



## Effects of emotion regulation strategies on music-elicited emotions: An experimental study explaining individual differences



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### ABSTRACT

This experimental study examined if emotional experience can be manipulated by applying an emotion regulation strategy during music listening and if individual differences in effects of strategies can be explained by person characteristics. Adults ( $N = 466$ ) completed questionnaires and rated emotions. They were randomly assigned to a condition, in which they applied an emotion regulation strategy (suppression, enhancement, neutral) when listening to a music fragment. Next, participants rated emotions again. MANCOVA showed that individuals who applied enhancement experienced the strongest increase in emotion intensity. Age, neuroticism, extraversion, and positive trait affect predicted individual differences in effects of enhancement and suppression, e.g., especially more neurotic and introverted individuals experienced increased emotion intensity when applying enhancement. This study shows that emotional experience can be intensified by music listening, which can be facilitated by applying enhancement. Applying an emotion regulation strategy during music listening seems especially effective when it matches person characteristics.

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Individuals can apply regulatory strategies to modify their experience of emotions (Gross, 1998). Two strategies are suppression of emotion experience and enhancement of emotion experience. Suppression refers to the down-regulation of feelings, that is, not allowing yourself to experience the focal emotion, which requires self-regulatory resources (Hofmann, Rauch, & Gawronski, 2007); enhancement refers to the up-regulation or accentuation of feelings, that is, giving in to emotions (Webb, Miles, & Sheeran, 2012). There is evidence that emotion regulation strategies serve multiple functions, including the satisfaction of hedonic needs, facilitation of specific goals and tasks, and optimization of personality functioning (Koole, 2009). The outcomes of emotion regulation strategies likely depend on their functions. For example, hedonic needs are met when positive emotions are high and negative emotions low, whereas for goal or task fulfillment, negative emotions could help complete tasks (Tamir, 2005).

An important reason why people listen to music is the ability of music to express, trigger, and evoke emotions, used to fulfill hedonic needs, to reduce stress, and to regulate one's own mood, motivation, and arousal (Juslin & Laukka, 2004; Loizou, Karageorghis, & Bishop, 2014; Randall, Rickard, & Vella-Brodrick, 2014). For example, within the domain of sport and exercise psychology studies have shown that pre-task music can optimize arousal, facilitate task-relevant imagery,

and improve performance in exercisers, and that music during repetitive endurance tasks (e.g., running) can enhance affect, reduce perceived exertion, and improve energy efficiency and work output (Karageorghis & Priest, 2012). Research indicates that the amount of music listening, but not playing an instrument, is related to a larger use of music for emotion regulation purposes (Saarikallio, Nieminen, & Brattico, 2013).

Individuals can influence mood regulating functions of music by applying emotion regulation strategies when listening to music. Little is known about the effects of the emotion regulation strategies suppression and enhancement of emotion experience during music listening. Suppression or enhancement of emotions may serve hedonic functions, when listening to music in attempts to reduce negative feelings and/or increase positive feelings. Enhancement could also be used to vent both positive and negative emotions, to reduce stress or facilitate tasks. In their study on suppression and enhancement during music listening, Randall et al. (2014) demonstrated that when participants were in an initial negative mood, both suppression and enhancement significantly decreased negative emotions. In contrast, when participants were in a positive mood, the use of suppression of emotion experience when listening to music significantly decreased positive emotions, whereas enhancement of emotion experience had no effect. Some other studies used experimental designs to examine the effects of emotion regulation with other emotional stimuli. For example, suppression has been found effective in attenuating emotional experience when applied while watching negative affective pictures (Ohira et al., 2006). Another study, however, revealed no differences in emotional experience

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between participants instructed to suppress emotion experience and those in a control condition (Hofmann et al., 2007).

Individual differences in effects of emotion regulation strategies on felt emotions during music listening might at least partially be explained by person characteristics, such as age, sex, and personality characteristics. For example, according to the socioemotional selectivity theory, motivational goals change across the lifespan, with an increasing value placed on positive emotional experience (Carstensen & Mikels, 2005). Indeed, older adults - more than younger adults - have been found to turn on happy music when in a bad mood or to use music to decrease loneliness (Groarke & Hogan, 2015). At the same time, however, they were less able to reduce emotional intensity when instructed to suppress negative emotion expression, and also younger people emphasized using music to regulate affect (Groarke & Hogan, 2015; Viellard, Harm, & Bigand, 2015). The emotion literature additionally reveals sex differences in music-related emotion regulation. Men reported they listened to music especially for revival and distraction and showed stronger dislike of their disliked music than women (Saarikallio et al., 2013). Sex differences in effects of emotion regulation strategies on emotional experience in the context of music-elicited emotions are still unexplored.

Another important source of individual differences in music-related emotion regulation can be personality, and neuroticism and extraversion in particular, as they have been consistently linked to the experience of negative and positive emotions, respectively (Larsen & Ketelaar, 1991). Individuals higher on neuroticism have been found to listen to aggressive or sad music to express negative feelings (Carlson et al., 2015). Individuals higher on extraversion more actively modulated emotions and individuals who are open to new experience tend to be flexible and may appreciate their own emotional experiences (John & Gross, 2007). Some support for personality-congruent biases in the recognition of musical emotions has been found, although findings are inconsistent (Taruffi, Allen, Downing, & Heaton, 2017; Vuoskoski & Eerola, 2011). Related to personality is the concept of trait affect intensity. Specifically, participants high on trait negative affect have been found to experience an increase in negative emotions when attempting to suppress their emotions while writing about a distressing personal memory (Dalgleish, Yiend, Schweizer, & Dunn, 2009). In line with the ironic process theory, this might be because efforts to suppress a thought paradoxically increase unwanted thoughts, particularly under demanding conditions, requiring resources which could otherwise be used for suppression (Wegner & Erber, 1992).

In the current study, we aim to disentangle the role of emotion regulation in the link between music-elicited emotions and emotional experience. First, we examined if we can manipulate the way a well-known music fragment affects individuals' emotional experience (i.e., positive, negative and intensity) by giving individuals the instruction to apply a certain emotion regulation strategy when listening to the music fragment (i.e., suppression, enhancement vs. neutral). We hypothesized that participants who applied suppression of emotion experience would experience no change in emotion intensity and that participants who applied enhancement of emotion experience would experience increased emotion intensity. Because the music fragment elicits no particular positive or negative emotions (see procedure), we explored effects on experienced positive and negative emotions.

Second, we evaluated individual differences in the effects of suppression and enhancement. Enhancement was expected to result in a stronger increase in positive emotions in individuals scoring high on extraversion and a stronger increase in negative emotions in individuals scoring high on neuroticism, consistent with their general tendencies to experience emotions (Larsen & Ketelaar, 1991). Suppression was expected to result in an increase in negative emotions in individuals with high negative trait affect intensity because of the lack of resources left for suppression (Dalgleish et al., 2009; Wegner & Erber, 1992). Because of the paucity of studies on the effects of suppression and enhancement of emotion experience on music-elicited emotions the other associations with person characteristics were explored.

## 1. Methods

### 1.1 Participants and procedure

Participants were recruited through the website and social media advertisements of the Dutch National NPO Radio 2 Top 2000 (popular music), a major radio event at the end of the year (late November 2015 until early January 2016). Of the total sample of 899 adult participants, 389 participants did not participate in the experiment and another 44 participants were excluded because they reported not having paid attention to the music fragment. This left 466 participants (253 women,  $M_{age} = 38.24$ ,  $SD_{age} = 14.17$  years, age range 18–71 years). The sample was highly educated, with 54.7% of the participants having completed higher vocational or university education.

Participants completed an internet survey and participated in the experiment in their own time. After the internet survey, including questionnaires on trait characteristics, participants were asked to rate how they felt at that specific moment. Subsequently, they listened to a fragment of Led Zeppelin's song "Stairway to heaven." The song has been in the top 5 of the Top 2000 since 1999 and is therefore considered to be familiar and meaningful to most participants. It has been described as possibly very emotionally salient to individuals, but perhaps strongly positively experienced by some individuals and strongly negatively by others (Berenbaum & Boden, 2014).

To check whether the music fragment was emotionally salient, both in a positive and negative sense, we asked participants to rate on a 7-point Likert scale (1 = *not at all* and 7 = *very much*) to what extent different musically induced emotions pertain to the song, by using an adapted Dutch short 14-item version of the Geneva Emotional Music Scale (GEMS; Zentner, Grandjean, & Scherer, 2008), used in prior research (Hanser, ter Bogt, Van den Tol, Mark, & Vingerhoets, 2016). The measured musically induced emotions indeed showed variation in responses (filled with wonder  $M = 3.06$ ,  $SD = 1.48$ ; transcendence  $M = 2.71$ ,  $SD = 1.35$ ; beauty  $M = 3.45$ ,  $SD = 1.59$ ; fascinated  $M = 3.42$ ,  $SD = 1.67$ ; tenderness  $M = 3.00$ ,  $SD = 1.42$ ; nostalgic  $M = 3.91$ ,  $SD = 1.69$ ; peaceful  $M = 3.36$ ,  $SD = 1.36$ ; powerful  $M = 3.62$ ,  $SD = 1.62$ ; energized  $M = 3.24$ ,  $SD = 1.53$ ; joyful activation  $M = 2.21$ ,  $SD = 1.16$ ; tense  $M = 1.74$ ,  $SD = 0.85$ ; sad  $M = 2.64$ ,  $SD = 1.33$ ; moved  $M = 3.14$ ,  $SD = 1.54$ ; bored  $M = 1.67$ ,  $SD = 1.15$ ).

Participants were randomly assigned to one out of three conditions: neutral, suppression of emotion experience (listening in a matter-of-fact manner, not paying attention to anything raised by the song) and enhancement of emotion experience (listening while giving in to the music and feel everything induced by the song). After listening to the fragment, participants again rated how they felt at that particular moment, as well as some control questions (e.g., whether they listened attentively, whether they liked the song). The psychological ethics committee gave ethical approval.

## 2. Measures

### 2.1 Felt emotions before and after music listening

Participants indicated how they felt by rating a list of 16 emotion terms on a 9-point Likert scale (Ekman, 1992), commonly used in experimental research on effects of emotion elicitation (e.g., Gross & Levenson, 1997; Soto, Levenson, & Ebling, 2005). Based on principal component analysis of the emotion scores before the music fragment using the oblique rotation method, two scales were constructed: positive emotions (amusement, contentment, happiness, interest) and negative emotions (anger, confusion, contempt, disgust, embarrassment, fear, pain, sadness, tension). The two scales explained 56.6% of the variance in emotions; factor loadings were above 0.66. Internal consistency of these scales was good, positive emotions  $\alpha = 0.84$  and negative emotions  $\alpha = 0.90$ . The emotions arousal, surprise, and relief were excluded, because they did not refer to specific positive or negative emotions.

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