristics except for tempo and key have a range from 0 – 1, 2) BPM = beats per minute, 3) Mean values, SD given in parentheses, 3) Cohen's *d*: small 0.2, medium 0.5, and large 0.8

Analyses of Lyrics with LIWC

We investigated the total word count, pronouns, sentiment, temporal focus, social connections, and topics using the LIWC software (Tables 2 and 3). Funeral lyrics in both English and Dutch songs contained fewer words than the control songs, but this difference was only significant for the English songs. In both languages, there was substantial variability in lyric length. Moreover, most personal pronouns were first-person singular, followed by

second-person pronouns. First-person plural pronouns were rare. First-person singular and plural pronouns did not differ significantly between selections. In contrast, second-person pronouns were significantly more common in English funeral lyrics compared to control songs. A comparable, non-significant pattern was present for Dutch lyrics.

Positive words were more frequent than negative words for both languages in both funeral and control songs. Words specifically related to discrete categories of anger, anxiety, and sadness were uncommon. English funeral lyrics contained significantly more words related to sadness than controls. Dutch funeral lyrics showed a trend towards less positive emotion words compared to Dutch control lyrics. Overall, Dutch lyrics were less, albeit not significantly, positive and contained more words in discrete negative emotion categories than the English selection.

Regarding temporal focus, lyrics in both selections focused on the present with fewer words relating to the past or future. Nevertheless, both Dutch and English funeral lyrics contained more words associated with the future than control songs. However, it should be noted that the English 2015 dictionary (Pennebaker et al., 2015) uses a slightly different algorithm than the Dutch 2007-dictionary to determine words related to temporal perspectives. This may partly explain the fewer overall words related to temporal focus in Dutch song texts.

Words referring to family and friends, as well as words related to the topics of religion and death, were rare for both funeral and control songs in both languages. On the other hand, there were significantly more family-related words in English control songs than in the funeral lyrics. Dutch funeral lyrics contained significantly more words related to religion than controls, and there was a similar, although non-significant, trend for death-related words. Significant effects for word categories were small to medium in size.

Table 2. Overview of the results of the LIWC-analyses of English funeral and control lyrics.

	Funeral	Control	*t*	df	*p*	Cohen's *d*
Words per song*	215 (80.24)	258 (110.38)	-3.22	186.27	.001	-0.45
Pronouns						
First-person singular	8.54 (5.39)	8.61 (5.09)	-0.11	203.29	.915	-0.01
First-person plural	1.25 (2.06)	0.93 (1.58)	1.27	191.42	.206	0.18
Second person*	6.08 (4.28)	4.91 (3.41)	2.18	194.46	.031	0.30
Emotion						
Negative emotion	2.11 (1.77)	2.12 (2.49)	-0.02	184.33	.987	0.00
Positive emotion	4.57 (2.91)	4.24 (3.06)	0.79	203.58	.428	0.11
Anger	0.30 (.58)	0.47 (1.11)	-1.38	154.13	.170	-0.19
Anxiety	0.20 (.42)	0.33 (.94)	-1.27	141.64	.205	-0.18
Sadness*	1.14 (1.43)	0.74 (1.10)	2.28	191.84	.024	0.32
Time orientation						
Focus Past	3.27 (3.06)	3.66 (3.38)	-0.85	202.02	.395	-0.12
Focus Present	15.05 (5.07)	15.11 (4.96)	-0.09	203.90	.930	-0.01
Focus Future*	2.38 (2.36)	1.79 (1.70)	2.06	185.31	.040	0.29
Social						
Friends	0.34 (.90)	0.25 (.47)	0.95	153.35	.345	0.13
Family*	0.18 (.43)	0.67 (1.65)	-2.93	115.48	.004	-0.41
Topics						
Death	0.24 (.45)	0.35 (.89)	-1.14	151.10	.256	-0.16
Religion	0.55 (1.06)	0.71 (1.46)	-0.91	186.67	.366	-0.13

Note: 1) Mean values, SD given in parentheses, 2) Word categories are percentages of total, 3)

Cohen's *d*: small 0.2, medium 0.5, and large 0.8

Table 3. Overview of the results of the LIWC-analyses of Dutch funeral and control lyrics.

	Funeral	Control	*t*	df	*p*	Cohen's *d*
Words per song	245 (83.33)	265 (82.05)	-1.14	91.98	.257	-0.24
Pronouns						
First-person singular	8.12 (5.43)	7.09 (5.19)	0.94	91.82	.351	0.19
First-person plural	0.84 (1.71)	0.61 (.1.12)	0.76	79.23	.452	0.16
Second person	6.15 (3.81)	5.59 (4.21)	0.68	91.10	.499	0.14
Emotion						
Negative emotion	2.03 (1.63)	2.00 (1.83)	0.08	90.85	.933	0.02
Positive emotion	2.87 (1.90)	3.70 (2.25)	-1.93	89.50	.057	-0.40
Anger	0.47 (.86)	0.33 (.70)	0.84	88.40	.405	0.17
Anxiety	0.29 (.53)	0.15 (.28)	1.55	69.67	.126	0.32
Sadness	1.42 (1.34)	1.65 (1.54)	-0.77	90.34	.443	-0.16
Time orientation						
Focus Past	2.67 (2.44)	2.81 (3.13)	-0.25	86.91	.806	-0.05
Focus Present	11.37 (3.88)	10.95 (3.39)	0.56	90.35	.577	0.12
Focus Future*	1.21 (1.12)	0.77 (.99)	2.04	90.54	.045	0.42
Social						
Friends	0.22 (.50)	0.31 (.91)	-0.60	71.80	.552	-0.12
Family	0.45 (.98)	0.32 (.63)	0.74	78.82	.460	0.15
Topics						
Death	0.26 (.59)	0.10 (.21)	1.73	57.93	.090	0.36
Religion*	0.31 (.55)	0.10 (.29)	2.35	69.78	.022	0.48

Note: 1) Mean values, SD given in parentheses, 2) Word categories are percentages of total, 3)

Cohen's *d*: small 0.2, medium 0.5, and large 0.8

Analyses of Lyrics with Tidytext

Lastly, we investigated which words contributed to lyric sentiment in the English funeral and control selection only (Table 4) through the R-package *tidytext* with the NRC Lexicon. As in the LIWC-analyses, positive words were more prevalent than negative words for both funeral and control. Positive words reflected more warmth and positivity, while negative words were colder and expressed loneliness. Although *Love* is the most common positive word in both conditions, it occurred more frequently in the funeral songs. When combined with the derived *loving*, it makes up over 25% in the funeral songs instead of 16% in the control songs.

Table 4. Most frequently used positive and negative words in funeral and control lyrics.

Funeral				Control			
Positive		Negative		Positive		Negative	
$N = 1147$	N	$N = 642$	N	$N = 1464$	N	$N = 921$	N
Love	252	Words	33	Love	207	Leave	30
Sun	53	Feeling	31	Baby	123	Lord	27
Loving	37	Cry	20	Dance	71	Words	23
Feeling	31	Lonely	20	Good	43	Feeling	22
Baby	27	Leave	19	Alive	32	Pain	20
True	26	Cold	15	Master	29	Blind	19
Star	21	Darkness	14	Lord	27	Cry	17
Darling	20	Fall	14	Sun	27	Dust	17
Word	20	Lost	13	Loving	26	Alien	16
Good	19	Wait	13	Beautiful	25	Lonely	16

Discussion

This study aimed to gain insight into the music and linguistical characteristics of songs popular at Dutch funeral rites. To this end, we explored and compared music and linguistic features of funeral songs and popular control songs by the same artist. To our knowledge, there has been no previous research into the linguistic characteristics of funeral songs. Nevertheless, based on investigations into the song texts of English popular music in general, we expected the use of pronouns in funeral lyrics to show a focus on others and less so on the self (DeWall et al., 2011; Packard & Berger, 2020; Rude et al., 2004; Tausczik & Pennebaker, 2010). We further hypothesized them to be negative, less positive, and less focused on the

present (Garrido, 2017) and to contain more words concerning relationships and death-related topics (Christenson et al., 2019).

As expected, funeral songs scored lower on valence and energy, and there was a trend for them to be lower in tempo than control songs. They were also often in a major key. These results corroborate previous findings on funeral music characteristics (Mollenhorst et al., 2016[9]), thus confirming funeral music's characterization as sounding solemn, serene, and tender. Moreover, funeral music scored higher on acousticness and lower on danceability than control songs. The higher acousticness emphasizes vocals and lyrics (for example, Eric Clapton's Tears in Heaven). Differences in these measures were less substantial for Dutch songs compared to English ones. Future work may wish to consider if cultural differences contribute to this discrepancy.

The findings further support our hypothesis that funeral lyrics are more social and sadder than control song lyrics. Regarding pronouns, first-person pronouns (I, me, mine) were the most common personal pronouns in funeral lyrics, but their frequency is not exceptionally high compared to findings in popular music in general (DeWall et al., 2011; p. 202). Given the frequent use of second-person pronouns (you, yours; Packard & Berger, 2020), it can be concluded that funeral lyrics are, as expected, more focused on others than on the self. This was particularly the case for English funeral songs, which contained more second-person pronouns than the artist-matched control songs. As stated before, frequent use of second-person pronouns has been linked to an increase in song liking and commercial success (Packard & Berger, 2020), particularly when the second-person pronoun serves as the object in a sentence (e.g., 'Still loving you'). In these cases, it is suggested that listeners do not interpret the content of the lyrics as addressed to themselves by the artist. Instead, they transfer this lyrical content from themselves to a significant other (Packard & Berger, 2020). This seems particularly relevant for funeral music, in which the lyrics may serve as final words or as a farewell from the bereaved to the deceased. Here, song texts may help give voice to what the bereaved are feeling and empower them. Interestingly, this transference does not seem to be limited to sentences containing second-person pronouns but may also apply to sentences with first-person singular pronouns, as exemplified in qualitative research by Viper and colleagues (2020, p. 11): listeners may apply these first-person singular song texts to their own situation, or the lyrics in first-person become more likely essential when

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[9] Mollenhorst et al. (2016) used the Echo Nest software for their research, which is currently owned by Spotify.

sung by a significant other. Additional research may also consider if the bereaved experience parts of the song lyrics as addressed to them when the music was chosen by the deceased and was meant to reflect the relationship with them.

Lastly, as in previous research on popular music lyrics in general (DeWall et al., 2011; Packard & Berger, 2020), first-person plural pronouns (we, us) are less common. The frequency of these words in our funeral selections did not differ significantly from the frequency in the control songs, although a non-significant trend was observed. Interestingly, we found less use of first-person singular pronouns in Dutch control songs than in funeral lyrics, but sources for comparison are unavailable. The pattern for first-person plural and second-person pronouns in Dutch lyrics is like English lyrics but less substantial for second-person pronouns.

The music characteristics of the funeral songs (i.e., low valence and energy) point towards funeral music sounding 'more negative.' Nevertheless, we failed to find substantial differences in the prevalence of negative words between funeral songs and controls, and words of discrete emotional categories of anger and anxiety were rare. Words of the sadness category were significantly more frequent in English funeral lyrics than in controls, thus supporting the idea that funeral lyrics express more sadness. Both English and Dutch selections contained more positive words than negative ones, although, in Dutch, positive words were less frequent in the funeral than in the control selection. Overall, the Dutch lyrics were somewhat less positive and contained more words in the anger, anxiety, and sadness categories, pointing to potential differences in the selection process of songs in a native and foreign language. The emotional valence and discrete emotional categories of lyrics, and thus the song texts themselves, may matter more when choosing funeral music in a native tongue. Cultural differences may further play a role and deserve further study.

The current results on the emotional word categories thus do not fully match previous research findings on lyrics of happy and sad music (Garrido, 2017): funeral lyrics are not necessarily emotionally negative lyrics. Further support for this conclusion comes from the temporal focus of the song texts. We found no difference in focus on the past between funeral and control songs. While, overall, there was a greater reference to the past than to the future in general and an even greater focus on the present, we instead found that funeral lyrics, both in English and Dutch, focused more on the future than their artist-matched controls. Examples of this future focus, according to LIWC, are 'I will always love you', 'You'll never walk alone',

and 'We'll meet again. These examples combine our findings on first and second person pronouns with a future focus, and further demonstrate the potential social-bonding nature of song texts. We speculate that these parts of lyrics, which are likely to be found in the song's title and chorus, convey strong emotional messages that may be central as to why some songs are more suitable as funeral music than others. This connects with Bruin-Mollenhorst's concept of the musical eulogy (2020), in which only part of the lyrics may apply to the deceased or a funeral setting. We further suggest that the emphasis and repetitive nature of these messages as chorus may play an additional role in the choice for these songs. Future research should look further into the musical and linguistic properties of a song's chorus, specifically in relation to specific uses. Future studies may also wish to consider the meaning of this future focus within the funeral setting: does it, for instance, provide listeners with hope of an afterlife, or does it perhaps help them come to terms with the finality of death?

Lastly, references to death, religion, and friends or family were rare. This could be anticipated based on the thematic analyses of popular songs by Christenson and colleagues (2019). There are not many songs that explicitly deal with these topics. Romantic relationships are, by far, the most common theme in popular music, and words responsible for the affective quality of both English funeral and control songs dealt with this topic. Explicit mentions of 'love' (we made no distinction between love as a noun or verb) or a derivative are the most common in both selections, however, more so for funeral lyrics. Follow-up analyses should determine if there is a difference in the type of love, for instance, love of a more spiritual, emotional, or physical nature.

To conclude, we found considerable differences in music and linguistic characteristics of funeral and non-funeral music that may contribute to the choice of these songs for this specific function. Differences in music properties are more substantial than those for linguistic features. It may thus be easier to relate music characteristics to specific uses and functions of music than features of the lyrics.

Limitations

Several critical comments can be made regarding the applied method. Word count software does not look at the context of words or specific relationships between them. We further only considered some specific word categories, while others may also be important, for instance, words relating to cognitive processes ('never', 'always'), and questions (i.e., 'Who wants to live forever?'). Future studies may wish to focus on other categories and word relationships.

For our selection of control songs, we depended on their availability on Spotify. A possible issue of concern regards the values of the music characteristics since it is not clear how the results provided by Spotify (2021), such as danceability, valence, and acousticness, are compiled (see Howlin & Rooney, 2020 for a discussion), stressing the need for more empirical research into their construct validity. Other studies that have used these measures have, however, found differences and patterns that correspond to what one might expect given previous knowledge on music and its uses (e.g., Baltazar et al., 2019; Baltazar & Västfjäll, 2020; Howlin & Rooney, 2020; Vidas et al., 2021).

A further limitation is our small sample size, especially of Dutch lyrics. Word count software becomes more reliable when more data are available (Pennebaker et al., 2015). We focused on the most frequently used funeral songs instead of on a full funeral home songbook. A full songbook would provide more songs, but it is unclear how popular these songs are as funeral music in general. Including more songs may reveal more differences between funeral songs and (artist-matched) controls. Mollenhorst and colleagues (2016), for example, used a funeral home songbook and compared this to the Dutch Top 2000 and Top 40 popular song lists. It appeared that many of the most frequently used funeral songs, as well as of the control songs were also included in the annual editions of the Dutch Top 2000. Specific artists, music characteristics, as well as linguistic properties, may make these songs particularly popular for multiple functions. This may explain some of the minor differences in terms of linguistic categories. However, this can also be considered a strength of our current study; our selection of popular songs showed apparent differences depending on their specific use. This bolsters the idea that musical and linguistic features also contribute to this choice despite idiosyncratic listener preferences to use songs for particular functions.

Lastly, in the present work, we considered funeral music as a homogenous category of songs. Still, there is sufficient reason to assume that subcategories exist that may depend on, for example, the preference of the deceased, the bereaved, the moment the music is played during the ceremony, culture, as well as various specifics related to the deceased such as their age, relationship to the bereaved and more. Future studies should investigate these more detailed subcategories further.

In conclusion, the current study confirms and expands the modest present knowledge on the characteristics of funeral music based on musical and textual features. The terms solemn, serene, and tender are indeed the keywords to describe the musical properties of this music.

Specific word categories may also play a role in determining the utility of songs to serve as funeral music. However, the role of personal preferences and musical features may be more significant than the role of lyrics. Our findings on lyrics underscore their importance in expressing social connections with others (Schäfer et al., 2013). The current study stresses the importance of considering musical, linguistic, and personal properties when relating music to specific (emotional) uses and functions. As such, we hope that our study stimulates other researchers to continue this line of research to achieve a greater understanding of the role of music in funeral rites and the possible determining mechanisms.

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Chapter 6: Music Listening as a Potential Aid in Reducing Emotional Eating:

An Exploratory Study[10]

Abstract

Emotional Eating (EE) is understood as a maladaptive self-regulation strategy to satisfy emotional needs instead of hunger. Consequently, EE has been associated with negative health consequences. Enjoyment of food and music share similar neural activations in the brain and are both used by people for regulating affect. This suggests that music listening could potentially be a healthier alternative to EE. The present study was designed to investigate associations between EE, disordered mood, and music-related mood regulation. A total of 571 participants completed measures of EE, music listening strategies, and disordered mood. Associations between seven different music listening strategies and EE were examined, and also whether these regulation strategies were associated with depression, anxiety, and stress. Finally, we explored associations between music listening and EE in people with low and high (non-clinical) levels of disordered mood (depression, anxiety, and stress). The findings of this research indicated that music listening for discharge (releasing anger or sadness through music that expresses these same emotions) and EE were positively associated with one another. In addition, EE and the music listening strategies of entertainment, diversion or mental work were associated in people with low levels of disordered mood. When disordered mood was high, EE was higher, but was not associated with music listening strategies. These associations point towards the possibility of some music listening strategies being useful as healthier alternatives for EE.

Music Listening as a Potential Aid in Reducing Emotional Eating: An Exploratory Study

Emotional Eating and Listening to Music

Emotional eating (EE) can be defined as eating beyond the satiation point, or in the absence of hunger, in response to negative affect (e.g., Nguyen-Rodriguez et al., 2009; Van Strien et al., 1986; Van Strien, 2002). Although EE may be a symptom of some eating disorder diagnoses in DSM-5 and ICD-10 such as Bulimia Nervosa and Binge Eating Disorder (American Psychiatric Association, 2013; World Health Organization, 2016), it is a specific behavior rather than a clinical diagnosis and can exist along a continuum of severity (Van Strien et al., 1986). More specifically EE occurs when an individual consumes more food than is physiologically necessary in a conscious or unconscious attempt to improve affect in the short term. EE has a high comorbidity with psychological problems such as depression and anxiety and is more common in some individuals as a consequence of stress (Nguyen-Rodriguez et al., 2009; Ouwens et al., 2009). EE is also associated with negative health outcomes as the overconsumption of snack foods is associated with increased caloric intake, obesity, weight gain, interference with weight loss (Hays & Roberts, 2008; Koenders & Van Strien, 2011; Konttinen et al., 2010), and it is linked to chronic illnesses such as heart disease, cancer, and type-2 diabetes (Dixon, 2010).

A deeper understanding of the different psychological processes involved in emotional eating is of clinical importance, as it allows for the development of new behavioral therapies that teach people to regulate their emotions and, consequently, manage their caloric intake more effectively (Maratos et al., 2008; Thaut, 2002). One potential mechanism that shares psychological features (reward and potential to regulate negative emotions) with eating but is not associated with the same negative health outcomes, is music. It is possible that music listening can fulfil some of people's motivations for EE.

Emotion regulation

Emotion regulation refers to the processes involved in monitoring, evaluating or modifying emotional experience in order to accomplish personal goals (Thompson, 1994). Adaptive emotion regulation strategies are essential for mental (and sometimes physical) well-being (Gross, 2002). EE and the use of music for mood-regulation are both commonly used (in conscious or unconscious attempts) to regulate negative affect (Morris & Reilly, 1987; Van Goethem & Sloboda, 2011). A deeper understanding of this link could be useful in the

management of EE. More specifically, information about the associations that EE has with various music listening strategies may provide valuable first insights into how the initial motivation for engaging in EE can, potentially, be reduced by utilizing different music listening strategies.

Emotional eating. Most theories share the assumption that when emotional eaters experience negative affect they cannot effectively regulate, they adopt an easily accessible strategy, like eating, to distract from (avoidant) or improve (emotion-oriented) negative emotions (Evers et al., 2010; Gibson, 2012; Nguyen-Rodriguez et al., 2009). EE is associated with consumption of highly palatable snack foods (comfort foods), which are high in fat, sugar and salt, whilst being low in nutritional value (Van Strien et al., 2013). Empirical evidence indicates that the consumption of highly palatable foods protects against stress by the suppression of the hypo-thalamic–pituitary–adrenal axis response, although activation of the hypothalamic–pituitary–adrenal axis may itself drive appetite for these foods in the long term (Gibson, 2012). Moreover, EE is seen as a maladaptive strategy to regulate mood, as it does not address the reason behind the negative emotions leading to repeated episodes (Spoor et al., 2007) and often unwanted weight gain (Dixon, 2010).

EE can lead to feelings of guilt (Dubé et al., 2005; Macht & Dettmer, 2006) and emotional eaters show general patterns of emotion dysregulation, the need to escape from negative affect, and rumination (Gibson, 2012). Studies investigating antecedents of EE indicate that incidents that elicit low to moderately intense negative emotions, like daily hassles, are most likely to trigger EE (Macht, 2008). Hassles related to interpersonal problems which result in negative affect have been found to trigger disturbed eating behavior (Tanofsky-Kraff et al., 2007; Wilfley et al., 1997). These mechanisms explain why EE is sometimes referred to as comfort-eating or stress-eating (Gibson, 2012).

Music listening for mood regulation. Unlike food, music does not imply an obvious physiological satisfaction, but neuroimaging studies show activation of emotion, reward, motivation, and arousal networks during music listening (Blood & Zatorre, 2001; Mas-Herrero et al., 2013; Salimpoor et al., 2011). Music has been implicated as a versatile and effective tool to regulate emotions in a variety of studies (i.e., Saarikallio & Erkkilä, 2007; Sloboda et al., 2009; Van den Tol & Giner-Sorolla, 2017). It is believed (Schäfer et al., 2013) that motivation for listening to music can partly be explained by its capacity to change, maintain, or intensify affective states, and that this may even be the main reason for listening

to music (e.g., Van Goethem & Sloboda, 2011). Moreover, similar to EE, music is used habitually for mood regulating when in a negative mood (Randall & Rickard, 2017). People also use music (and lyrics) for cognitive effects, including cognitive reappraisal, search for meaning, and for diversion from boredom, intrusive thoughts and emotions (see e.g., Saarikallio & Erkkilä, 2007).

One important and well-established framework for studying the use of music as a mood regulator is the Music in Mood Regulation Scale (MMR; Saarikallio, 2008). The following regulating strategies have been identified: *entertainment* (creating a nice atmosphere and happy feeling to maintain or enhance current positive mood and feeling), *revival* (personal renewal, relaxing, and getting new energy from music when stressed or tired), *strong sensation* (inducing and strengthening intense emotional experiences), *diversion* (using music to be distracted from negative thoughts and forgetting the current mood), *discharge* (releasing anger or sadness – similar to "blowing off steam" – through music that expresses these same emotions), *mental work* (using music as a framework for mental contemplation and clarification of emotional preoccupations), and *solace* (searching for acceptance and understanding when feeling sad or troubled). For the current work, we are interested in the association of EE with all of these seven different music listening strategies, as a higher association with EE may point towards a higher potential of interchangeable use.

Depression, anxiety, and stress. Links have been found between maladaptive affect-regulation strategies (such as extensive use of avoidant coping) and various psychological disorders including depression, anxiety, and stress (Berking et al., 2012; Cheng et al., 2014), in which unhealthy patterns of regulating emotions are often present before the onset of such disorders. Moreover, the associations between EE and all different music listening strategies might also be dependent on a person's existing level of disordered mood (low vs. high). As indicated earlier, EE has comorbidity with disordered mood. Results from an experimental study where snack foods were provided in a sham taste test showed that trait anxiety led to higher food intake following a mood induction in obese participants (Schneider et al., 2010). Similarly, EE has been found to be associated with depression (Konttinen et al., 2010; Ouwens et al., 2009) and stress (Nguyen-Rodriguez et al., 2009; Nolan & Geliebter, 2012) when measured through self-report.

Certain music listening strategies have also been linked to disordered mood. The use of music for discharge has, for example, been related to depression, anxiety and neuroticism in several

self-report studies (Carlson et al., 2015; Chin & Rickard, 2013; Thomson et al., 2014). Thomson et al. (2014) also found that using music for distraction (a concept closely related to the MMR diversion subscale) correlated with anxiety and stress. Chin and Rickard (2013) reported an additional negative association between entertainment, strong sensation and disordered mood (depression, anxiety, and stress), and found that relationships with disordered mood can partly be explained by those with better mental health using less suppression. Unlike EE, for which associations with mental health are mainly seen as an indicator of maladaptive coping, research about music listening suggests that one reason why some associations exist with disordered mood might actually be because music listening can help one cope with disordered mood (Getz et al., 2014, Van den Tol & Edwards, 2013). People who are exposed to a stressor in an experiment are, for example, more likely to want to listen to music (Getz et al., 2014). Moreover, participants in a retrospective survey study reported that they were motivated to listen to sad music when feeling sad in order to accept negative situations and work through emotions (Van den Tol et al., 2016). Several experimental studies in which participants have been subjected to a stress induction and then have listened to self-selected music have shown decreased state anxiety, improved negative mood, and reduced stress compared to a non-music control group (Getz et al., 2014; Labbé et al., 2007; Radstaak et al., 2014).

This research aims to identify which music listening strategy is most strongly associated with tendencies for EE, as this would provide future indicators (in terms of receiving extra attention in future research) of what might be the more adaptive music listening strategies (in terms of long-term mental health) for replacing EE.

Aims

The current study has two main aims: (a) to examine associations between music listening strategies, disordered mood (depression, anxiety, stress) and EE and (b) to identify potential interactions between disordered mood (in terms of high and low levels of depression, anxiety, and stress) and use of music selection strategies in relation to EE.

The following research questions were focal in trying to pursue these aims: (1) Which (if any) music listening strategies are associated with EE? and (2) Do associations between music listening strategies and EE vary for high or low disordered mood?

Method

Participants

Eight hundred participants were recruited, using opportunity sampling from De Montfort University campus, and online through social media websites via a short advertisement and link to the questionnaire. Participants were required to be fluent in English to ensure item comprehension, and to be at least 18 years of age. Two hundred and thirty participants were excluded due to not meeting inclusion criterion (English as a first language), withdrawal, failure to properly indicate consent and incomplete data.

The final sample consisted of 571 participants (see Table 1), comprised of 188 (33.40%) males, 375 females (65.8 %) and 7 (1.2%) participants who preferred not to disclose their sex, with a mean age ($N = 569$, range: 18–65 years) of 23.41 ($SD = 4.39$). The average indicated height ($N = 565$) was 169.62 cm ($SD = 10.76$, ranging from 134 to 200 cm) and the average indicated weight ($N = 564$) was 69.36 kg ($SD = 18.45$, ranging from 40 to 181). Body Mass Index (BMI) average (for those participants that provided both weight and height ($N = 557$) was calculated to be 23.92 ($SD = 5.46$, ranging from 15.05 to 58.00). The participants in our sample had a mean EE score of 2.5 ($SD = 0.8$), which was similar to that of several recent studies (EE score = 2.7, $SD = 0.7$, in Anschutz et al., 2009; EE score = 2.4, $SD = 0.9$, in Van Strien et al., 2013). We did not collect data on participants' nationality or socioeconomic background, however we know that this was an educated University sample. Moreover, De Montfort University has a diverse population of students; 43% are white European and 57% are from BAME (Black and minority ethnic) backgrounds, including 24% Black African/Caribbean and 17% South Asian.

Table 1. Descriptive statistics for age, BMI, and each sub-scale as a total, according to gender and compared across gender.

	Mean (*SD*)			Difference scores across gender	*p*	η_p^2
	Total *N* = 571	Male (*N* = 188)	Female (*N* = 376)			
Person	*N* = 571					
Age	23.18 (4.87)	23.41 (4.38)	23.05 (5.11)	.36	.41	.00
Body Mass Index	24.04 (6.13)	24.55 (4.58)	23.75 (6.79)	.80	.10	.00
Music in Mood Regulation Scale						
Entertainment	3.32 (.83)	4.09 (.83)	4.20 (.73)	.13	.10	.00
Strong- Sensation	3.63 (.79)	3.64 (.77)	3.63 (.80)	.00	.07	.00
Revival	3.32 (.85)	3.35 (.82)	3.30 (.82)	.05	.07	.00
Diversion	3.25 (.86)	3.17 (.87)	3.30 (.85)	.13	.08	.00
Discharge	2.81 (.94)	2.68 (.92)	2.87 (.94)	.18	.08	.01
Mental Work	3.38 (.89)	3.32 (.90)	3.41 (.87)	.10	.08	.00
Solace	3.16 (.89)	3.06 (.88)	3.21 (.89)	.15	.08	.01
The Dutch Eating Behavior Questionnaire						
Emotional Eating	2.50 (.80)	2.23 (.71)*	2.63 (.81)	.40	.000	.05
Depression, Anxiety, and Stress Scales						
Depression	1.68 (.72)	1.53 (.57)	1.75 (.77)	.22	.06	.02
Anxiety	1.66 (.61)	1.54 (.56)	1.66 (.63)	.12	.05	.01
Stress	1.92 (.72)	1.73 (.60)*	2.02 (.75)	.29	.000	.04

Note. SD = Standard Deviation of the mean. *N* = number of participants. *p*-value = two-tailed significance levels of the *t*-test conducted to compare means across genders. Partial η^2 = effect size of the 95% confidence interval for each identified difference, giving 0.01 (small), 0.09 (medium) and 0.25 (large) values. * denotes a significant gender difference at *p* < .0045. EE items are rated from 1 (Never) to 5 (Very Often) scale. Music in Mood Regulation items (see text for sub-scales) are rated from 1 (Strongly Disagree) to 5 (Strongly Agree). DASS items (see text for sub-scales) are rated from 1 (did not apply at all) to 4 (applied very much, or most of the time).

Design and Materials

The study had a cross-sectional, correlational design. The dependent variable (DV) was emotional eating (EE), the independent variables (IV) were negative mood (depression, anxiety, and stress) and the moderator variables were the music listening for mood regulation variables (entertainment, revival, discharge, diversion, solace, mental work, and strong sensation).

The Dutch Eating Behavior Questionnaire. EE was measured with the English version (Wardle, 1987) of the 13-item EE subscale of the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien et al., 1986). The sub-scale includes 13 items (e.g., *Do you have a desire to eat when you are feeling lonely?*) on a 5-point Likert scale (*1 = Never, 5 = Very Often*). Cronbach's alpha for the sub- scale was good at .91 in the current sample.

Music in Mood Regulation Scale. Music related mood-regulating strategies were measured with the 40-item Music in Mood Regulation scale (MMR; Saarikallio, 2008). Items are rated on a 5-point Likert scale (*1 = Strongly Disagree, 5 = Strongly Agree*). All seven sub-scales were used: (1) Entertainment (4 items, e.g., *I usually put background music on to make the atmosphere more pleasant*), (2) Revival (7 items, e.g., *Listening to music helps me to relax*), (3) Diversion (5 items, e.g., *For me, music is a way for me to forget my worries*), (4) Discharge (6 items, e.g., *When everything feels miserable, I start to listen to music that expresses these feelings*), (5) Strong sensation (7 items, e.g., *Music offers me unforgettable moments*), (6) Mental work (5 items, e.g., *Listening to music takes me back and gets me thinking about different things that have happened to me*), and (7) Solace (6 items, e.g., *When something is troubling me, I find solace in music*). The scale has a Cronbach's alpha of .95 in the current sample, and reliability ranges from .78 to .86 for each sub-scale.

Depression, Anxiety, and Stress. Depression, anxiety, and stress were measured with the 42-item Depression, Anxiety, and Stress Scales (DASS; Lovibond & Lovibond, 1995). Each sub-scale of the DASS consists of 14 items and measures depression (e.g., *I felt downhearted and blue*), anxiety (e.g., *I felt scared without any good reason*), and stress (e.g., *I was in a state of nervous tension*). We removed the eating-behavior item (*I had difficulty in swallowing*) in the depression scale, as it would distort the correlation with the EE sub-scale. For each item participants rated the extent to which they experienced negative emotional symptoms over the past week on a 5-point severity/frequency scale (*0 = did not apply at all, 4 = applied very much, or most of the time*), while this scale is traditionally rated on a 0 to 3 Likert scale. The

sub-scales' Cronbach's alpha in the current sample range from .95 to .97 and all sub-scales have well-established psychometric properties in community samples (Bayram & Bilgel, 2008).

Procedure

Participants were recruited online and through opportunity sampling. The online survey software Qualtrics (http://www.qualtrics.com) was utilized to collect data online from participants. Ethical guidelines set out by the British Psychological Society (2013, 2014) were adhered to throughout the research process, and ethical approval was granted by the Faculty Research Ethics Committee (FREC) at De Montfort University.

Preliminary analysis

Data analysis was completed using IBM SPSS 22 with a Process add-on (Hayes, 2013) for moderation analyses. Initial normality tests indicated that several variables were not normally distributed, therefore 1000 bootstrapped corrected confidence intervals (95%) were used for all linear regression analyses. Previous research suggested the possibility of age, gender and BMI differences in music listening, and disordered mood (Carlson et al., 2015; Crawford & Henry, 2003; Larsen et al., 2006; Schroevers et al., 2003; Thomson et al., 2014). A MANOVA did reveal a significant difference for gender, Wilks' $\Lambda = .90$, $F(11, 551) = 5.459$, $p < .001$, $\eta_p^2 = .10$, medium effect size. With post-hoc tests (Table 1) revealing a gender difference for EE, and stress (at small effect size, see Table 1). None of the variables yielded a significant association with age. Stress and EE were positively associated with BMI. Analyses therefore controlled for gender and BMI where relevant (for all analyses in which either EE or stress was the dependent variable).

Results

(Aim 1) associations between music listening strategies, disordered mood (depression, anxiety, stress) and EE

A series of linear regression analyses was conducted to examine associations between EE, music listening strategies and disordered mood (depression, anxiety, stress). Either EE (Table 2a) or one of the disordered mood variables (Table 2b) was the DV in all analyses. Music listening strategies or disordered mood were the IV in analyses where EE was the DV, and music listening strategies were the IV in analyses where disordered mood was the DV.

The regression analyses controlled for gender and BMI when either EE or stress were the DV, but not when depression or anxiety was the DV. One thousand bootstrapped corrected confidence intervals (95%) were used for all linear regression analyses to adjust for any issues with normality in the data.

As can be seen in Table 2a, EE was only related to one music regulation strategy, discharge, but was associated with all the disordered mood variables (depression, anxiety, and stress). As can be seen in Table 2b, discharge and solace were associated with depression, anxiety, and stress. Moreover, strong sensation was associated with depression and stress, and mental work with depression and anxiety. We did not find any other significant association for any of the music listening strategies with disordered mood.

Table 2a. Relationships between EE, stress, anxiety, and depression and all music listening strategies measured as regression coefficients controlled for gender and BMI where relevant.

	DV: Emotional Eating					95% CI for B		R^2	Cohen's f^2
	B	SE for B	β	t	p				
						95% LLCI	95% ULCI		
Entertainment	0.08	0.19	0.08	1.85	0.19	−0.04	0.20	0.10	0.10
Revival	0.01	0.05	0.02	0.38	0.71	−0.08	0.11	0.09	0.10
Diversion	0.06	0.15	0.07	1.60	0.16	−0.01	0.15	0.09	0.10
Discharge	0.10	0.04	0.12	2.86	0.004	0.03	0.17	0.10	0.11
Solace	0.06	0.04	0.07	1.62	0.14	−0.02	0.04	0.09	0.10
Strong Sensation	0.04	0.05	0.03	0.84	0.48	−0.06	0.13	0.09	0.10
Mental Work	0.05	0.05	0.06	1.43	0.27	−0.04	0.15	0.09	0.10
Stress	0.26	0.05	0.23	5.64	0.001	0.17	0.36	0.14	0.16
Anxiety	0.85	0.22	0.21	5.24	0.001	0.17	0.38	0.13	0.15
Depression	0.24	0.05	0.21	5.18	0.001	0.15	0.34	0.13	0.15

Note. B = unstandardized Beta value. *SE* for B = standard error of B. β = standardized Beta value. $t = \beta$ divided by its own standard error. p-value = two-tailed significance levels of the regression-coefficient. 95% CI for B = Confidence Interval for B measured at 95 percent and based on a 1000 bias corrected bootstraps, 95% LLCI = Lower Limit, 95% ULCI = Upper Limit. Cohen's $f2$ = effect size of the regression analysis and is interpreted as 0.02 = small, 0.15 = medium, 0.35 = large. Regression coefficients are controlled for gender and BMI. Further analyses of the data did however reveal that when analyses controlled for gender and BMI were significant, these were also significant when not controlled for either (or both) of these variables.

Table 2b. Relationships between EE, stress, anxiety, and depression and all music listening strategies measured as regression coefficients controlled for gender and BMI where relevant.

	B	SE for B	β	t	p	95% CI for B		R^2	Cohen's f^2
						95% LLCI	95% ULCI		
DV: Stress									
Entertainment	0.03	−0.04	0.03	0.77	0.49	−0.06	0.11	0.05	0.05
Revival	−0.00	0.04	−0.00	−0.07	0.94	−0.08	0.07	0.05	0.05
Diversion	0.07	0.04	0.09	2.03	0.07	−0.008	0.15	0.06	0.06
Discharge	0.22	0.03	0.28	6.99	0.001	0.15	0.28	0.13	0.14
Solace	0.12	0.03	0.15	3.64	0.001	0.05	0.19	0.07	0.08
Strong Sensation	0.15	0.04	0.16	3.93	0.001	0.07	0.23	0.07	0.08
Mental Work	0.05	0.04	0.2	4.87	0.26	−0.26	0.14	0.09	0.10
DV: Anxiety									
Entertainment	0.02	0.03	0.06	1.52	0.66	−0.06	0.09	0.00	0.00
Revival	0.02	0.03	0.05	1.12	0.49	−0.04	0.09	0.00	0.00
Diversion	0.05	0.03	0.08	1.83	0.10	−0.01	0.12	0.01	0.06
Discharge	0.17	0.03	0.27	6.55	0.001	0.12	0.23	0.07	0.07
Solace	0.09	0.03	0.14	3.26	0.001	0.03	0.16	0.02	0.02
Strong Sensation	0.06	0.03	0.16	3.96	0.08	−0.01	0.12	0.03	0.01
Mental Work	0.12	0.03	0.21	5.23	0.001	0.06	0.17	0.05	0.01
DV: Depression									
Entertainment	0.06	0.05	0.04	0.095	0.20	−0.04	0.15	0.03	0.00
Revival	0.04	0.04	0.04	1.02	0.31	−0.04	0.12	0.03	0.00
Diversion	0.07	0.04	0.09	2.04	0.06	−0.00	0.32	0.04	0.01
Discharge	0.26	0.03	0.32	8.07	0.001	0.19	0.32	0.13	0.11
Solace	0.16	0.04	0.19	4.57	0.001	0.08	0.23	0.06	0.04
Strong Sensation	0.15	0.04	0.04	4.07	0.001	0.06	0.23	0.06	0.03
Mental Work	0.17	0.04	0.21	4.97	0.001	0.11	0.25	0.06	0.05

Note. B = unstandardized Beta value. SE for B = standard error of B. β = standardized Beta value. $t = \beta$ divided by its own standard error. p-value = two-tailed significance levels of the regression-coefficient. 95% CI for B = Confidence Interval for B measured at 95 percent and based on a 1000 bias corrected bootstraps, 95% LLCI = Lower Limit, 95% ULCI = Upper Limit. Cohen's f^2 = effect size of the regression analysis and is interpreted as 0.02 = small, 0.15 = medium, 0.35 = large. Regression coefficients are controlled for gender and BMI for the analyses with either EE or stress as a DV. Further analyses of the data did however reveal that when analyses controlled for gender and BMI were significant, these were also significant when not controlled for either (or both) of these variables.

(Aim 2) Identifying potential interactions between disordered mood (in terms of low and high levels of depression, anxiety, and stress) and use of music selection strategies in relation to EE

To examine whether music listening strategies moderated the relationship between mood and EE a series of 21 moderated regressions was conducted using Process Model 1 (Hayes, 2013). Depression, anxiety, and stress were entered individually, one in each analysis, as an independent variable, along with one of the seven music selection strategies as the moderator. EE was entered as the dependent variable in all analyses. When significant, the interaction was then further tested, with each independent variable set to $+/-$ 1 SD from the mean.

The analyses provided a total of six significant interaction effects (see Table 3 for an overview of all statistics); entertainment and depression, entertainment and stress, diversion and depression, diversion and stress, mental-work and depression, and mental-work and stress. As can be seen in Table 3 (also see Figure 1 for a visual illustration of this pattern), all six interaction effects yielded a similar pattern: at high (+1 SD) levels of disordered mood there was no association between music listening strategy and EE. At low (-1 SD) levels of disordered mood[11] there was always a positive association between music listening strategy and EE (this effect was significant for all four analyses in which either entertainment or diversion was present, was marginally significant for the moderation with mental work and depression, and was approaching significance for the moderation analysis with mental work and stress; see Table 3 for statistics). In particular, low levels of music listening strategy were linked to low EE, and high levels of music listening strategy were linked to high EE.

To explain these findings once more in terms of mean EE scores, all six interaction effects yielded a similar pattern: EE was higher when there was a high level of disordered mood, regardless of music listening. EE was lowest when people scored both low on using music as a strategy and scored low on disordered mood (also see Figure 1 for one example of a visual illustration of this pattern, which was similar across all 6 interactions).

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[11] Depression levels which were 1 SD below the mean were outside the range of the scale and therefore replaced by 1.

Figure 1. Mean scores on EE for depression and entertainment, controlled for gender and BMI (error bars represent 95% CI).
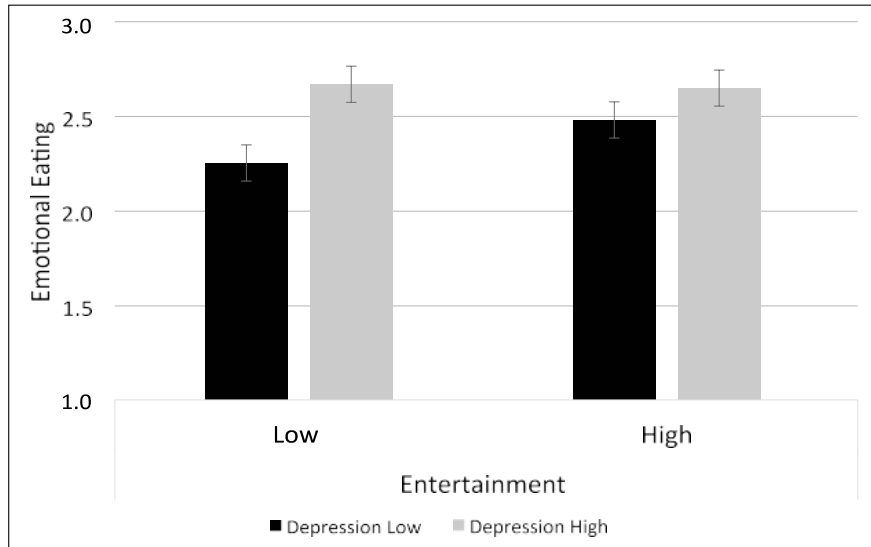
Table 3. An overview of the effects of music listening strategies on EE for different levels of depression, anxiety, or stress.

	DV: Emotional Eating						R^2 for step 2	Adjusted R^2 for step 2	R^2 change between step 1 & 2
	B	SE for B	t	p	95% LLCI for B	95% ULCI for B			
Entertainment – Depression	−0.13	0.05	−2.53	0.012	−0.23	−0.03	0.15	0.14	0.01
Low Depression	0.17	0.05	2.99	0.003	0.06	0.27			
High Depression	−0.01	0.05	−0.25	0.803	−0.12	0.09			
Diversion – Depression	−0.16	0.05	−3.35	0.001	−0.25	−0.06	0.15	0.14	0.02
Low Depression	0.16	0.05	3.20	0.001	0.06	0.26			
High Depression	−0.06	−0.06	−1.17	0.242	−0.15	0.04			
Mental work – Depression	−0.13	0.05	−2.69	0.007	−0.23	−0.04	0.14	0.14	0.01
Low Depression	0.10	0.05	2.03	0.042	0.00	0.19			
High Depression	−0.08	0.05	−1.63	0.103	−0.2	0.02			
Entertainment – Stress	−0.13	0.05	−2.47	0.013	−0.23	−0.03	0.15	0.15	0.01
Low Stress	0.16	0.06	2.98	0.003	0.06	0.27			
High Stress	−0.02	0.06	−0.38	0.706	−0.13	0.09			
Diversion – Stress	−0.14	0.05	−2.85	0.004	−0.23	−0.04	0.15	0.15	0.01
Low Stress	0.15	0.05	2.89	0.004	0.05	0.25			
High Stress	−0.05	0.05	−0.95	0.341	−0.15	0.05			
Mental work – Stress	−0.1	0.05	−2.14	0.033	−0.20	−0.01	0.15	0.14	0.01
Low Stress	0.08	0.05	1.64	0.101	−0.02	0.18			
High Stress	−0.07	0.05	−1.27	0.203	0.04	−0.01			

Note. B = Unstandardized Beta coefficient. *SE* = standard error of *B. t* = Unstandardized Beta coefficient divided by its own standard error. *p*-value = two-tailed significance levels of the of the moderation analysis. 95% LLCI refers to Lower Level Confidence Interval of the Beta value at 95 percent. 95% ULCI refers to Upper Level Confidence Intervals of the Beta value at 95 percent. *R²* for step 2 and adjusted *R²* for step 2 = effect size of the overall model at step 2. *R²* change between step 1 & 2 = increase in effect size for the overall model when the interaction is included.

Discussion

The first aim of this research was to examine associations between music listening strategies, disordered mood (depression, anxiety, stress) and EE. Current data showed an association between discharge and EE. Moreover, depression, anxiety and stress were all associated with EE. We also found that discharge and solace were both associated with depression, anxiety, and stress. The use of music for strong sensations was additionally associated with depression and stress (but not with anxiety). The use of music for mental work is additionally associated with anxiety and depression (but not with stress).

The second aim of this research was to identify potential interactions between (high and low levels of) disordered mood (in terms of depression, anxiety, and stress) and use of music selection strategies in relation to EE. In the current study it was found that levels of EE were dependent on a combination of disordered mood and music use for: entertainment and depression, entertainment and stress, diversion and depression, diversion and stress, mental work and depression, and mental work and stress. For these six combinations of variables there was no difference in levels of EE depending on music use for high values of disordered mood, but EE was higher when music use was higher for low values of disordered mood.

In the next two sections of the discussion all four music listening strategies that are related to EE will be discussed (overall or at either low or high levels of disordered mood). First, the association between emotional eating and discharge will be discussed, followed by the associations that EE had with music listening at low levels of disordered mood (depression and stress); music listening for diversion, entertainment, and mental work.

Discharge

One of the most central findings in this research was that EE was associated with the music listening strategy discharge. This suggests that discharge mimics EE. One important question

that this association raises is whether music listening for discharge can also be used to reduce, or be an alternative for EE? Considering the nature of discharge, there are two possible short-term outcomes of using discharge in order to reduce motivation to engage in EE: one possible outcome may be that people may continue to wallow in their negative mood and therefore may still feel the urge to eat. This is assuming that participants do not experience a cathartic release of negative mood after listening to music for discharge, which to our knowledge has not been tested yet in experimental research. However, in two experimental studies (Getz et al., 2014; Labbé et al., 2007) in which participants listened to (experimenter selected) metal music (many of the items on discharge are about the use of angry music) it has been found that people who experience stress (exam stress, or an experimental stress induction) did not feel better after doing so. Saying this, being in touch with sad or negative emotions (an element of using discharge music) might actually help people to accept negativity and enable people to move on (Van den Tol et al., 2016) and feel better, especially when people would otherwise suppress such negative emotions (Chin & Rickard, 2013). The other possible outcome is that people do feel relieved after listening to self-chosen discharge music and that the motivation to engage in EE disappears as a result. Our self-report data however does not provide any evidence about music listening for discharge having the potential to replace EE and further experimental and behavioral research is needed to explore such a causal effect.

Is discharge a good alternative to EE?. As suggested earlier, music listening could be a healthy alternative to EE in terms of physical health, however is music listening for discharge also a healthier alternative in terms of mental health? In this research it was found that both EE and discharge were associated with depression, anxiety, and stress. Although there can be no certainty about whether these associations are the result of maladaptive coping (using the wrong coping strategy in the wrong situation), EE and discharge have both been associated with ruminative tendencies and dysregulation in previous research (Carlson et al., 2015; Gibson, 2012; Nolen-Hoeksema, 1991; Silk et al., 2003) and both have a component of being overwhelmed by negative emotional experience, and of "letting oneself go" in terms of emotions. In addition, depression, anxiety, and stress are all conditions in which people are overwhelmed by negative mood, and may experience increased ruminating (Lovibond & Lovibond, 1995). Therefore, it seems likely that some of these overlapping mechanisms are important in explaining the relationship between EE and discharge and their correlations with depression, anxiety, and stress. It is possible therefore that discharge may generally not be such a good alternative for replacing EE in terms of mental health. Future research should

look further into which one of these concepts (being overwhelmed, letting go in terms of one's emotions, or ruminating) is most important for each association, in order to find out more about the long-term consequences of listening to music for discharge.

Future research should examine further the long-term effects of listening to music on mental health before concluding whether or not music should be used as a tool to decrease EE. Results of a recent study conducted on people's private phones with a music app (Randall, Rickard, & Vella-Brodrick, 2014) revealed that using music to regulate a recently experienced emotion yielded the greatest hedonic success but was associated with poorer emotional health and well-being. Research has additionally indicated that the use of music for suppression of a negative mood is associated with lower levels of mental health (Chin & Rickard, 2013), meaning that suppression of a negative mood might not be a good coping strategy. Related to this, Gortner et al. (2014) found a decrease in rumination and depression in a study in which participants were asked to regularly write about negative life events (thus regularly expressed their negative feelings and thoughts). These studies suggest that expressive strategies such as discharge may be advantageous for long-term mental health when used responsibly. In sum, in order to understand how adaptive or maladaptive the use of music for discharge is to decrease EE, future research would need to consider both short-term mood effects and long-term mental health effects.

Music Listening's Associations with EE at Low Disordered Mood

Findings indicated a positive association with EE for diversion, entertainment, and mental work, when particularly looking at those participants who were scoring low on depression and stress. This is especially interesting when we consider the fact that these moderated associations are mainly driven by people who score low on stress or depression. None of these music listening strategies was associated with stress, and two of these music listening strategies (diversion and entertainment) were not associated with depression or anxiety. Moreover, the use of music for diversion and entertainment have clearly been related to enhancing mood or maintaining positive mood (Van den Tol & Giner-Sorolla, 2017), whereas the use of music for mental work regards contemplation and clarification of emotional preoccupations (Saarikallio, 2008), which is a process that can free a person of negative affect (Chin & Rickard, 2013; Van den Tol, 2016).

The assumption that all of these music listening strategies are considered adaptive for relieving a bad mood might potentially point towards music already being used by some

people in an attempt to counter impulses to engage in EE. Moreover, it might point towards this being a healthy coping strategy, as those people with better mental health might use more adaptive coping styles in general (Berking et al., 2012; Cheng et al., 2014). Thus, although these people do engage in EE they are trying to reduce this impulse by using music listening strategies that reduce the negative moods associated with EE and by trying to maintain or enhance any existing positive mood (hence avoiding the urge to engage in EE).

A literature review on flexible coping (Cheng et al., 2014) shows that people with better mental health do use a larger variety of activities (such as music, eating, calling a friend, etc.) as coping strategies. Those with better mental health might therefore be more likely to use both (or even simultaneously engage in) EE and music listening strategies as a mean to cope with problems, creating the higher association with EE among lower mental health (and potentially even partly creating the lower association of EE for lower disordered mood). Thus, people with higher disordered mood (worse mental health) might be more likely to only use a coping strategy (EE) which results in negative health outcomes (e.g., excessive calorie intake, weight gain) and not try to counter their negative mood with the use of music.

An alternative explanation might be that people low and high in disordered mood engage in EE and/or music listening for different reasons. To give an example, both EE and diversion are being described as being used for distraction from (or avoidance of) negative emotions (Evers et al., 2010; Nguyen-Rodriguez et al., 2009; Saarikallio, 2008). While people low in depression might use EE for this reason, people high in disordered mood might have different motivations for EE. Thus, although both engage in EE and music listening, both do so for different reasons, meaning that we find different associations for both groups.

Is diversion, entertainment, or mental work a more promising music listening strategy for reducing EE?. One of the areas of interest in the current research was to examine which music listening strategy might potentially be used as a healthier alternative to EE. There has already been a discussion about discharge in this role. The next sections will discuss diversion, entertainment, or mental work in this role.

Diversion. Diversion refers to the strategy of using music to distract from negative thoughts and forget the current mood (Saarikallio, 2008). This description is in line with the description of some of the episodes of EE (Evers et al., 2010; Nguyen-Rodriguez et al., 2009) as an attempt to distract from (avoidance) or improve (emotion-oriented) a negative mood. This explains why diversion might potentially be used by some people who engage in EE. Thus,

using diversion for reducing EE might potentially be beneficial in terms of reducing the negative mood which creates the impulse to overeat among EEs. As we cannot (yet) be equally sure if this will also be the case for discharge, it is possible that using diversion rather than discharge might yield better results in terms of reducing EE in the short term. That being said, like EE, this strategy does not help one to actually solve the problems that are causing the negative moods in the first place.

Entertainment. Using music for entertainment has been described as creating a nice atmosphere and pleasant emotions to maintain or enhance positive mood (Saarikallio, 2008). This association with EE may be explained by a more positive overlap with EE, in terms of EE being an attempt to distract from (avoidance) or improve (emotion-oriented) a negative mood (Evers et al., 2010; Nguyen-Rodriguez et al., 2009). This overlap can be considered rather promising in terms of reducing the motivation for EE, as EE is generally associated with a prior negative mood, rather than a positive mood.

Moreover, entertainment might also be used as a preventative measure against negative mood, which might explain why it is not associated with depression, anxiety, or stress in the current sample. Based on these considerations, entertainment seems a very promising alternative to EE. However, people with higher levels of disordered mood might feel less motivated to engage in entertainment, as they may avoid positive experiences (Lovibond, & Lovibond, 1995). Future research should explore how effective entertainment is in terms of reducing motivation to engage in EE.

Mental work. Mental work refers to music being used as a framework for mental contemplation and clarification of emotional preoccupations (Saarikallio, 2008) which suggests a more analytical approach and problem-focused coping style. As mental work can reduce stress and negative mood (Chin & Rickard, 2013; Van den Tol & Edwards, 2015) it seems like a good alternative to reduce EE impulse in the short term. As it additionally does not relate to avoiding (such as diversion) or suppressing (such as might be the case for discharge) mood (Chin & Rickard, 2013), it might be a promising long-term strategy. However, we cannot be sure about what the long-term effects of using this strategy to replace EE would be in terms of mental health. Mental work may lead to the conclusion that a situation cannot be resolved, and goals may have to be adjusted. Mental work might hence reduce direct stress levels (i.e., "If I can't solve it why would I be stressed") but might increase overall depression and anxiety levels as reflected by the current association that

mental work has with depression and anxiety but not with stress. Longitudinal future research should look into this.

A final note about these moderated effects. As a final note about these moderations, we want to warn readers not to confuse "*the relations between EE and music listening strategies 'among' low or high depression and stress*" with "*the relations of EE and music listening strategies 'with' depression and stress*." Thus, even though EE and mental work are both associated with disordered mood, the associations between mental work and EE were nevertheless higher for people low on stress and depression (as these two things are different). As indicated earlier, although maladaptive use of coping is linked to mental health problems (Berking et al., 2012; Cheng et al., 2014), associations of certain coping strategies with disordered mood do not necessarily indicate that these coping strategies "caused" the mental health problems. It might just as well be possible that people with more mental health problems are more likely to use a certain strategy because it actually helps them to cope with those mental health problems. The interactions found in this research for EE and mental work among lower disordered mood might potentially point towards this being the case here.

Limitations and future research

There are a number of strengths associated with this study. Our collected data were drawn from a large sample of participants who were blind to the real purpose of the study. Many previous studies that have been carried out on the topic of music were advertised either on the radio or advertised by music students as being a study about music, hence drawing upon a population that are more likely to be musicians or have music as an important aspect of their life (Carlson et al., 2015; Hanser et al., 2016; Van Goethem & Sloboda, 2011).

One limitation of this research is the use of self-report data. Although the self-report measures used are considered to be valid for depression, anxiety, and stress (Antony et al., 1998), EE is a more difficult behavior to measure, as scores on EE measures and actual eating behavior are not always associated (Larsen et al., 2007). Future research should examine the mechanisms behind the associations between regulation using music and food, for example by measuring the relationship between music and food intake after experimentally inducing real life emotions, or naturalistically documenting people's music and eating behavior in real life (with the help of technological interventions). In particular, such research should test if the maladaptive strategy of EE can be reduced by the use of music listening strategies and which strategies are the most effective disruptors of EE behaviors. In addition, future research might

also want to look at links between music listening and its association with different facets of EE (within and beyond the DEBQ) and at long-term mental health effects of using certain music listening strategies in order to replace EE.

The current data that was gathered on depression, anxiety, and stress, measured recent episodes (i.e., last two weeks), but the questions on affect regulation strategies measured people's general tendencies (i.e., time not specified). Research by Tearne et al. (2016) has indicated that the DASS scale has stability over substantial periods of time (3 to 8 years). Nevertheless, it is possible that associations would have been stronger (or weaker) if we had either asked all questions with regard to the last two weeks or as a general tendency.

Another limitation of the current research is that there is not a simple relationship between negative mood and over-eating; some people eat fewer foods following negative life events, whilst other people will over-eat in response to positive affect (Geliebter & Aversa, 2003). We did not measure these tendencies in the current study and therefore cannot be sure if these have impacted on our results in any way. The tendency to under-eat in response to stress is linked with lower BMI (Tuschl, 1990). Our research did however control for BMI across all analyses. Future studies could look exclusively at individuals who over-eat in response to negative emotions and exclude other emotional eating styles.

There have been some recent criticisms of questionnaire and laboratory measures of EE (see Bongers & Jansen, 2016), which must be acknowledged as part of the evaluation of this study. It has been proposed that EE may be part of a cluster of behaviors related to uncontrolled eating (Vainik et al., 2015), characterized by low perceived self- control and a strong desire to eat. In addition, it has also been stated that individuals who have high scores on EE scales may actually be "concerned eaters" who worry about their eating behavior and their self-control (Jansen et al., 2012). It could be that the association between listening to music for discharge and EE may be caused by low perceived self-control, and this would be an interesting area for future research.

Implications

This article examined and found associations between EE and music listening strategies in relation to depression, anxiety, and stress, bringing together two distinct areas of emotional regulation research. The findings indicate that music listening, and EE are especially associated for people with low levels of disordered mood (when it concerns listening to music for entertainment, distraction or mental work), or when music is used for discharge (releasing

anger or sadness through music that expresses these same emotions). These associations point towards the possibility of some music listening strategies being useful as a physiologically, but also mentally, healthier alternative for EE. As this was a correlational design, it can only be concluded that different constructs are associated with each other, not what the mechanisms of those relationships are. This research has the potential to lead to further experimental and longitudinal studies, to examine whether adaptive music listening strategies can disrupt the association between negative mood and EE and if this will be beneficial in terms of people's mental health in the long term.

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Chapter 7: Discussion and Conclusion

Dissertation Goals

People often turn to music for mood-regulatory purposes (e.g., Schäfer et al., 2013; Thayer et al., 1994; Van Goethem & Sloboda, 2011). Several mood-regulation through music strategies have been identified, including entertainment, diversion, discharge, and solace (see Chapter 1 and Saarikallio & Erkkilä, 2007). This thesis aimed to further our knowledge and understanding of consolation through music. To that end, four empirical studies were conducted (Chapters 3 through 6). The studies were preceded by a general introduction (Chapter 1) and a literature review on aspects of the emotional power of music (Chapter 2). In this closing chapter the key findings from the empirical studies are briefly summarized and subsequently discussed in terms of how they can contribute to feeling consoled by music, how these results contribute to behavior that is associated with consolation, and how this compares to the pertinent literature. Consolation (synonymous with solace and comfort) is defined by Norberg and colleagues (2001; also, Ter Bogt et al., 2017) as a remedy against suffering in which (1) someone is present and willing to listen to the sufferer, and (2) the sufferer is willing to give expression to their pain and acknowledge its existence. Through this process, a sense of meaningful belonging and connection with oneself or others is established; the sufferer no longer feels alone or disconnected, which may help in accepting the situation. This general discussion concludes with suggestions on potential applications in managing health and well-being, and recommendations for further research.

Music and Solace

In the first empirical study (Chapter 3) a questionnaire was used to explore consolation through music in detail. Participants were specifically asked: (1) to describe the situations in which they turn to music for consolation; (2) what aspects of the music are important to them for providing solace; (3) the emotional experience of the music and consoling episode, and lastly, (4) how they listened to the music.

The study revealed that, out of several behaviors that are known to counter negative feelings (Thayer et al., 1994), music was rated as the most important source of consolation. More so than, for instance, crying, seeking comfort from others, eating, dressing warmly, taking a shower, or prayer. These findings on adults agree with Saarikallio and Erkkilä (2007) and Ter Bogt and colleagues (2017) who found that adolescents often turn to music to experience solace. A potential explanation on why some of these behaviors, such as eating or dressing warmly, are considered less consolatory than music, may be that even though they bring

physical relief or comfort, the sense of feeling connected with others is absent. These behaviors may, however, in combination with each other (e.g., listening to music in comfortable, warm clothing), or as part of a ritual, for example eating as part of a funeral ritual (Yoder, 1986), have a great potential to provide solace.

Regarding the situations in which people turn to music, we found that this most often occurs when mourning the loss of a loved one, followed by feeling lonely and misunderstood, problems in a relationship, seeing someone close to us suffer, or one's own ill health. In agreement with Ter Bogt et al.'s study among adolescents (2017), daily hassles were mentioned as well, but when considering the most recent consolation through music episodes, on which we also inquired, more severe situations were far more prominent (Chapter 3). These circumstances included existential crises (Norberg et al., 2001), in which there is a (potential) permanent loss, and one feels disconnected from others (as bereaved, or after a break-up) or oneself (when feeling misunderstood, or when in doubt about one's own body in case of poor health). It is unsurprising that in terms of preferred music listening in such states, people turn to music that they find aesthetically pleasing, and that is familiar and personally relevant (Chapter 3). In other words, it is music with which they have some connection.

This connection can have been established through the music itself, the lyrics, and memories that are associated with a song (Chapter 3), which has also been reported by other investigators (Baltazar & Saarikallio, 2019; Saarikallio & Erkkilä, 2007; Ter Bogt et al., 2017; Van den Tol & Edwards, 2015). Regarding the music itself, our findings (Chapter 3) show that it is valued for its beauty, it tends to be among the listener's favorite, and it is not exclusively listened to for consolatory purposes. Moreover, the reported emotional qualities of solace songs show them to be somewhat sad, nostalgic, tender, moving, and aesthetically pleasing. They also make listeners feel calm and relaxed on the one hand and empowered on the other. Personally relevant music may give people a sense of control over a situation in which they may have little. This effect may be bolstered by making the choice with regards to what music to listen to, and when and where it is heard (e.g., Howling & Rooney, 2021b; Liljeström et al., 2011; Saarikallio et al., 2013).

Considering these findings, the literature on listening and enjoying sad music is relevant. This topic has received substantial research attention during the past decade (see reviews by Eerola et al., 2018; Garrido, 2017; Sachs et al., 2015; Van den Tol, 2016). Several findings on

listening to sad music are relevant: (1) sad music is often listened to when feeling sad[12] and situations in which one listens to sad music thus overlap with situations in which one seeks consolation (Hunter et al., 2011; Taruffi & Koelsch, 2014; Van den Tol & Edwards, 2013; 2015), (2) listening to sad music may help express and validate negative feelings of listeners (Taruffi & Koelsch, 2014; Van den Tol & Edwards, 2015; Van den Tol, 2016), (3) sad music can facilitate acceptance-based coping (Van den Tol et al., 2016) and consolation (Taruffi & Koelsch, 2014), (4) listening to sad music leads to a wide range of experienced, often mixed affects, particularly nostalgia (Taruffi & Koelsch, 2014). Moreover, higher levels of trait empathy are associated with a greater appreciation of sad music (Taruffi & Koelsch, 2014; Vuoskoski et al., 2012, also see Eerola et al., 2018 for a review and discussion).

In the present work, being moved is the most often reported emotion when listening to songs of solace and when crying over music alike (Chapters 3 & 4). Being moved in daily life is often experienced when observing pro-social behavior that may lead to social bonding (see Zickfeld et al., 2019). Recent work by Vuoskoski and colleagues (2022) shows that being moved in music listening is associated with a sense of connection. The object of this connection, however, was not investigated. Moreover, feelings of being moved mediate the appreciation of sad music (Vuoskoski & Eerola, 2017; Vuoskoski et al., 2022). We evaluated the hypothesis that listeners feel connected with the performing artist, or the artist's fans, but found little evidence for this idea (Chapter 3). Likewise, even though a felt connection with a performing artist and their fans might be particularly relevant to adolescents, Ter Bogt and colleagues (2017) also found little support for this notion among this age group. A more plausible hypothesis is that listeners experience a connection with a song because of its personal associations.

The felt connection and experienced interpersonal closeness may explain why we found that music listening for consolatory purposes, as well as crying over music, mostly happens in solitude, as the sole activity without distractions. People who look for consolation through music actively try to close themselves off from their surroundings (Chapter 3). They turn to music when social support from others is unavailable or perhaps unwanted. This agrees with other research that suggests that music listening to deal with negative feelings is mostly done when alone (e.g., Fink et al., 2021; Saarikallio & Erkkilä, 2007). Moreover, it adds to the idea

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[12] Sad music is, however, not always listened to when feeling sad. When sad, and sometimes in general, some listeners avoid sad music. Moreover, there is not always a specific motivation for listening to sad music. See, for example, Eerola et al., 2018 and Van den Tol, 2016 for a discussion.

that the recognition found in music is sometimes compared to that of an understanding friend (Saarikallio & Erkkilä, 2007; Van den Tol, 2013), and that music listening can function as a social surrogate (Kahn et al., 2021; Schäfer & Eerola, 2020; Schäfer et al., 2020). Recent work by Kahn et al. (2021) further shows that music listening can offer similar aid as engaging with a friend, for example that it helps listeners to become aware of their sadness, give expression to it, as well as experience a sense of sharing these negative feelings. Music listening may aid people in a similar fashion as interpersonal emotional regulation (Kahn et al., 2021; see Zaki & Williams, 2013 for a discussion on interpersonal emotion regulation).

To summarize, the research in Chapter 3 demonstrates that seeking solace in music is a private regulation strategy, even though it has several social purposes to it. The findings further show an emphasis on songs of solace to be familiar, appreciated for their aesthetic qualities, and their lyrics on the one hand, and to have much personal relevance on the other. Results additionally reveal an emotional pattern of music that evokes sadness, and being moved, but also feeling calm, and empowered in combination with an appreciation for the music. These results in combination with other recent developments may help explain how music can offer consolation when managing negative situations.

Music and Tears

Even though crying is a common and powerful emotional expression, it was, however, not until the past few decades that this behavior has been the subject of systematic research (see Vingerhoets, 2013). Similarly, even though crying is an often-reported response to music and the arts in general (e.g., Gabrielsson & Wik, 2003), investigations into this phenomenon are scarce. Chapter 4 reports on a survey study in which we investigated crying over music episodes. We specifically inquired about the intensity, duration, the physical and emotional experience, and time of day of the most recent crying over music episode. Participants also reported on the presence of others and, if applicable, how they responded, what specific elements of the music made listeners cry, as well as how they felt afterwards.

Several results stood out. In agreement with recent work by Cotter et al. (2018; 2019) our findings show that crying over music is indeed common. Crying episodes do not last exceptionally long (less than 5 minutes) and mostly involve just moist eyes and some sobbing. Like listening to music to comfort oneself, most crying over music happens when alone (Chapters 3 & 4; Cotter et al., 2019), and listeners attribute their crying over music to evoked sad memories, feelings of nostalgia or longing, as well as the lyrics and aesthetic

properties of the music (Chapters 3 & 4). These characteristics partly overlap with those that makes listeners feel comforted (Chapter 3). Personal relevance seems to be more important than qualities of the music or lyrics.

We further found that being moved (65%) and sadness (54%) were the main emotions felt when crying over music (Chapter 4). Cotter and colleagues (2018; 2019) distinguish two emotional classes of crying, namely a sad class, and an awe-inspired class. Personal relevance, memories, feeling sad before crying onset, the lyrics, and listening to popular music are associated more with sad crying episodes, while music properties such as its aesthetics, and listening to classical music are more associated with awe-inspired crying (Cotter et al., 2019). What makes listeners cry about music is thus associated with what they are feeling. Although we did not directly assess this, a plausible hypothesis is that sad-crying-over-music episodes are positively associated with using music for (self-)soothing purposes.

A second major finding regarding crying over music, is that the typical gender differences well-known in the case of non-musical crying episodes, are smaller or non-existent when crying over music (Chapter 4). In general, women tend to cry more often, longer, and more intensely than men (Vingerhoets, 2013). These differences, however, become smaller or disappear during strongly positive and negative situations, such as after a birth, at a wedding, or after experiencing a loss (e.g., Vingerhoets, 2013). That a similar decrease of the gender differential in crying also occurs while listening to music, could suggest that these experiences are also less affected by, for example, cultural norms and expectations.

Music and Lyric Characteristics

In Chapters 3 and 4, factors that may contribute to crying over music and finding solace in music have been identified and discussed. Even though participants assigned much value to lyrics and certain qualities of the music, but those chapters did not investigate these characteristics in detail. In general, properties of music and lyrics need to be considered more in relation to music's uses (Baltazar et al., 2019). Recent investigations that relate musical and lyrical characteristics to specific functions of music show that they are indeed relevant for specific purposes or emotional outcomes (see Howlin & Rooney, 2021a; Mori, 2022; Vuoskoski et al., 2022). Funeral music is for instance lower in valence and energy than non-funeral music, and can be characterized as solemn, serene, and tender (Mollenhorst et al., 2016). Moreover, funeral music is often in a major key. In combination with the lower valence, this could indicate a mixed affect as opposed to simply sad (Mollenhorst et al., 2016;

Schellenberg & Von Scheve, 2012). Recent work by Mori (2022) shows that tears evoked by music are related to the harmonies of a song, as opposed to rhythmic properties, which are associated with the experience of chills.

The relationship between lyrics and music's uses is less straightforward than it simply being a text message listeners notice. As argued by Bruin-Mollenhorst (2020), only excerpts of the lyrics, such as a specific phrase, the song title, or a word, may be relevant for it being used as funeral music due to the personalized nature of these farewell rituals. Similarly, autobiographical memories that are associated with a specific song may matter more than the lyrics to move someone to tears (Chapter 4; Cotter et al., 2019).

There may nevertheless be some lyrical characteristics such as the use of certain types of words that may help explain why some songs are particularly suited as funeral music. In Chapter 5 we evaluated this idea on commonly used funeral songs in the Netherlands. We also sought to replicate the characterization of funeral music by Mollenhorst and colleagues (2016), and investigate what words are mainly responsible for the lyric's affect. We demonstrated that funeral music contains more second-person pronouns (you, yours), and more words related to the future than non-funeral music. In general, songs that contain more second-person pronouns are more liked and commercially successful than songs with fewer second-person pronouns (Packard & Berger, 2020). These specific pronouns may help listeners relate to or think of someone important to them. More specifically, in sentences as '*Still loving you*' and '*I'm your lady and you are my man'* listeners may think of a significant other addressing them rather than the performing artist (Packard & Berger, 2020). Regarding funeral music, these sentences may also give voice to what the bereaved are feeling and may help them give expression to these feelings. The future focus in funeral lyrics, e.g., '*We'll meet again*', may give voice to the thought that the relationship between deceased and bereaved persists beyond death. This adds to the idea of music as a social surrogate and may explain how lyrics are a way of communicating with this agent.

In addition, we replicated findings by Mollenhorst et al. (2016) that funeral songs are lower in valence, energy and often in a major key than non-funeral songs. We also found funeral songs to be more acoustic, which fits in with the characterization of funeral music as solemn, serene and tender. Moreover, even though we found more words in the discrete emotion category of sadness for funeral songs than for non-funeral songs, the funeral lyrics were not particularly negative. Overall, they contained more positively valenced words ('love', 'sun') than negative

('lonely') ones. In combination with most of the songs being in a major key, of low valence and energy, and mostly acoustic, it can be argued that these songs are of mixed affect and not simply sad. The loss of a loved one is one of the main contexts in which people turn to music for solace. It is thus reasonable to assume that some funeral songs will also be songs of consolation. In addition, Mori (2022) also found frequent use of second-person pronouns in songs that may make people cry. To conclude, these findings demonstrate that characteristics of both the music and the lyrics may contribute to why some songs are more-often selected to fulfill specific purposes, here as funeral songs, than others. Further research may wish to investigate the lyrical and musical characteristics of songs that provide consolation or that make people cry. Regarding the latter category, an interesting question is whether there are lyrical differences in songs that cause sad or happy/awe-inspired tears.

Music, Consolation and Emotional Eating

In Chapter 6 associations between music-listening strategies for mood regulation and emotional eating, another common emotion-regulating strategy, were explored. In this novel line of investigation, discharge (the venting of anger and sadness while listening to music that expresses these emotions) was the only strategy (other strategies: entertainment, revival, strong sensation seeking, diversion, mental work, and solace[13]) that associated significantly with emotional eating (EE). In addition, discharge and solace positively associated with self-reported measures of stress, depression, and anxiety. People experiencing these negative feelings may regularly turn to mood regulation through music or EE to improve their mood. We found no direct association between music as consolation and emotional eating.

Follow-up research, however, reports a significant, but small correlation between EE and solace, as well as between solace and stress. Findings on discharge and EE were also replicated (Van den Tol et al., 2019). Moreover, in a recent series of laboratory experiments, Van den Tol and colleagues (2022) investigated participant's food-intake after being induced with either a sad or stressed mood. Participants subsequently listened to a self-selected song that matched one of three mood regulatory strategies (diversion, discharge, and solace) or sat in a no-music control condition. Their snack foods intake was measured post-music. When sad, participants consumed less food after hearing a song in the discharge category, while less snack foods were consumed when listening to a solace song when stressed. When participants were given a free choice out of their three songs, diversion was chosen the most, but this did

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[13] For the purpose of the current discussion, the focus is on solace.

not lead to a decrease in food-intake, although participants reported a reduction in stress. This implies that songs of solace could be particularly relevant to counter stress. The authors attribute their found effects on EE to music's ability to influence arousal levels in listeners (Van den Tol et al., 2022). Findings discussed in Chapter 3 also showed that songs of solace make listeners feel relaxed and calm. Replicating the research by Van den Tol et al. (2022) with a specific focus on investigating the underlying mechanisms of why music use as discharge or solace reduces EE can make this assumption more substantial.

The effects of different self-regulatory strategies through music listening require more research attention in general. Discharge is, for example, commonly associated with maladaptive mood regulation, while distraction and solace are considered healthier alternatives (Carlson et al., 2015). Although recent investigations suggest that using music as discharge may be helpful in some situations (Silverman, 2021). In a laboratory setting, comforting and distracting music were equally effective at reducing loneliness and nervousness and increasing feelings of happiness and relaxation after being induced with sad conditions (Schäfer et al., 2020). Listening to self-selected music in solitude may help counter negative mood and improve feelings of connectedness regardless of the chosen listening strategy (Schäfer et al., 2020).

Music, Health, and Well-being

The rationale behind the exploratory work on the benefits of listening to music as a counter to emotional eating fits in with a growing body of evidence that demonstrates positive effects of music interventions[14] on various aspects of health and well-being (see e.g., Hanser, 2010; Thaut & Wheeler, 2010). Examples include improving the quality of life of people with cancer and dementia (Bradt et al., 2016; Van der Steen et al., 2018), reducing pain (Howlin & Rooney, 2021b; Lee, 2016), stress (De Witte et al., 2020; 2022), and anxiety (Harney et al., 2022). Evidence for the beneficial effects of music interventions is increasing rapidly, although some caution is advised, since not all the reported effects are particularly strong. Furthermore, interventions and study methodology are diverse which makes results difficult to compare (e.g., Dingle et al., 2021; Van der Steen et al., 2018). There is a clear need to understand and consider the mechanisms and musical aspects (such as lyrics, and music

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[14] Music interventions refer to both music as medicine, i.e., listening to recorded music, sometimes administered by health professionals with minor instruction, and music therapy, which can involve both listening and actively making music under guidance of a trained therapist. For the latter, a therapeutic process between therapist and patient is instrumental (see e.g., Bradt et al., 2015; Bradt et al., 2016; De Witte et al., 2020; De Witte et al., 2022 Gold et al., 2011).

characteristics such as tempo) through which music can aid in health care settings (e.g., Baltazar et al., 2019; Dingle et al., 2021).

Consolation and its associated behavior are an integral part of health care; it is even explicitly mentioned in Swedish health care policy (see Norberg et al., 2001). Since it mostly follows a personal loss, utilizing music as a source of solace in health care settings intuitively makes sense, especially when coping with chronic illness. We indeed found that one's own ill health is a reason to use music as consolation (Chapter 3). References to music as solace in music interventions do not always explicitly mention consolation as an outcome or goal, although examples are present. For instance, music is mentioned as a source of peace and comfort through its aesthetic qualities, and as offering hope for the future in cancer patients (Bradt et al., 2015). Moreover, music interventions may help accept the severe life-changes brought on by multiple sclerosis (Ostermann & Schmid, 2006). Further research that considers music as a source of solace within patient groups appears warranted.

Findings discussed in the present work also raise questions about, for example, the (non)expression of behavior that is assumed to be associated with disordered mood. Consider the case of people who discontinued their crying. An inability to cry scores highest on an item in the Beck Depression Index, a self-repot measure of depression, but research into non-criers is scarce (Hesdorffer et al., 2018). In an exploratory comparison of 'normal' criers and non-criers, Hesdorffer and colleagues report that the latter group experiences equal levels of well-being as criers, but felt less connected with others, received less support, and scored lower on ratings of empathy. Of further interest to the topic of solace is the finding that non-criers reported being moved less by the arts, including music, compared to criers. We found that being moved is frequently mentioned when seeking solace through music (Chapter 3), and when crying over music (Chapter 4). Whether this means that non-criers turn to music for self-consolation less, or if an inability to console oneself and non-crying are related to disordered mood is a topic for further investigation.

Limitations and Recommendations for Further Study

In addition to the limitations mentioned separately in each chapter, there are several overarching shortcomings to the present body of work. First, due to the design of the questionnaires we were unable to make statements on potential lifespan developments. We also were unable to inquire further on open-ended responses on, for example, the context in which songs were listened to. Past research showed that music as a mood regulator remains

important during later life (see e.g., Groarke & Hogan, 2016; Groarke & Hogan, 2019; Leipold & Loepthien, 2015; Saarikallio, 2011; Shifriss et al., 2015), but possible developments across the lifespan have received little attention (e.g., Bonnvill-Roussy et al., 2013; Groarke & Hogan, 2016; Saarikallio, 2011). There is a clear need for qualitative and quantitative longitudinal studies that cover lifespan developments of consolation through music, but also mood regulation through music in general. Experiments on, for example, the calming properties of songs of solace are another avenue for further study.

Second, findings in the present work may benefit from research into the role of individual differences and person characteristics (see e.g., Manolika et al., 2021; Miranda, 2021; Ter Bogt et al., 2021), and should take these factors into account in future work. The results of the present work and recent findings on crying over music (Cotter et al., 2019) further emphasize the need to consider situations and contexts for listening to specific songs.

Conclusion

Music can provide consolation to listeners. The present findings support the notion that music can serve as emotional support when other people are unavailable or potentially unwanted. The felt personal associations provide connectedness with the music. These connections may be facilitated using certain words that suggest a bond with others. The aesthetic qualities of the music may make these songs among the listener's favorites. It is this sense of connection that may make music particularly consoling as compared with other self-soothing behavior.

The emotions that listeners experience when crying over music or when being comforted have recently been linked to pro-social behavior and social bonding processes. In addition, songs of solace appear remarkably calming and empowering, which could benefit listeners in dealing with stress. These findings may benefit the areas of mood regulation through music, and the general understanding of consolation. The study of consolation through music may help make solace a more tangible subject, as it was until now mostly studied in the domains of religion and philosophy. Lastly, this work emphasizes the need for an understanding of, and fundamental research into common, everyday behavior, such as listening to music for consolatory purposes and crying over music, of which we sometimes know little, even though music provides life with meaning, flavor, and the apparent tools to manage both daily hassles as well as hardships.

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Summary

Summary

One of the main reasons people listen to music is that music evokes emotions. Listeners often turn to music when in a negative mood to express or manage these negative feelings. Music listening can be used as a form of mood regulation. One of the ways in which music helps cope with negative feelings is by helping listeners feel consoled. Although music's comforting abilities are widely recognized and used daily, little systematic research has explored how music can provide solace. The present thesis investigates music's consolatory properties and considers related behavior.

Chapter 1 provides the research questions and dissertation outline. This opening chapter also introduces several key concepts: music's ability to evoke emotion in listeners and mood regulation through music listening. **Chapter 2** contains a literature review on music and emotion and music's ability to influence affective ratings of visual stimuli. The central theme in this chapter is that music is a powerful emotional stimulus that is used both consciously and subconsciously to influence various emotional functions in daily life. For example, music can enhance the feelings an emotional picture evokes (make a pleasant landscape seem more pleasant) and make a neutral face sadder when the picture of a face is accompanied by sad-sounding music.

Chapter 3 is the first of four empirical studies in this thesis. This chapter discusses a survey study in which participants answered questions concerning music and consolation. That is, they were asked (1) to name the situations in which they turn to music for consolation; (2) what aspects of the music are essential to them for providing solace; (3) about the emotional experience of the music and consoling episode, and lastly, (4) how they listened to the music. Results revealed that consolation through music is a private mood-regulation strategy that mostly follows suffering a personal loss (e.g., the loss of a loved one, of one's health, or feeling misunderstood). Music was considered the most consoling behavior out of a list of several behaviors (e.g., crying, seeking comfort from others, eating). Music that offers consolation is often familiar to listeners and rated as among their favorites. Listeners attribute music's comforting ability to the music itself, the lyrics, and the memories these songs evoke. Songs of solace induce feelings of being moved, sadness, and nostalgia and make listeners feel empowered and relaxed. The results suggest that listeners feel comforted by the music through the deep connection they experience when listening to it. Music can serve as an

understanding friend in the absence of actual others. This connection is established through the personal relevance of the songs, their experienced aesthetics, and the lyrics.

In **Chapter 4**, the results of a survey on crying over music are discussed. Music is one of the many antecedents that can cause people to shed emotional tears, but thus far, it has received little research interest. In this questionnaire study, participants provided information on the most recent time they cried when listening to music. They provided information on the length, intensity, and time of day of the crying episode; what made them cry about the music; details of the song they cried over; the presence and, if applicable, the response of others; and how they felt during and after the episode. These responses were used to characterize crying over music, and differences between women and men were investigated.

The results showed that crying over music is common and that episodes do not last exceptionally long, tend to involve merely moist eyes and, occasionally, some sobbing, commonly occur when alone, during the afternoon and the evening. People cry over a wide variety of songs, and they attribute their crying to sad memories, nostalgia, the music itself, and the lyrics. About half the people chose the music they cried to themselves. The most often reported emotions are being moved, sadness, powerlessness, and nostalgia. The gender differences that are common when crying over other antecedents are small or absent when crying over music. These more minor differences are also found for strongly positive and negative situations, such as during a wedding or funeral.

Findings discussed in Chapters 3 and 4 revealed that listeners partly attribute their sense of consolation and their tears to the song texts. Moreover, the main situation in which solace through music is sought is after losing a loved one. In **Chapter 5**, I examined popular Dutch funeral songs' musical and lyrical characteristics. A previous characterization of funeral music sounding solemn, serene, and tender was replicated and expanded upon. We also found that funeral music is lower in valence and energy than non-funeral songs. Funeral songs are more acoustic than non-funeral songs and often in a major key. There were no differences in tempo.

Lyrics were investigated with word count software. The following word categories were explored: linguistics-related (first-person singular/plural, second-person pronouns; past, present, future tense; expressed emotion (positive, negative words, and the discrete emotional categories anger, anxiety, sadness); and category words (those relating to family, friends, death, religion). English funeral music lyrics contained more second-person pronouns and were more future-focused than comparison songs ('*I will always love you*'). These lyrics were

not particularly negative and contained more positively than negatively valenced words. They, however, also had more words that expressed sadness than non-funeral songs. Frequent use of second-person pronouns is associated with greater liking and increased commercial success. The underlying idea is that second-person pronouns make listeners think of someone close to them.

Regarding funeral music, the bereaved may also use these song lyrics to express their relationship to the deceased or give voice to how they are feeling. In agreement with previous research that argues that only part of the lyrics may be important for funeral music, we think that the most relevant lyrical excerpts are in the chorus and that the repetition of the chorus contributes to the emotional message's strength. Taken together, these results suggest that despite the personal nature of funeral music, there are musical and lyrical characteristics that may make these songs particularly useful for this purpose.

Chapter 6 presents the results of an exploratory study that considered potential associations between emotional eating and several mood regulation through music strategies. Participants filled out a questionnaire that measured self-reported emotional eating, mood-regulatory strategies through music listening, depression, anxiety, and stress. Emotional eating is associated with the venting of emotions (discharge) but not with solace. However, recent follow-up laboratory research points to the possibility that songs of consolation may help decrease emotional eating when feeling stressed.

Chapter 7 provides a general discussion and conclusion. Music can give consolation to listeners. Findings from several chapters support the notion that music can serve as emotional support when other people are unavailable or potentially unwanted. The felt personal associations provide connectedness with the music. These connections may be facilitated using certain words that suggest a bond with others. The aesthetic qualities of the music may make these songs among the listener's favorites. It is this sense of connection that may make music particularly consoling as compared with other self-soothing behavior.

The emotions that listeners experience when crying over music or when being comforted have recently been linked to pro-social behavior and social bonding processes. In addition, songs of solace appear remarkably calming and empowering, which could benefit listeners in dealing with stress. These findings may benefit the areas of mood regulation through music, and the general understanding of consolation.

Samenvatting

Samenvatting

De emoties die muziek oproept, zijn een van de belangrijkste redenen om naar muziek te luisteren. Mensen blijken een sterke behoefte te hebben aan muziek wanneer zij in een negatieve stemming zijn om zodoende uiting te geven aan deze negatieve gevoelens of om deze stemming te beïnvloeden. Luisteren naar muziek kan gebruikt worden als stemmingsregulatie. Een van de manieren waarop muziek dat doet, is door het bieden van troost. Hoewel het troostende vermogen van muziek algemeen wordt erkend en muziek dagelijks voor dit doel wordt ingezet, is er weinig systematisch onderzoek gedaan naar hoe muziek luisteraars soelaas biedt. Deze dissertatie onderzoekt de troostende eigenschappen van muziek en gedrag dat daarmee samenhangt.

Hoofdstuk 1 beschrijft de onderzoeksvragen en de opzet van dit proefschrift. Dit eerste hoofdstuk introduceert een aantal terugkerende concepten, namelijk: het vermogen van muziek om emotie op te roepen bij luisteraars en stemmingsregulatie door het beluisteren van muziek. **Hoofdstuk 2** is een literatuurstudie naar muziek en emotie en het vermogen van muziek om affectieve waarderingen van visuele stimuli te beïnvloeden. De eindconclusie hier is dat muziek een krachtige emotionele stimulus is, die zowel bewust als onbewust kan worden gebruikt om diverse emotionele functies in het dagelijks leven te beïnvloeden. Muziek kan bijvoorbeeld de gevoelens die een emotioneel beeld oproept versterken (een aangenaam landschap nog aangenamer doen lijken) en een neutraal gezicht droeviger maken, wanneer de afbeelding van dit gezicht door droevig klinkende muziek wordt vergezeld.

Hoofdstuk 3 rapporteert het eerste van vier empirische studies uit dit proefschrift. Dit hoofdstuk bespreekt een vragenlijstonderzoek waarin deelnemers werd gevraagd naar muziek en troost. Dat wil zeggen, hen werd gevraagd (1) de situaties te benoemen waarin zij zich tot muziek wenden voor troost; (2) welke aspecten van de muziek voor hen essentieel zijn voor het bieden van troost; (3) naar de emotionele ervaring van de muziek en de troostende episode; en ten slotte, (4) hoe zij naar de muziek luisterden. Uit de resultaten bleek dat troost door muziek een zeer persoonlijke en private stemmingsregulatiestrategie is, die meestal volgt op het ervaren van een persoonlijk verlies (bv. het verlies van een geliefde, van iemands gezondheid, of het gevoel onbegrepen te worden). Muziek werd beschouwd als het meest troostend uit een lijst van diverse gedragingen (bv. huilen, troost zoeken bij anderen, eten). Het zijn vaak bekende en lievelingsliederen die troost bieden. Luisteraars schrijven het troostende vermogen van muziek toe aan de muziek zelf, de teksten, en de herinneringen die

de muziek oproept. Troostliederen wekken gevoelens op van ontroering, droefheid en nostalgie en geven luisteraars een gevoel van kracht en ontspanning. De luisteraars blijken zich vooral getroost te voelen door een diepe verbondenheid die zij ervaren tijdens het beluisteren van muziek. Muziek kan dienen als een begripvolle vriend als men zich eenzaam voelt. Deze verbondenheid komt tot stand door de persoonlijke associaties met de liedjes, de ervaren esthetiek, en de teksten.

In **Hoofdstuk 4** worden de resultaten van een onderzoek naar huilen met muziek besproken. Muziek is een van de vele redenen dat mensen tot tranen toe geroerd kunnen worden, maar tot nu toe is er weinig onderzoek naar gedaan. In dit vragenlijstonderzoek gaven de deelnemers informatie over de laatste keer dat zij huilden tijdens het luisteren naar muziek. Ze gaven informatie over de lengte, de intensiteit en het tijdstip van de huilbui; waarom ze huilden bij de muziek; details van het liedje waar ze om huilden; de aanwezigheid en, indien van toepassing, de reactie van anderen; en hoe ze zich voelden tijdens en na de huilbui. Deze antwoorden werden gebruikt om het huilen met muziek te karakteriseren. Daarnaast werden verschillen tussen vrouwen en mannen onderzocht.

Het bleek dat huilen bij muziek vaak voorkomt maar dat die huilbuien niet lang duren en meestal alleen vochtige ogen en soms wat snikken omvatten. Doorgaans huilen luisteraars wanneer zij alleen zijn in de namiddag en 's avonds. Mensen huilen bij een grote verscheidenheid aan liedjes, en zij schrijven hun huilen toe aan droevige herinneringen, nostalgie, de muziek zelf en de teksten. Ongeveer de helft van de mensen koos zelf de muziek waarbij zij huilden. De meest genoemde emoties zijn ontroering, droefheid, machteloosheid en nostalgie. Terwijl in geval van huilen om andere redenen er sprake is van aanzienlijke sekseverschillen, zijn deze in geval van huilen bij het luisteren naar muziek juist klein of helemaal afwezig. Deze kleinere verschillen worden doorgaans gevonden voor sterk positieve en negatieve situaties, zoals tijdens een bruiloft of begrafenis.

Uit de in Hoofdstuk 3 en 4 besproken bevindingen bleek dat luisteraars hun gevoel van troost en hun huilen deels toeschrijven aan de liedteksten. Bovendien is het verlies van een dierbare de belangrijkste situatie waarin troost in muziek wordt gezocht. In **Hoofdstuk 5** werden de muzikale en tekstuele kenmerken van populaire Nederlandse uitvaartliederen onderzocht. Een eerdere karakterisering van uitvaartmuziek als plechtig, sereen en teder werd bevestigd en uitgebreid. We vonden eveneens dat uitvaartmuziek droeviger en minder energiek klinkt dan

muziek die niet voor dit doel wordt gebruikt. Uitvaartliederen zijn bovendien meer akoestisch dan niet-uitvaartliederen en vaak in majeur. Er was geen verschil in tempo.

Teksten werden onderzocht met software die woorden telt en indeelt in categorieën. De volgende woordcategorieën werden onderzocht: linguïstisch (eerste persoons voornaamwoorden enkelvoud/ meervoud, tweede persoons voornaamwoorden; verleden, heden, toekomst tijd; uitgedrukte emotie (positieve, negatieve woorden, en de discrete emotionele categorieën woede, angst, verdriet); en categoriewoorden (die betrekking hebben op familie, vrienden, dood, religie). Engelstalige uitvaartsongteksten bevatten meer tweede persoons voornaamwoorden en zijn toekomstgerichter dan vergelijkingsliedjes (*'I will always love you'*). Deze liedteksten zijn niet bijzonder negatief en bevatten meer positieve dan negatieve woorden. Ze bevatten echter ook meer woorden die verdriet uitdrukken dan vergelijkingsteksten. Songteksten met veelvuldig gebruik van tweede persoons voornaamwoorden worden positief gewaardeerd en blijken vaker commercieel succesvol. Het achterliggende idee is dat tweede persoons voornaamwoorden luisteraars doen denken aan iemand die hen dierbaar is.

Wat uitvaartmuziek betreft, kunnen de nabestaanden deze liedteksten ook gebruiken om hun relatie tot de overledene uit te drukken of om uiting te geven aan hoe zij zich voelen. In overeenstemming met eerder onderzoek, dat stelt dat slechts een deel van de tekst belangrijk hoeft te zijn voor uitvaartmuziek, denken wij dat de meest relevante tekstfragmenten zich in het refrein bevinden en dat de herhaling van dit refrein bijdraagt aan de kracht van de emotionele boodschap. Ondanks het persoonlijke karakter van uitvaartmuziek, zijn er muzikale en tekstuele kenmerken, die deze liederen bijzonder geschikt maken voor dit doel.

Hoofdstuk 6 presenteert de resultaten van een verkennend onderzoek naar mogelijke verbanden tussen emotioneel eten en stemmingsregulatie met muziek. Deelnemers vulden een vragenlijst over emotioneel eten, stemmingsregulatiestrategieën met muziek, depressie, angst en stress. Emotioneel eten hangt samen met het ventileren van emoties (ontlading), maar niet met troost. Bevindingen uit laboratoriumvervolgonderzoek wijzen echter op de mogelijkheid dat troostmuziek kan helpen bij het verminderen van emotioneel eten wanneer men zich gestrest voelt.

Hoofdstuk 7 bevat een algemene discussie en conclusie. Muziek kan luisteraars troost bieden. Onderzoeksresultaten uit verschillende hoofdstukken ondersteunen het idee dat muziek kan dienen als emotionele steun wanneer andere mensen niet beschikbaar of mogelijk ongewenst

zijn. De persoonlijke relevantie (zoals herinneringen) zorgt voor verbondenheid met de muziek. Deze verbondenheid kan worden bevorderd door woorden te gebruiken die een band met anderen suggereren. De esthetische kwaliteiten van de muziek kunnen ertoe bijdragen dat deze nummers tot de favorieten van de luisteraar behoren. Het is dit gevoel van verbondenheid dat muziek bijzonder troostend kan maken.

De emoties die luisteraars ervaren wanneer ze huilen met muziek of wanneer ze getroost worden, zijn recent in verband gebracht met prosociaal gedrag en sociale verbindingsprocessen. Bovendien blijken troostliederen opmerkelijk kalmerend en versterkend te werken. Dit zou luisteraars ten goede kunnen komen bij het omgaan met stress. Deze bevindingen kunnen nuttig zijn op het gebied van stemmingsregulatie via muziek en het algemene begrip van troost.

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