

Abstract

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.

Keywords: music use, emotional eating, coping, emotion regulation, stress.

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; World Health Organization, 2016), it is a specific behaviour rather than a clinical diagnosis and can exist along a continuum of severity (Van Strien et al., 1986; Van Strien et al., 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.

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, Coulthard, Hanser, 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, 1977; 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 and 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, N. S., & 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 & 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 and colleagues (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 (Evers et al., 2010) a higher intake of palatable foods was found among participants who indicated a common use of response-focused emotion regulation strategies of ‘suppression’ when compared to participants who indicated a common use of antecedent focused coping strategies ‘cognitive-reappraisal’.

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). Whereas, EE has been found to be an easy access strategy (Nguyen-Rodriguez et al., 2008) for distraction from (avoidant-distraction) or improvement of (emotion-oriented) negative affect. 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, 2016; Van den Tol & Edwards, 2015).

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 and colleagues (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 and colleagues (2014) recognised, that music use may well be employed to reduce the negative emotional states rather than cause them. Carlson and colleagues (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.

- 1. The association between stress and EE can be (partially) explained by both avoidance and emotion-oriented coping, but not by task-oriented coping*
- 2. The association between stress and discharge can be (partially) explained by both avoidance and emotion-oriented coping, but not by task-oriented coping*
- 3. 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 the '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 all 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 23.19 ($SD = 4.87$). The average indicated height ($N = 565$) was 169.83 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

PLEASE INSERT TABLE 1 HERE

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 .91 in the current sample.

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 .95 in the current sample, and reliability ranges from .78 to .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 subscales on emotional-oriented coping and task-oriented coping, 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 .81 for emotion-oriented coping, .58 for avoidance coping, and .71 for task-oriented coping.

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 sub-scales 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 .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, 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, Coulthard & Hanser, 2018). A MANOVA did indeed reveal a significant difference for gender (Wilks' $\Lambda = .84$, $F(8, 541) = 12.613$, $p < .001$, partial $\eta^2 = .16$, indicating a 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) 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-variables 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 considered as a mediator in any of the further analyses.

PLEASE INSERT TABLE 2 HERE

In order to test if the association between stress and EE, and stress and discharge can (to some extent) be explained by avoidance and emotion-oriented coping, we run Process model 4 (Preacher & Hayes, 2004; 2008) ⁴ with 1,000 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 (Table 3 and 4) stress was the predictor variable (X) and EE was the outcome variable (Y). In the following two models (Table 5 and 6) stress was the predictor variable (X) and discharge was the outcome variable (Y). In the final two models (Table 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

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'*. The model 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 ($F(11,545)=9.52, R^2=.16, MSE=.56, p=.0000$). As can be seen in Table 3, the initial significant total effect ($B = .27, SE = .05, 95\% CI = .18, .36$) which described the association between stress and EE stayed significant but diminished as a direct effect ($B = .16, SE = .05, 95\% CI = .05, .26$) when taking into account the significant indirect effect of emotion-oriented coping ($B = .09, SE = .03, 95\% CI = .03, .15$). 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.

The same model in which avoidant coping was include as a mediator rather than emotion-oriented coping yielded a medium effect size as well ($F(11,545)=8.74, R^2=.15, MSE=.57, p=.0000$). As can be seen in Table 4, avoidance coping did not have an indirect effect on this association ($B = .01, SE = .01, 95\% CI = -.002, .02$). This means that we cannot additionally confirm the part of this hypothesis in which avoidance coping plays a role in explaining the association between stress and EE.

PLEASE INSERT TABLE 3 AND 4 HERE

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'*. The model which predicted discharge (DV) based on stress as independent variables (IV) emotion-oriented coping as a mediator (M) and all covariates yielded a large effect size ($F(11.545)=28.79, R^2=.37, MSE=.54, p=.0000$). As can be seen in Table 5, the initial significant total effect ($B = .27, SE = .05, 95\% CI = .17, .36$) which described the association between stress and EE stayed significant but diminished as a direct effect ($B = .21, SE = .05, 95\% CI = .11, .32$) when taking into account the significant indirect effect of emotion-oriented coping as a mediating variable ($B = .06, SE = .03, 95\% CI = .002, .11$). 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.

The same model in which avoidance coping was include as a mediator rather than emotion-oriented coping also yielded a large effect size ($F(11.545)=28.23, R^2=.36, MSE=.54, p=.0000$). As can be seen in Table 6, avoidance coping cannot be assumed to have an indirect effect on this association as well ($B = .003, SE = .01, 95\% CI = -.006, .01$). This means that we cannot additionally confirm the part of this hypothesis in which avoidance coping additionally plays a role in explaining this association.

PLEASE INSERT TABLE 5 AND 6 HERE

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' The model which predicted EE (DV) based on discharge as an independent variable (IV) emotion-oriented coping as a mediator (M) and all covariates yielded a medium effect size ($F(11,545)=8.83, R^2=.15, MSE=.57, p=0.0000$). As can be seen in Table 7, the initial significant total effect ($B = .10, SE = .04, 95\% CI = .02, .19$) which described the relationship between stress and EE stayed significant but diminished as a direct effect ($B = .06, SE = .04, 95\% CI = -.02, .15$) when taking into account emotion-oriented coping as a significant indirect effect ($B = .04, SE = .01, 95\% CI = .02, .07$). 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.

The same model in which avoidance coping was include as a mediator rather than emotion-oriented coping yielded a medium effect size ($F(11,545)=6.70, R^2=.12, MSE=.59, p=0.0000$). As can be seen in Table 8, avoidance coping did not have an indirect effect on this association ($B = .10, SE = .04, 95\% CI = .01, .18$). This means the part of this hypothesis in which avoidance coping additionally plays a role in explaining this association could not be confirmed.

PLEASE INSERT TABLE 7 AND 8 HERE

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 avoidant 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 is related to higher levels of depression (Miranda & Claes, 2009). The association found between music use for discharge and EE could fully be explained by emotion-oriented coping. This too supports our theorising based on a variety of different studies 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 explainable due to an overlap in 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, Wilson & Yamnitz, 2007; Silk, Steinberg & Morris, 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 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, but especially music in general, can form a healthier alternative to EE in regulating emotions when feeling stressed.

Although we are realistic about the impact of one single study, we nevertheless 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 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 blind to the study's purpose. This allowed a comprehensive assessment of the association between all variables, in contrast to many previous studies on the topic of music. These studies 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 (we are aware of) research 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, & Lockwood, 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 (or might not) 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) 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 to 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 relationship between music and food intake after experimentally inducing real life emotions, or naturalistically documenting people's music and eating behaviour in real life (with the help of technological interventions). In particular, future research could replicate the current findings while measuring food intake after inducing emotions, or while following people's music and eating behaviour in real life (with the help of technological interventions).

In addition, future research might also want to 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 potentially play out different for people with different BMIs or levels of body satisfaction. 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.

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References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author. doi: 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. doi: 10.1037/1040-3590.10.2.176.
- 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.
- 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.
- 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. doi: 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. doi: 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. doi: 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. doi: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. doi: 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*. doi: 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. doi: 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. doi: 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. doi: 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. doi: 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. doi: 10.1016/s0191-8869(02)00006-5.
- Geliebter, A., & Aversa, A. (2003). Emotional eating in overweight, normal weight, and underweight individuals. *Eating Behaviors*, *3*(4), 341–347. doi: 10.1016/s1471-0153(02)00100-9.
- 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. doi: 10.1177/0305735612456727.
- Gibson, E. L. (2012). The psychobiology of comfort eating: implications for neuropharmacological interventions. *Behavioural pharmacology*, *23*(5-6), 442-460. doi: 10.1097/FBP.0b013e328357bd4e.
- Greeno, C. G., & Wing, R. R. (1994). Stress-induced eating. *Psychological Bulletin*, *115*(3), 444–464. doi: 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. doi: 10.1177/1029864915620264.

- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.
- 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. doi: 10.1037/0022-006x.73.4.658.
- Hilliard, R. E. (2001). The use of cognitive-behavioral music therapy in the treatment of women with eating disorders. *Music Therapy Perspectives, 19*, (2), 1, 109–113, doi.org/10.1093/mtp/19.2.109
- 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. doi: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. doi:10.1016/j.jpsychores.2005.07.006.
- Larsen, J. K., Van Strien, T., Eisinga, R., Herman, C. P., and Engels, R. C. M. E. (2007). Dietary restraint: Intention versus behavior to restrict food intake. *Appetite, 49*(1), 100-108. doi: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. doi: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. doi: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. doi: 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. doi: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. doi: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. doi: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. doi: 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. doi: 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. doi:10.1177/0305735616666939.

- Saarikallio, S. (2008). Music in mood regulation: Initial scale development. *Musicae Scientiae*, 12(2), 291-309. doi:10.1177/102986490801200206.
- Saarikallio, S., & Erkkilä, J. (2007). The role of music in adolescents' mood regulation. *Psychology of Music*, 35(1), 88–109. doi: 10.1177/0305735607068889.
- Sasaki, M., & Yamasaki, K. (2007). Stress coping and the adjustment process among university freshmen. *Counselling Psychology Quarterly*, 20(1), 51–67. doi: 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. doi: 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. doi: 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. doi: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). doi: 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. doi: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. doi:

- 10.1016/j.appet.2006.10.005.Tavakol, M. & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55. doi: 10.5116/ijme.4dfb.8dfd
- 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. doi: 10.1037/0022-006X.75.6.901.
- 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. doi: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. doi: 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. doi: 10.1016/j.jpain.2005.02.01.
- Tuschl, R. J. (1990). From dietary restraint to binge eating: some theoretical considerations. *Appetite*, 14, 105–109. doi: 10.1016/0195-6663(90)900 04-R.
- 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, Coulthard, H., & Hanser, W. A. (2018). Music Listening as a Potential Aid in Reducing Emotional Eating: An exploratory study. *Musicae Scientiae*, doi.org/10.1177/1029864918780186.
- 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. doi: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., Edwards, J., & Heflick., N. A. (2016). Sad music as a means for acceptance-based coping. *Musicae Scientiae*, 20(1), 68 – 83. doi:10.1177/1029864915627844.
- Van den Tol, A. J. M., & Giner-Sorolla, R. (2016). Listening to ironically-enjoyed music: A self-regulatory perspective. *Psychology of Music*, 1-17. DOI: 10.1177/0305735616658956
- Van Goethem, A., & Sloboda, J. (2011). The functions of music for affect regulation. *Musicae Scientiae*, 15(2), 208–228. doi: 10.1177/1029864911401174.
- Van Strien, T. (2002). *DEBQ: Dutch eating behaviour questionnaire: Manual*. London, England: Thames Valley Test.
- 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. doi: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. doi: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. DOI: 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. DOI: 10.1037/0278-6133.26.1.105

- Wardle, J. (1987). Eating style. A validation study of the Dutch eating behaviour questionnaire in normal weight subjects and women with eating disorders. *Journal of Psychosomatic Research*, 31(2), 161–169. doi: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. doi:10.1016/s0005-7967(97)00058-2.

Footnotes

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, Coulthard & Hanser, 2018).

³ Please note that the same variables would need to be controlled for when these analyses are conducted with regression with 1000 corrected bootsteps, but that less of these variables are associated with each other when using this (more conservative) test to analyse their associations (resulting in a different table).

⁴ This model can be used to explore if the relationship between two variables (X and Y) can be explained by a third variable (M) (Preacher & Hayes, 2004; 2008) and is known as a mediation analysis. It must be noted though that these statistics alone do not proof mediation in terms of causality, but that causality needs to be grounded in theory (Fiedler, Schott & Meiser, 2011; MacKinnon, Krull, & Lockwood, 2000). In terms of the current research we can only test if we can assume causality and further research will be needed to proof it.

⁵ As part of our research we are interested in the effect of discharge on EE, meaning that we want to predict EE (DV) based on discharge (IV). Please note though, that our findings with regards to a third variables explaining the association between both variables were similar (only emotional oriented coping could explain this association) in a model in which we reversed the predictor and outcome variable. Results were also similar (only emotional oriented coping could explain this association) when we run stepwise linear regression analysis to predict the effect of one of these variables on the other (controlled for

avoidance and emotion-oriented coping at step 2, and controlled for age, BMI, and all music in mood-regulation variables at step 3).

⁶ Analyses indicated that the R-squared of the overall models which included all co-variates was higher than the R² of models with fewer covariates (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.