The role of coping in emotional eating and the use of music for discharge when feeling stressed

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A B S T R A C T

The use of music for discharge (for releasing anger or sadness through music that expresses these same emotions) is a commonly used strategy for people who engage in emotional eating (EE; eating to cope with stress). It is unknown, however, if this is a good alternative to EE. Emotional and avoidance coping strategies have been found in past research to relate to worse mental health, but are also likely associated with both EE and discharge when coping with stress. Therefore, it was predicted that the links between stress and EE, stress and the usage of music for discharging emotion, and EE and using music for discharge, would be at least partially mediated by these coping styles. The results of self-reported, cross-sectional, data from 570 adults indicated that the relationship between EE and the usage of music for discharge was fully mediated by higher levels of emotion-oriented coping. The relationships between stress and EE and between stress and music for discharge was partially mediated by emotion-oriented coping. None of these relationships were explained by avoidance coping, however. This suggests that using music for discharge and EE share a common relationship with using emotions to cope. Potential implications for reducing EE and future research directions are discussed.

Introduction

Emotional eating (EE) can be defined as 'the tendency to overeat in response to negative emotions such as anxiety or irritability' (Van Strien et al., 2007). Although EE may be a symptom of some eating disorder diagnoses in the DSM-5 and the ICD 10, such as Bulimia Nervosa and Binge Eating Disorder (American Psychiatric Association, 2013), it is a specific behaviour rather than a clinical diagnosis and can exist along a continuum of severity (Van Strien, Frijters, Bergers, & Defares, 1986, 2007). EE is associated with consumption of highly palatable (high in fat, sugar and salt and low in nutritional value) snack foods (e.g. Van Strien et al., 2013) and is more common in individuals when stressed (e.g. Bennett, Greene, & Schwartz-Barcott, 2013; Greeno & Wing, 1994; Nguyen-Rodriguez, Chou, Unger, & Spruijt-Metz, 2008). Empirical evidence indicates that the consumption of highly palatable foods protects against stress by suppressing the hypothalamic–pituitary–adrenal axis response (Gibson, 2012). However, activation of the hypothalamic– pituitary–adrenal axis may itself drive appetite for these foods in the long term (Gibson, 2012). EE is regarded as a maladaptive strategy to regulate affect, as it does not address the reason behind the negative emotions, leading to repeated EE episodes (Spoor, Bekker, Van Strien, & Van Heck, 2007). In other words, EE may be caused by stress but could also lead to stress in the long term. As it is not so much the emotional state itself, but how that state is dealt with, that affects eating behaviours (Evers, Stok, & De Ridder, 2010) it may be particularly important for those people engaging in EE to learn to use alternative approaches to relieve their stress.

Music has been acknowledged as a versatile and effective tool to regulate emotions in a variety of studies (e.g. Saarikallio & Erkkilä, 2007; Sloboda, Lamont, & Greasley, 2009). The use of music for mood-regulation is common, consciously or unconsciously, for regulating negative affect and stress (Randall & Rickard, 2016; Thomson, Reece, & Di Benedetto, 2014; Van Goethem & Sloboda, 2011). Getz, Marks, and Roy, (2014) found that increased stress levels predicted emotional music use. Moreover, Chin and Rickard (2013) investigated the association between the use of different music listening strategies (for a description of each, see Saarikallio, 2008) and stress. They found that young people who frequently use discharge (the use of music for releasing anger or sadness, venting, similar to 'blowing off steam', through music that expresses these same emotions), but not strong sensation (inducing and strengthening intense emotional experiences) or entertainment (creating a nice atmosphere and happy feeling to maintain or enhance current positive mood and feeling), are likely to experience more stress symptomology.

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Recent research (Van den Tol, Coulthard, & Hanser, 2018) investigated the association between the use of different music listening strategies, EE and symptoms of stress (as well as anxiety and depression). It was found that the use of music for discharge was positively associated with EE, and both EE and the use of music for discharge were positively associated with stress. In other words, using music for discharge and EE are associated to each other and both used in stressful situations, meaning that individuals who use music for discharge may also engage in EE. It is however not yet clear if using music in this way is a better alternative to EE when feeling stressed in terms of mental health.

The aim of the current research was to test several hypotheses which may potentially explain the previously found (Van den Tol et al., 2018) associations between using music for discharge and EE. This aim will be facilitated by testing the potential role of two commonly used coping strategies used in stressful situations - avoidant and emotion-focused coping - in the associations between; stress and EE, stress and the use of music discharge, and EE and the use of music for discharge. This research will be important to help therapists understand if replacing EE with the use of music for discharge may have potential negative psychological effects, due to being associated with coping mechanisms which have found to be present before the onset of mental health problems (e.g. Berking et al., 2012).

Coping, emotion regulation and wellbeing

Coping is a construct referring to efforts to deal with negative life events and the subsequent negative affect (e.g. Endler & Parker, 1990; Haan, 1997; Lazarus & Folkman, 1984). The best course of action when dealing with any stressful situation depends to a great extent on the characteristic of the situation, and a person's own characteristics and personal resources (Kirby, Shakespeare-Finch, & Palk, 2011; Lazarus & Folkman, 1984). For example, avoidance strategies prevent the cognitive processing of stimuli. This can be effective in the short-term when dealing with stress when a situation cannot be changed, or when a person simply does not have the resources to deal with it. However, this strategy may lead to worse life circumstances in the long term and hence increase stress, when people use it in a situation where they could have used behavioural coping for improving their situation (Carver & Scheier, 1998; Holahan, Moos, Holahan, Brennan, & Schutte, 2005; Sheppes & Gross, 2011).

Mental health has commonly been found to be associated with greater usage of particular coping and affect-regulation strategies (e.g. Berking et al., 2012; McWilliams, Cox, & Enns, 2003; Skinner, Edge, Altman, & Sherwood, 2003). This means that finding out how people's common use of certain coping strategies to deal with stress relate to their engagement in EE and use of music for discharge, may provide us with insights on potential short and long term effects of the engagement in such behaviours.

Research has identified many different coping strategies, and taxonomies in which to organise these (Endler & Parker, 1999). For the current research we will focus on a taxonomy of coping that is commonly used to organise people's responses to stress. Endler and Parker (1994) investigated people's use of coping by dividing their responses into three overarching different coping strategies which are (Endler & Parker, 1994). Task-oriented coping strategies involve addressing and dealing with a stressor. Emotion-oriented coping strategies involve elevating negative emotions associated with the stressor. Avoidance coping strategies involving avoiding stress or aversive emotions by engaging in a substitute task (also known as avoidant-distraction) or via social diversion.

A tendency to lean more towards using task-oriented coping strategies has been associated with better mental wellbeing (Endler & Parker, 1990; Sasaki & Yamasaki, 2007) but a tendency to lean more towards using emotion-oriented coping strategies has been associated with psychological distress (Endler & Parker, 1994; Pritchard, Wilson, & Yamnitz, 2007; Silk, Steinberg, & Morris, 2003). Avoidant strategies relate to wellbeing and psychological distress, with avoidant-coping by social diversion relating more to wellbeing (Sasaki & Yamasaki, 2007) and avoidant-distraction coping strategies relating more to psychological distress (Endler & Parker, 1994; Pritchard et al., 2007; Silk et al., 2003).

Stress, coping and EE

Evers et al. (2010) theorised that it is the way in which negative emotions are regulated which affects food intake rather than negative emotions per se. This was based on their research in which a higher intake of palateable food was found among participants who indicated a common use of the response-focused emotion regulation strategie of 'suppression' when compared to participants who indicated a common use of the antecedent-focused emotion regulation strategie of 'cognitive-reappraisal'. Most theories share the assumption that EE is caused by peoples' inability to regulate effectively, with EE being an easy access strategy (Nguyen-Rodriguez et al., 2008) for distraction from (avoidant-distraction) or improvement of (emotion-oriented) negative affect. It has also been found that people who engage in EE show general patterns of emotion dysregulation, the need to escape from negative affect and rumination (Gibson, 2012). Moreover, stress related to interpersonal problems is a prominent predictor of disturbed eating behavior (Tanofsky-Kraff et al., 2007) as interpersonal problems elicit negative affect, which trigger disturbed eating behaviour (Wilfley, 1997). Whereas, Van Strien, Engels, Leeuwe, and Snoek, (2005) found that in eating-disordered women, the relationship between negative affect and EE was mediated by a lack of interoceptive awareness. In other words, people's ability to cope with stress seems to directly influence their eating behavior. With suppression and lack of introspection being an important predictor of EE, there might be a potential for music to reduce EE, as music can be used for introspection and being in touch with feelings of sadness (Van den Tol & Edwards, 2015; Van den Tol, 2016).

To our knowledge no research has directly investigated the role of coping in the association between stress symptomology (as measured in the DASS) and EE. However, negative affect has been associated with enhanced levels of emotion-oriented coping and avoidant forms of coping (Billings & Moos, 1984; McWilliams et al., 2003; Turner, Ersek, & Kemp, 2005). Spoor et al. (2007) found that reliance on emotion-oriented and avoidant-distraction coping was related to higher levels of EE. They also found that a sample of women who were outpatients in treatment for an eating-disorder reported higher levels of negative affect, EE, emotion-oriented coping, and avoidance distraction, and lower levels of task-oriented coping and avoidance via social diversion compared to a community sample. It may then be expected that both emotionally-oriented and avoidance coping strategies can partly explain the association between EE and stress symptomology.

Stress, coping, and the use of music for discharge

Saarikallio (2008) found that when music is used for regulating mood, it is more likely to be used for the antecedent-focused strategy of cognitive reappraisal than for the response-focused strategy of suppression. The frequent use of music for discharge, however, was associated to depression, anxiety and stress symptomology in two different cross-sectional studies (Chin & Rickard, 2013; Thomson et al., 2014) which may be unsurprising as discharge allows negative emotions to be vented. It must be noted though, as Thomson et al. (2014) recognised, that music use may well be employed to reduce the negative emotional states rather than cause them. Carlson et al. (2015) additionally reported a weak association between the use of music for discharge, and anxiety and neuroticism, but did not measure stress in their research. Chin and Rickard (2013) also found that discharge was associated with suppression. These findings suggest that greater amounts of music listening, if coupled with a tendency to regulate emotions with the use of

discharge or by suppression (a strategy bearing similarities to avoidance), may have undesirable wellbeing outcomes.

Miranda and Claes (2009) reported that recurrent avoidance coping and emotion-oriented coping by music listening were related to higher depression, while problem-oriented coping with music was associated with higher wellbeing, but using music in an emotion-focused or avoidant style to cope with stress was associated with poorer wellbeing. As depression is related to stress (Van den Tol et al., 2018), and based on earlier findings that suggest music boosts affect through active coping and distraction, similar to task-oriented and avoidant-distraction coping (Van Goethem & Sloboda, 2011), it is expected that both avoidance and emotionally-oriented coping strategies can partly explain the association between discharge and stress symptomology.

EE, the use of music for discharge and coping

As indicated above, based on previous research it is expected that the association of stress with EE and discharge with stress can at least partly be explained by avoidant coping and emotion-oriented coping. Although no research has been done investigating the overlap between EE and discharge specifically, the strong association between both can probably also be explained by individuals who engage in one or the other being more inclined to use emotion-oriented and avoidant coping strategies in situations of stress and negative emotion. Thus, we expected that the association between EE and discharge can partly be explained by both behaviours having elements of emotion-oriented and avoidance coping.

Hypotheses

Three hypotheses were proposed, with the third hypothesis being the focal point of this research.

The association between stress and EE can be (partially) explained by both avoidance and emotion-oriented coping, but not by task-oriented coping.

The association between stress and discharge can be (partially) explained by both avoidance and emotion-oriented coping, but not by task-oriented coping.

The association between discharge and EE can be (partially) explained by both avoidance and emotion-oriented coping but not, by task-oriented coping.

Method

Participants

Eight hundred participants were recruited, using opportunity sampling from De Montfort University campus (Leicester, the UK), and online through social media websites via a short advertisement and link to the questionnaire. Participants were required to use English as a main language to ensure item comprehension, and to be at least 18 years of age, but this study did not have any other inclusion or exclusion criteria (i.e. the study did not require participants to identify as emotional eaters, or to commonly listen to music). Two hundred and thirty participants were excluded due to not meeting inclusion criterion (English as a first language), withdrawal, incomplete data, or being an extreme outlier in terms of BMI (BMI > 70). The final sample consisted of 570 participants (see Table 1 for more descriptive statistics), comprised of 188 males (33%), 375 females (65.8%) and 7 participants who preferred not to disclose their sex (1.2%), with a mean age ($N = 569$, 18–65) 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). BMI average ($N = 557$) was calculated to be 23.92

($SD = 5.46$, ranging from 15.05 to 58.00).[1] We did not collect data on participants' nationality. However, we know that De Montfort University (from which most participants were gathered) 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.[2]

Design

The research involved an online survey with several Likert scales. The study had a cross-sectional, correlational design.

Materials

The Dutch eating behaviour questionnaire

EE was measured with the English version (Wardle, 1987) of the 13-item Emotional Eating subscale of the Dutch Eating Behaviour 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 from 1 (*Never*) to 5 (*Very Often*). Cronbach's alpha for the sub-scale was good at 0.91 in the current sample (See Table 1 for mean scores as total and divided by gender across all scales).

Music in mood regulation scale

The use of music for discharge was measured along several other music listening strategies (which allowed us to control for other music listening strategies in statistical analyses) with the 40 item Music in Mood Regulation scale (MMR; Saarikallio, 2008). Items are rated on a 5-point Likert scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The following sub-scales are included in this scale: (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 0.95 in the current sample, and reliability ranges from 0.78 to 0.86 for each sub-scale.

Coping inventory for stressful situations

Emotion-oriented coping, task-oriented coping, and avoidance coping were measured using the 21-item Coping Inventory for Stressful Situations (CISS-21; Endler & Parker, 1999). The shortened 21-item version is more participant friendly than the original 48-item scale, consisting of the most reliable items from the original. The 7-item subscales are two of three measuring participant's responses to stressful situations; all 7 items were included in the sub-scales on emotional-oriented eating and task-oriented eating, but two of the items (item 4 and 18) on the avoidant-coping scale had to be removed due to these items being specifically about using eating to cope with problems, this resulted in a 5-item subscale on avoidant coping. Statements were answered on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*). Scores were obtained by summing items on each subscale. Research has shown that the original subscales have high internal consistency (Cohan, Jang, & Stein, 2006; Fournier, De Ridder, & Bensing, 2002). The sub-scales' Cronbach's alpha in the current sample were 0.81 for emotion-oriented coping, .58 for avoidance coping, and 0.71 for task-oriented coping.

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[1] Please note that not all participants answered all questions, which resulted in a different number of participants for several statistics. We have indicated the amount of participant on which each statistic is based behind the '*N*=' symbol.

[2] This data was part of a data set that has been used in previous publications (Van den Tol et al., 2018).

Table 1
Descriptive sample statistics and MANOVA outcomes for testing gender differences.

	All participants Mean (SD)	MANOVA statistics				
		Males Mean (SD)	Females Mean (SD)	Mean Difference	p	Partial η2
Age	23.19 (4.87)	23.38 (4.36)	23.02 (5.15)	.36	.41	.001
BMI	23.92 (5.46)	24.55 (4.58)*	23.57 (5.81)	.98	.05	.007
EE	2.50 (.80)	2.23 (.72)*	2.64 (.82)	.40	.000	.06
Discharge	2.77 (.91)	2.65 (.89)*	2.82 (.91)	.17	.04	.04
E-C	3.13 (.87)	2.79 (.83)*	3.30 (.85)	.51	.000	.08
A-C	2.82 (.83)	2.63 (.83)*	2.91 (.82)	.27	.000	.02
T-C	3.18 (.69)	3.34 (.66)*	3.09 (.69)	.25	.000	.03
Stress	1.92 (.72)	1.74 (.59)*	2.01 (.75)	.27	.000	.03

Notes: Please note that statistics for 'all participants' in this table also include the 7 participants who did not indicate a gender (rather than the MANOVA total). The statistics for 'Males' and 'Females' are representing the MANOVA statistics, meaning that they are based on those 550 participants (185 men, 365 women) who filled in all questions.

E-C refers to emotion-oriented coping, A-C refers to avoidant coping, and T-C refers to task-oriented coping. * denotes a significant gender difference at $p < .05$. Discharge items are rated from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Stress items are rated from 1 (*did not apply at all*) to 4 (*applied very much, or most of the time*), but please note that these items are traditionally rated on a 0 to 3 scale. Coping sub-scale items are rated from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Stress

Stress was measured using the 14-item stress (e.g., *I was in a state of nervous tension*) subscale of the 42-item Depression, Anxiety, and Stress Scales (DASS; Lovibond & Lovibond, 1995). For each item participants rated the extent to which they experienced negative emotional symptoms over the past week on a 4-point severity/frequency scale from 1 (*did not apply at all*) to 4 (*applied very much, or most of the time*). All subscales on the DASS have well-established psychometric properties in community samples (Bayram & Bilgel, 2008). The stress sub-scales' Cronbach's alpha in the current sample was 0.96.

Procedure

Participants were recruited online and through opportunity sampling by four researchers. The online survey software 'www.Qualtrics. com' was utilised to collect data online from participants. Ethical guidelines set out by the British Psychological Society (2013); British Psychological Society, 2014) were adhered to throughout the research process, and ethical approval was granted by the Faculty of Health and Life Sciences Ethics Committee at De Montfort University.

Data analyses

Data analyses were completed using IBM SPSS 22 with a Process add-on (Hayes, 2013) used for moderation and mediation analyses. Normality tests indicated that several variables were not normally distributed, therefore 1000 bootstrapped corrected confidence intervals (95%) were used for all regression analysis in the result section.

Previous research suggested the possibility of age, gender and BMI differences in EE, music listening, and coping strategies (Carlson et al., 2015; Larsen, Van Strien, Eisinga, & Engels, 2007; Thomson et al., 2014), while music listening strategies have also been related to each other and to EE (Van den Tol et al., 2018). A MANOVA did indeed reveal a significant difference for gender (Wilks'∧ = 0.84, *F*(8, 541) = 12.613, *p* < .001, partial η² = .16, medium effect size). Post-hoc tests (see Table 1) revealed a gender difference for BMI, EE, stress, avoidance coping, emotional coping, task-oriented coping and discharge. Correlational analysis (see Table 2 for statistics) indicated that BMI and some of the music in mood regulation strategies were associated with EE. Moreover, age and all music in mood regulation strategies were associated with discharge. Age, gender, BMI, and all music in mood regulation strategies, were therefore considered as co-variates in all main analyses.[3]

To find out if further analysis was justified (Barron & Kenny, 1986) and relationships between stress, EE and discharge did indeed exist, and could potentially be (partly) explained by coping style, we also explored associations between stress, EE and discharge. It was found (see Table 2) that stress, EE and discharge were indeed associated with each other. Stress, EE and discharge were additionally all associated to emotion-oriented coping and avoidance coping, but not to task-oriented coping. Task-oriented coping was therefore not included as a mediator in any of the further analyses.

In order to test if the association between stress and EE, and stress and discharge can be explained by avoidance and emotion-oriented coping, we run Process model 4 (Preacher & Hayes, 2004, 2008)[4] with 1000 bias-corrected and accelerated bootstraps. Six different variations of this model were run. Either emotion-oriented coping, or avoidant coping was included as the third variable (M) in each of these models. In the first two models (Tables 3 and 4) stress was the predictor variable (Y) and EE was the outcome variable (Y). In the following two models (Tables 5 and 6) stress was the predictor variable (X) and discharge was the outcome variable (Y). In the final two models (Tables 7 and 8) discharge was the predictor variable (X) and EE was the outcome variable (Y).[5] All models controlled for age, BMI, gender, and all music in mood regulation strategies.[6]

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[3] Please note that the same variables would need to be controlled for when

Table 2
Zero-order correlations between all variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age													
2. BMI	.15**												
3. EE	−.05	.17***											
4. Discharge	−.13**	.01	.15***										
5. E-C	−.09*	−.02	.26***	.22***									
6. A-C	−.07	−.02	.13**	.10*	.26***								
7. T-C	−.04	.05	−.05	−.06	.06	.22***							
8. Stress	−.05	.08	.27***	.30***	.53***	.11**	−0.08						
9. Entertainment	−.18***	.02	.10*	.31***	.06	.10*	.17***	.06					
10. S-S	−.08*	.04	.05	.36***	.10*	.03	.19***	.16***	.50***				
11. Revival	−.14**	.04	.03	.41**	0.01	.03	.14**	.01	.57***	.57***			
12. Diversion	−.11**	.07	.10*	.42***	.05	.12**	.10*	.12**	.52***	.51***	.69***		
13. Mental Work	−.12**	.05	.09*	.51***	.12**	.09*	.15***	.21***	.50***	.68***	.58***	.59***	
14. Solace	−.15***	.02	.11*	.55**	.09*	.08	.11*	.17***	.47***	.64***	.66***	.71***	.75***

Notes: S-S refers to strong-sensation, E-C refers to emotion-oriented coping, A-C refers to avoidant coping, and T-C refers to task-oriented coping. * denotes a significant difference at $p < .05$. ** denotes a significant difference at $p < .01$. *** denotes a significant difference at $p < .001$. Music in mood regulation items are rated from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Stress items are rated from 1 (*did not apply at all*) to 4 (*applied very much, or most of the time*), but please note that these items are traditionally rated on a 0 to 3 scale. Coping sub-scale items are rated from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Table 3
The association between stress and emotional eating explained in terms of emotion-oriented coping.

IV: stress	B	SE for B	t	p	95%LLCI for B	95%LLCI for B
Total effect	0.27	0.05	5.78	0.0000	0.18	0.36
Direct effect	0.16	0.05	2.92	0.0037	0.05	0.26
Indirect effect of E_C	0.09	0.03			0.03	0.15
Model summary	$F(11,545) = 9.52$, $R^2 = .16$, $MSE = .56$, $p = .0000$					

Note: E-C refers to emotion-oriented coping. B refers to the Unstandardized Beta coefficient. SE refers to the standard error of B. *t* refers to Unstandardized Beta coefficient divided by its own standard error. *p* refers to the 2-tailed significance levels. 95%LLCC refers to Lower Level Confidence Interval of the Beta value at 95 percent. 95%ULCC refers to Lower Level Confidence Intervals of the Beta value at 95 percent. *F* refers to the *F*-ratio of the overall model. R^2 refers to the effect size of the overall model. *MSE* refers to Mean Squared Error of the overall model.

Table 4
The association between stress and emotional eating explained in terms of avoidant coping.

IV: stress	B	SE for B	t	p	95%LLCI for B	95%LLCI for B
Total effect	0.27	0.05	5.78	0.0000	0.18	0.36
Direct effect	0.24	0.05	5.15	0.0000	0.15	0.33
Indirect effect of A-C	0.01	0.01			−.002	0.02
Model summary	$F(11,545) = 8.74$, $R^2 = .15$, $MSE = .57$, $p = .0000$					

Note: A–C refers to avoidance coping. B refers to the Unstandardized Beta coefficient. SE refers to the standard error of B. *t* refers to Unstandardized Beta coefficient divided by its own standard error. *p* refers to the 2-tailed significance levels. 95%LLCC refers to Lower Level Confidence Interval of the Beta value at 95 percent. 95%ULCC refers to Lower Level Confidence Intervals of the Beta value at 95 percent. *F* refers to the *F*-ratio of the overall model. R^2 refers to the effect size of the overall model. *MSE* refers to Mean Squared Error of the overall model.

Table 5
The association between stress and discharge explained in terms of emotion-oriented coping.

IV: stress	B	SE for B	t	p	95%LLCI for B	95%LLCI for B
Total effect	0.27	0.05	5.78	0.0000	0.17	0.36
Direct effect	0.21	0.05	3.98	0.0001	0.11	0.32
Indirect effect of E-C	0.06	0.03			0.002	0.11
Model summary	$F(11,545) = 28.79$, $R^2 = .37$, $MSE = .54$, $p = .0000$					

Note: E-C refers to emotion-oriented coping. B refers to the Unstandardized Beta coefficient. SE refers to the standard error of B. *t* refers to Unstandardized Beta coefficient divided by its own standard error. *p* refers to the 2-tailed significance levels. 95%LLCC refers to Lower Level Confidence Interval of the Beta value at 95 percent. 95%ULCC refers to Lower Level Confidence Intervals of the Beta value at 95 percent. *F* refers to the *F*-ratio of the overall model. R^2 refers to the effect size of the overall model. *MSE* refers to Mean Squared Error of the overall model.

Table 6
The association between stress and discharge explained in terms of avoidant coping.

IV: stress	B	SE for B	t	p	95%LLCI for B	95%LLCI for B
Total effect	0.27	0.05	5.78	0.0000	0.17	0.36
Direct effect	0.26	0.05	5.68	0.0000	0.17	0.35
Indirect effect of A-C	0.003	0.01			0.006	0.01
Model summary	$F(11,545) = 28.23$, $R^2 = .36$, $MSE = .54$, $p = .0000$					

Note: A–C refers to avoidance coping. B refers to the Unstandardized Beta coefficient. SE refers to the standard error of B. *t* refers to Unstandardized Beta coefficient divided by its own standard error. *p* refers to the 2-tailed significance levels. 95%LLCC refers to Lower Level Confidence Interval of the Beta value at 95 percent. 95%ULCC refers to Lower Level Confidence Intervals of the Beta value at 95 percent. *F* refers to the *F*-ratio of the overall model. R^2 refers to the effect size of the overall model. *MSE* refers to Mean Squared Error of the overall model.

Results

Stress EE

The first hypothesis of this research was that '*The association between stress and EE can be (partly) explained by both avoidance and emotion-oriented coping, but not by task-oriented coping.*'. As can be seen in Table 3

(footnote continued)

(justifying the presence of all co-variates in each variation of this model). Moreover, the predictive value of all models was higher when coping strategies were included as a mediating third variable compared to when they were not.

Table 7
The association between discharge and EE explained in terms of emotion-oriented coping.

	B	SE for B	t	p	95%LLCI for B	95%ULCI for B
Total effect	0.10	0.04	2.38	0.02	0.02	0.19
Direct effect	0.06	0.04	1.41	0.16	−0.02	0.15
Indirect effect of E-C	0.04	0.01			0.02	0.07
Model summary	$F(11,545) = 8.83$, $R^2 = .15$, $MSE = .57$, $p = .0000$					

Note: E-C refers to emotion-oriented coping. B refers to the Unstandardized Beta coefficient. SE refers to the standard error of B. *t* refers to Unstandardized Beta coefficient divided by its own standard error. *p* refers to the 2-tailed significance levels. 95%LLCC refers to Lower Level Confidence Interval of the Beta value at 95 percent. 95%ULCC refers to Lower Level Confidence Intervals of the Beta value at 95 percent. *F* refers to the *F*-ratio of the overall model. R^2 refers to the effect size of the overall model. *MSE* refers to Mean Squared Error of the overall model.

Table 8
The association between discharge and EE explained in terms of avoidant coping.

	B	SE for B	t	P	95%LLCI for B	95%ULCI for B
Total effect	0.10	0.04	2.38	0.02	0.02	0.19
Direct effect	0.10	0.04	2.28	0.02	0.01	0.18
Indirect effect of A-C	0.00	0.00			−0.003	0.02
Model summary	$F(11,545) = 6.70$, $R^2 = .12$, $MSE = .59$, $p = .0000$					

Note: A–C refers to avoidance coping. B refers to the Unstandardized Beta coefficient. SE refers to the standard error of B. *t* refers to Unstandardized Beta coefficient divided by its own standard error. *p* refers to the 2-tailed significance levels. 95%LLCC refers to Lower Level Confidence Interval of the Beta value at 95 percent. 95%ULCC refers to Lower Level Confidence Intervals of the Beta value at 95 percent. *F* refers to the *F*-ratio of the overall model. R^2 refers to the effect size of the overall model. *MSE* refers to Mean Squared Error of the overall model.

which depicts the statistics for the model in which emotion-oriented coping is included as the mediator, the initial significant total effect ($B = 0.27$, $SE = 0.05$, 95% $CI = 0.18$, 0.36) which described the association between stress and EE stayed significant but diminished as a direct effect ($B = .16$, $SE = 0.05$, 95% $CI = 0.05$, 0.26) when taking into account the significant indirect effect of emotion-oriented coping ($B = .09$, $SE = 0.03$, 95% $CI = 0.03$, .15). This confirmed the part of our hypothesis in which emotion-oriented coping plays a role in explaining the association between stress and EE, however as the direct effect for this association stayed significant, emotion-oriented coping can only be assumed to partly explain this association. As can be seen in Table 4 which depicts the statistics for the model in which avoidance coping is included as the mediator, avoidance coping did not have an indirect effect on this association ($B = 0.01$, $SE = 0.01$, 95% CI = -0.002, .02). This means that we cannot confirm that avoidance coping additionally plays a role in explaining the association between stress and EE.

The model (Table 3) which explored the association between stress (DV) and EE (IV) with all covariates and emotion-oriented coping as mediator (M) yielded a medium effect size ($F(11,545) = 9.52$, $R^2 = .16$, $MSE = .56$, $p = 0.0000$). The same model in which avoidant coping was include as a mediator rather than emotion-oriented coping (Table 4) yielded a medium effect size as well ($F(11,545) = 8.74$, $R^2 = .15$, $MSE = .57$, $p = 0.0000$).

Stress and discharge

The second hypothesis of this research was that '*The association*

between stress and discharge can be (partly) explained by both avoidance and emotion-oriented coping, but not by task-oriented coping.'. As can be seen in Table 5 which depicts the statistics for the model in which emotion-oriented coping is included as the mediator, the initial significant total effect ($B = 0.27$, $SE = 0.05$, 95% $CI = 0.17$,.36) which described the association between stress and EE stayed significant but diminished as a direct effect ($B = .21$, $SE = 0.05$, 95% $CI = .11$, 0.32) when taking into account the significant indirect effect of emotion-oriented coping as a mediating variable ($B = .06$, $SE = 0.03$, 95% $CI = 0.002$, .11). This confirmed part of this hypothesis in which emotion-oriented coping plays a role in explaining this association, however as the direct effect was still significant, emotion-oriented coping can only be assumed to partly explain this association. As can be seen in Table 6 which depicts the statistics for the model in which avoidance coping is included as the mediating variable, avoidance coping cannot be assumed to have an indirect effect on this association as well ($B = 0.003$, $SE = 0.01$, 95% $CI = -0.006$, .01). This means that we cannot confirm avoidance coping to additionally play a role in explaining this association.

The model which predicted discharge (DV) based on stress as independent variables (IV) emotion-oriented coping as a mediator (M) and all covariates (Table 5) yielded a large effect size ($F(11.545) = 28.79$, $R^2 = .37$, $MSE = .54$, $p = 0.0000$). The same model in which avoidance coping was include as a mediator rather than emotion-oriented coping (Table 6) also yielded a large effect size ($F(11.545) = 28.23$, $R^2 = 0.36$, $MSE = .54$, $p = 0.0000$).

Discharge and EE

The third hypothesis of this research was that '*The association between discharge and EE can be (partly) explained by both avoidance and emotion-oriented coping, but not by task-oriented coping.*' As can be seen in Table 7 which depicts the statistics for the model in which emotion-oriented coping is included as the mediator, the initial significant total effect ($B = 0.10$, $SE = .04$, 95% $CI = 0.02$, 0.19) which described the relationship between stress and EE stayed significant but diminished as a direct effect ($B = .06$, $SE = .04$, 95% $CI = -0.02$, 0.15) when taking into account emotion-oriented coping as a significant indirect effect ($B = .04$, $SE = 0.01$, 95% $CI = 0.02$, .07). This confirmed the part of this hypothesis in which emotion-oriented coping plays a role in explaining this association. Moreover, as the remaining direct effect was not significant after taking out the role of emotion-oriented coping, emotion-oriented coping can be assumed to fully (rather than partly) explain this association. Indeed, as can be seen in Table 8 which depicts the statistics for the model in which avoidance coping is included as the mediator, avoidance coping did not have an indirect effect on this association ($B = 0.10$, $SE = .04$, 95% $CI = 0.01$, 0.18). This means that we could not additionally confirm avoidance coping to also play a role in explaining this association.

The model which predicted EE (DV) based on discharge as an independent variable (IV) emotion-oriented coping as a mediator (M) and all covariates (Table 7) yielded a medium effect size ($F(11,545) = 8.83$, $R^2 = .15$, $MSE = .57$, $p = 0.0000$). The same model in which avoidance coping was include as a mediator rather than emotion-oriented coping (Table 8) yielded a medium effect size ($F(11,545) = 6.70$, $R^2 = .12$, $MSE = .59$, $p = 0.0000$).

Discussion

The study explored if the associations between EE, music use for discharge, and stress can be explained by avoidance and emotion-oriented coping. The significant association found between EE and stress was partially mediated by emotion-oriented, but not by avoidance coping. This supports previous literature that demonstrates stress levels are related to disturbed eating behaviours (Tanofsky-Kraff et al., 2007), and that both negative affect (Turner et al., 2005) and EE are related to

a higher usage of emotion-oriented (Spoor et al., 2007). The significant association found between stress and music use for discharge was also partially mediated by emotion-oriented coping, but not by avoidance coping. This supports previous literature where high anxiety levels were related to music use for discharge (Carlson et al., 2015) and high emotion-oriented coping by music listening were related to higher levels of depression. The association found between music use for discharge and EE could fully be explained by emotion-oriented coping. This too supports our theorising that music and discharge are associated through coping strategies.

Implications

This research provides further evidence for the association between music listening for the use of discharge and EE being associated trough emotion-oriented coping. This has important implications for advising people who engage in EE to use music for this purpose as an alternative to EE (Hilliard, 2001). A more common use of emotion-oriented coping is found to be present before the onset of mental health problems in several different studies (Endler & Parker, 1994; Pritchard et al., 2007; Silk et al., 2003). As the link between stress and the use of discharge was additionally partly explained by this coping strategy only, one may consider the use of discharge when under stress to be an emotion-oriented coping strategy itself. Knowing this, practitioners should be careful in advising the use of music for discharge to replace EE urges as a common practice.

This does not mean that we generally advise against using music for discharge. More specific, music use may well be employed to reduce symptoms of stress rather than cause them when used under circumstances where emotion-oriented coping is appropriate. Research into music listening suggest that one reason why some associations exist with disordered mood might be because music listening can help one cope with negative events and negative mood (e.g. Getz et al., 2014; Saarikallio & Erkkilä, 2007; Thomson et al., 2014; Van den Tol & Edwards, 2013). For example, listening to self-selected music has been found to decrease state anxiety, improve a negative mood, and reduce stress, in experimental studies where participants were stressed (Baste & Gadkari, 2014; Getz et al., 2014; Labbé, Schmidt, Babin, & Pharr, 2007; Radstaak, Geurts, Brosschot, & Kompier, 2014). Moreover, when asked to recall reasons for listening to sad music when feeling sad, participants reported a variety of psychological advantages, including improved mood and acceptance of a negative situation (Van den Tol & Edwards, 2013; Van den Tol, Edwards, & Heflick, 2016). It is hence likely that when used under the right circumstances, music use for discharge, and music in general, can form a healthier alternative to EE in regulating emotions when feeling stressed.

We hope that ongoing research on this topic (see suggestions for future research in the paragraphs below) will have further implications in terms of improving our understanding of the problems of those engaging in EE and bettering their lives. It is also hoped that such ongoing research will provide practitioners in (mental) healthcare with further insights into how to best teach people to use music when feeling stressed or sad, in order to reduce the short and long term negative effects of engagement in EE.

Strengths and limitations

There are several strengths associated with this study. One strength was that the data were drawn from a large sample of participants who were initially blind to the this being a study about music listening. This allowed a comprehensive assessment of the association between all variables, in contrast to many previous studies on the topic of music, which were advertised either on the radio, among or by music students as a study about music, hence drawing upon a population more likely to have music play an important role in their life (Carlson et al., 2015; Hanser et al., 2016; Van Goethem & Sloboda, 2011). Another strength

of this research is that this is the first study to examine if the use of music for discharge is associated with EE and stress, because of avoidance and emotion-oriented coping. Our research is also the first research we are aware of that directly investigated the role of coping in the association between stress symptomology and EE.

One limitation with regards to exploring third variable effects in a single cross-sectional study is that causality cannot be determined. Future experimental research is needed to determine if these variables are causally related, and to better determine the directional nature of any causal relationships that might exist (Fiedler, Schott, & Meiser, 2011; MacKinnon, Krull, & Hoffman, 2000).

Another limitation of this research is the use of self-report data. Self-report measures are a valid means of assessing stress, depression and anxiety (Antony, Bieling, Cox, Enns, & Swinson, 1998), but although some people might self-identify as emotional eaters, this is not always reflected in their actual behaviour (Larsen, Van Strien, Eisinga, Herman, & Engels, 2007). Moreover, despite the associations found between EE and discharge, we did not gather any information regarding using both at the same time, or into music use for discharge being used as an alternative to EE. Similarly, in regards to music use, emotion-oriented coping may not be mutually exclusive to task-oriented coping; one can undertake almost any other task when listening to music, and music listening is rarely a sole activity (North, Hargreaves, & Hargreaves, 2004; Sloboda, O'Neill, & Ivaldi, 2001; Van den Tol & Giner-Sorolla, 2016), therefore one could undertake both emotion-oriented coping via music use and task-oriented coping via other means. Future research should further explore these lines of enquiry.

Moreover, in order to address some overlap in the avoidance coping sub-scale with EE items had to be removed, causing a relatively (but still acceptable; Tavakol & Dennick, 2011) Cronbach's alpha. It is possible that we would have found avoidance coping to play a role in some of the associations we tested had we used a different measure on avoidance coping with higher reliability. Future research should explore this further. In addition, the current data that were gathered on 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). While research (Tearne, Jianghong, & McLean, 2016) has indicated that the DASS scale has shown some stability of each of the syndromes over substantial periods of time (3–8 years), the relationships between these variables might have been stronger if we would have either asked all questions with regards to the last two weeks or as a general tendency.

Suggestions for future research

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. Future research could examine the association between music and food intake after experimentally inducing emotions, or naturalistically documenting people's music and eating behaviour in real life (with the help of technological interventions).

In addition, future research could also investigate the links between music listening and its association with different facets of eating behaviour (i.e. restricted eating as an alternative or addition to emotional eating), such as explore how effects might play out different for people with different levels of body satisfaction or in association to BMI. Future, research could also investigate if teaching people to change their music listening behaviour may have a positive effect on eating behaviour, stress, and/or other aspects of short and long-term mental health.

Altogether these findings indicate that the association between EE, music use for discharge, and stress can all at least be partly explained by emotion-oriented coping. We did however not find any evidence for avoidance coping to additionally play a role in these associations. Along

with previous research, this research suggests that people's ability to cope with stress directly influences their eating behaviour and music listening behaviour. This research also suggests that individuals who engage in one or the other behaviour are more inclined to use emotion-oriented in situations of stress and negative emotion, and that this overlap in coping strategy creates an association between both behaviours. It is hoped that the current research will inspire new research and insights in the larger field of EE, music, health, mental health, and therapy.

Author notes and acknowledgements

References

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Authorhttps://doi.org/10.1176/appi.books.9780890425596.

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the depression anxiety stress scales in clinical groups and a community sample. *Psychological Assessment, 10*(2), 176–181. https://doi.org/10.1037/1040-3590.10.2.176.

Barron, R., & Kenny, D. (1986). The moderator- mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.

Baste, V. S., & Gadkari, J. V. (2014). Study of stress, self-esteem and depression in medical students and effect of music on perceived stress. *Indian Journal of Physiology and Pharmacology, 58*(3), 296–299. Retrieved from http://ijpp.com/IJPP%20archives/2014_58_3_July-%20Agut/296-299.pdf.

Bayram, N., & Bilgel, N. (2008). The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. *Social Psychiatry and Psychiatric Epidemiology, 43*(8), 667–672. https://doi.org/10.1007/s00127-008-0345-x.

Bennett, J., Greene, G., & Schwartz-Barcott, D. (2013). Perceptions of emotional eating behavior. A qualitative study of college students. *Appetite, 60*, 187–192. https://doi.org/10.1016/j.appet.2012.09.023.

Berking, M., Poppe, C., Luhmann, M., Wupperman, P., Jaggi, V., & Seifritz, E. (2012). Is the association between various emotion-regulation skills and mental health mediated by the ability to modify emotions? Results from two cross-sectional studies. *Journal of Behavior Therapy and Experimental Psychiatry, 43*(3), 931–937. https://doi.org/10.1016/j.jbtep.2011.09.009.

Billings, A. G., & Moos, R. H. (1984). Coping, stress, and social resources among adults with unipolar depression. *Journal of Personality and Social Psychology, 46*(4), 877–891. https://doi.org/10.1037/0022-3514.46.4.877.

British Psychological Society (2013). *Ethics guidelines for internet-mediated research.* Leicester, UK: Author.

British Psychological Society (2014). *Code of human research ethics.* Leicester, UK: Author.

Carlson, E., Saarikallio, S., Toiviainen, P., Bogert, B., Kliuchko, M., & Brattico, E. (2015). Maladaptive and adaptive emotion regulation through music: A behavioral and neuroimaging study of males and females. *Frontiers in Human Neuroscience, 9.* https://doi.org/10.3389/fnhum.2015.00466.

Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior.* New York, NY: Cambridge University Press.

Chin, T., & Rickard, N. S. (2013). Emotion regulation strategy mediates both positive and negative relationships between music uses and wellbeing. *Psychology of Music.* https://doi.org/10.1177/0305735613489916.

Cohan, S. L., Jang, K. L., & Stein, M. B. (2006). Confirmatory factor analysis of a short form of the coping inventory for stressful situations. *Journal of Clinical Psychology, 62*(3), 273–283. https://doi.org/10.1002/jclp.20211.

Endler, N. S., & Parker, J. D. A. (1990). Multidimensional assessment of coping: A critical evaluation. *Journal of Social and Personality Psychology, 58*, 844–854. https://doi.org/10.1037/0022-3514.58.5.844.

Endler, N. S., & Parker, J. D. A. (1994). Assessment of multidimensional coping: Task, emotion, and avoidance strategies. *Psychological Assessment, 6*(1), 50–60. https://doi.org/10.1037/1040-3590.6.1.50.

Endler, N. S., & Parker, J. D. A. (1999). *Coping inventory for stressful situations (CISS): Manual* (2nd ed.). North Tonawanda, ON: Multi-Health Systems.

Evers, C., Stok, F. M., & De Ridder, D. T. D. (2010). Feeding your feelings: Emotion regulation strategies and emotional eating. *Personality and Social Psychology Bulletin, 36*(6), 792–804. https://doi.org/10.1177/0146167210371383.

Fiedler, K., Schott, M., & Meiser, T. (2011). What mediation analysis can (not) do. *Journal of Experimental Social Psychology, 47*, 1231–1236.

Fournier, M., De Ridder, D., & Bensing, J. (2002). How optimism contributes to the adaptation of chronic illness. A prospective study into the enduring effects of optimism on adaptation moderated by the controllability of chronic illness. *Personality*
and Individual Differences, 33(7), 1163–1183. https://doi.org/10.1016/s0191-8869(02)00006-5.

Getz, L. M., Marks, S., & Roy, M. (2014). The influence of stress, optimism, and music training on music uses and preferences. *Psychology of Music, 42*(1), 71–85. https://doi.org/10.1177/0305735612456727.

Gibson, E. L. (2012). The psychobiology of comfort eating: Implications for neuropharmacological interventions. *Behavioural Pharmacology, 23*(5-6), 442–460. https://doi.org/10.1097/FBP.0b013e328357bd4e.

Greeno, C. G., & Wing, R. R. (1994). Stress-induced eating. *Psychological Bulletin, 115*(3), 444–464. https://doi.org/10.1037/0033-2909.115.3.444.

Haan, N. (1997). *Coping and defending: Processes of self-environment organization* (1st ed.). Cambridge, MA: Academic Press.

Hanser, W. E., Tom, F. M., Ter Bogt, T. F. M., Van den Tol, A. J. M., Mark, R. E., & Vingerhoets, A. J. J. M. (2016). Consolation through music: A survey study. *Musicae Scientiae, 20*(1), 122–137. https://doi.org/10.1177/1029864915620264.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* New York, NY: Guilford Press.

Hilliard, R. E. (2001). The use of cognitive-behavioral music therapy in the treatment of women with eating disorders. *Music Therapy Perspectives, 19*(2), 109–113. https://doi.org/10.1093/mtp/19.2.109 1.

Holahan, C. J., Moos, R. H., Holahan, C. K., Brennan, P. L., & Schutte, K. K. (2005). Stress generation, avoidance coping, and depressive symptoms: A 10-year model. *Journal of Consulting and Clinical Psychology, 73*(4), 658–666. https://doi.org/10.1037/0022-006x.73.4.658.

Kirby, R., Shakespeare-Finch, J. E., & Palk, G. R. (2011). Adaptive and maladaptive coping strategies predict posttrauma outcomes in ambulance personnel. *Traumatology, 14*, 25–34 Doi: 10.1177%2F1534765610395623.

Labbé, E., Schmidt, N., Babin, J., & Pharr, M. (2007). Coping with stress: The effectiveness of different types of music. *Applied Psychophysiology and Biofeedback, 32*(3-4), 163–168. https://doi.org/10.1007/s10484-007-9043-9.

Larsen, J. K., Van Strien, T., Eisinga, R., & Engels, R. C. M. E. (2007). Gender differences in the association between alexithymia and emotional eating in obese individuals. *Journal of Psychosomatic Research, 60*(3), 237–243. https://doi.org/10.1016/j.jpsychores.2005.07.006.

Larsen, J. K., Van Strien, T., Eisinga, R., Herman, C. P., & Engels, R. C. M. E. (2007). Dietary restraint: Intention versus behavior to restrict food intake. *Appetite, 49*(1), 100–108. https://doi.org/10.1016/j.appet.2006.12.005.

Lazarus, R. S., & Folkman, S. (1984). *Stress appraisal and coping.* New York, NY: Springer.

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales* (2nd ed.). Sydney, AU: Psychology Foundation of Australia.

MacKinnon, D. P., Krull, J. L., & Hoffman, J. M. (2000). Equivalence of the mediation confounding and suppression effect. *Prevention Science, 1*, 173–181.

McWilliams, L. A., Cox, B. J., & Enns, M. W. (2003). Mood and anxiety disorders associated with chronic pain: An examination in a nationally representative sample. *Pain, 106*(1), 127–133. https://doi.org/10.1016/s0304-3959(03)00301-4.

Miranda, D., & Claes, M. (2009). Music listening, coping, peer affiliation and depression in adolescence. *Psychology of Music, 37*(2), 215–233. https://doi.org/10.1177/0305735608097245.

Nguyen-Rodriguez, S. T., Chou, C.-P., Unger, J. B., & Spruijt-Metz, D. (2008). BMI as a moderator of perceived stress and emotional eating in adolescents. *Eating Behaviors, 9*(2), 238–246. https://doi.org/10.1016/j.eatbeh.2007.09.001.

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

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36*(4), 717–731. https://doi.org/10.3758/bf03206553.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*(3), 879–891. https://doi.org/10.3758/brm.40.3.879.

Pritchard, M. E., Wilson, G. S., & Yamnitz, B. (2007). What predicts adjustment among college students? A longitudinal panel study. *Journal of American College Health, 56*(1), 15–22. https://doi.org/10.3200/jach.56.1.15-22.

Radstaak, M., Geurts, S. A., Brosschot, J. F., & Kompier, M. A. (2014). Music and psychophysiological recovery from stress. *Psychosomatic Medicine, 76*(7), 529–537. https://doi.org/10.1097/PSY.0000000000000094.

Randall, W. M., & Rickard, N. S. (2016). Reasons for personal music listening: A mobile experience sampling study of emotional outcomes. *Psychology of Music, 45*(4), 479–495. https://doi.org/10.1177/0305735616666939.

Saarikallio, S. (2008). Music in mood regulation: Initial scale development. *Musicae Scientiae, 12*(2), 291–309. https://doi.org/10.1177/102986490801200206.

Saarikallio, S., & Erkkilä, J. (2007). The role of music in adolescents' mood regulation. *Psychology of Music, 35*(1), 88–109. https://doi.org/10.1177/0305735607068889.

Sasaki, M., & Yamasaki, K. (2007). Stress coping and the adjustment process among university freshmen. *Counselling Psychology Quarterly, 20*(1), 51–67. https://doi.org/10.1080/09515070701219943.

Sheppes, G., & Gross, J. J. (2011). Is timing everything? Temporal considerations in emotion regulation. *Personality and Social Psychology Review, 15*(4), 319–331. https://doi.org/10.1177/1088868310395778.

Silk, J. S., Steinberg, L., & Morris, A. S. (2003). Adolescents' emotion regulation in daily life: Links to depressive symptoms and problem behavior. *Child Development, 74*(6), 1869–1880. https://doi.org/10.1046/j.1467-8624.2003.00643.x.

Skinner, E. A., Edge, K., Altman, J., & Sherwood, H. (2003). Searching for the structure of coping: A review and critique of category systems for classifying ways of coping. *Psychological Bulletin, 129*(2), 216–269. https://doi.org/10.1037/0033-2909.129.2.216.

Sloboda, J., Lamont, A., & Greasley, A. (2009). Choosing to hear music. In S. Hallam, I. Cross, & M. Thaut (Eds.). *Oxford handbook of music psychology.* (pp. 431–440). . https://doi.org/10.1093/oxfordhb/9780199298457.013.0040.

Sloboda, J. A., O'Neill, S. A., & Ivaldi, A. (2001). Functions of music in everyday life: An exploratory study using the experience sampling method. *Musicae Scientiae, 5*(1), 9–32. https://doi.org/10.1177/102986490100500102.

Spoor, S. T. P., Bekker, M. H. J., Van Strien, T., & Van Heck, G. L. (2007). Relations between negative affect, coping, and emotional eating. *Appetite, 48*(3), 368–376. https://doi.org/10.1016/j.appet.2006.10.005.

Tanofsky-Kraff, M., Goossens, L., Eddy, K. T., Ringham, R., Goldschmidt, A., Yanovski, S. Z., ... Yanovski, J. A. (2007). A multisite investigation of binge eating behaviors in children and adolescents. *Journal of Consulting and Clinical Psychology, 75*(6), 901–913. https://doi.org/10.1037/0022-006X.75.6.901.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education. 2,* 53–55. https://doi.org/10.5116/ijme.4dfb.8dfd.

Tearne, J. E., Jianghong, L., & McLean, N. J. (2016). Older maternal age is associated with depression, anxiety, and stress symptoms in young adult female offspring. *Journal of Abnormal Psychology, 125*(1), 1–10. https://doi.org/10.1037/abn0000119.

Thomson, C. J., Reece, J. E., & Di Benedetto, M. (2014). The relationship between music-related mood regulation and psychopathology in young people. *Musicae Scientiae, 18*(2), 150–165. https://doi.org/10.1177/1029864914521422.

Turner, J. A., Ersek, M., & Kemp, C. (2005). Self-efficacy for managing pain is associated with disability, depression, and pain coping among retirement community residents with chronic pain. *The Journal of Pain, 6*(7), 471–479. https://doi.org/10.1016/j.jpain.2005.02.01.

Van den Tol, A. J. M. (2016). The appeal of sad music: A brief overview of current directions in research on motivations for listening to sad music. *The Arts in Psychotherapy, 49,* 44–49.

Van den Tol, A. J. M., & Edwards, J. (2013). Exploring a rationale for choosing to listen to sad music when feeling sad. *Psychology of Music, 41*(4), 440–465. https://doi.org/10.1177/0305735611430433.

Van den Tol, A. J. M., & Edwards, J. (2015). Listening to sad music in adverse situations: How music selection strategies relate to self-regulatory goals, listening effects, and mood enhancement. *Psychology of Music, 43*(4), 473–494.

Van den Tol, A. J. M., & Giner-Sorolla, R. (2016). Listening to ironically-enjoyed music: A self-regulatory perspective. *Psychology of Music,* 1–17. https://doi.org/10.1177/0305735616658956.

Van den Tol, A. J. M., Coulthard, H., & Hanser, W. A. (2018). Music listening as a potential aid in reducing emotional eating: An exploratory study. *Musicae Scientiae.* https://doi.org/10.1177/1029864918780186.

Van den Tol, A. J. M., Edwards, J., & Heflick, N. A. (2016). Sad music as a means for acceptance-based coping. *Musicae Scientiae, 20*(1), 68–83. https://doi.org/10.1177/1029864915627844.

Van Goethem, A., & Sloboda, J. (2011). The functions of music for affect regulation. *Musicae Scientiae, 15*(2), 208–228. https://doi.org/10.1177/1029864911401174.

Van Strien, T., Cebolla, A., Etchemendy, E., Gutiérrez-Maldonado, J., Ferrer-García, M., Botella, C., ... Baños, R. (2013). Emotional eating and food intake after sadness and joy. *Appetite, 66,* 20–25. https://doi.org/10.1016/j.appet.2013.02.016.

Van Strien, T., Engels, R. C. M. E., Leeuwe, J. V., & Snoek, H. M. (2005). The stice model of overeating: Tests in clinical and non-clinical samples. *Appetite, 45*(3), 205–213. https://doi.org/10.1016/j.appet.2005.08.004.

Van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). The Dutch eating behavior questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders, 5*(2), 295–315. https://doi.org/10.1002/1098-108x(198602)5:2<295::aid-eat2260050209>3.0.co;2-t.

Van Strien, T., Van de Laar, F. A., Van Leeuwe, J. F. J., Lucassen, P. L. B. J., Van den Hoogen, H. J. M., & Rutten, G. E. H. M. (2007). The dieting dilemma in patients with newly diagnosed type 2 diabetes: Does dietary restraint predict weight gain 4 years after diagnosis? *Health Psychology, 26,* 105–112. https://doi.org/10.1037/0278-6133.26.1.105.

Wardle, J. (1987). Eating style. A validation study of the Dutch eating behavior questionnaire in normal weight subjects and women with eating disorders. *Journal of Psychosomatic Research, 31*(2), 161–169. https://doi.org/10.1016/0022-3999(87)90072-9.

Wilfley, D. (1997). Assessing the specific psychopathology of binge eating disorder patients: Interview or self-report? *Behaviour Research and Therapy, 35*(12), 1151–1159. https://doi.org/10.1016/s0005-7967(97)00058-2.