



Research Article

Musical prescriptions for mood improvement: An experimental study

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ABSTRACT

Background: Music is used in a variety of health contexts for mood regulation purposes. However, while research demonstrates that self-selected music is most effective in using music to alter mood in a positive direction, some people, particularly those with tendencies to depression, may incline towards music that perpetuates a negative mood.

Methods: Participants were randomly assigned to Happy and Sad music groups and listened to a prescribed playlist for four weeks. Pre- and post- mood measures were taken as well as diaries of mood responses, which were analysed both qualitatively and quantitatively.

Results: No long-term mood effects were observed. The affective impact was less positive for people with high scores in rumination. However, the diary-taking exercise raised participant awareness of mood impacts and increased deliberateness of music use in some participants.

Conclusions: Researcher-selected music is limited in effectiveness to a single listening session even where playlists are carefully designed to appeal to the sample. However, consciousness-raising programs may be effective in changing the long-term listening habits of people who for whom music choice is sub-optimal as a coping strategy.

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Introduction

Music has been used for mood regulation purposes for centuries (Garrido and Davidson, 2013). In modern times, too, music is used in a variety of health contexts for mood improvement purposes. Pre-recorded music is widely available and can be accessed as needed, making it a resource for mood management that could be broadly beneficial. While only a small percentage of people with depression will seek professional help (Gottfries, 2001), media use such as music listening increases when people are depressed (Block et al., 2014). Music may therefore be a particularly useful resource for people who do not access professional treatment, and instead experience increased isolation and lack of social engagement. This study thus focuses on the use of music listening to improve mood and wellbeing.

However, while music is able to be effectively utilized for mood improvement purposes by most people, research demonstrates that for people with low mood this resource is less effective. People in a depressed mood show a decreased liking for energetic music (Punkanen, Eerola, & Erkkila, 2011) and an increased attraction

to sad music (Chen, Zhou, & Bryant, 2007). Garrido and Schubert (2015a, 2015b) have shown that while listening to sad music can have positive psychological functions for most people, particularly when in a low mood (Van den Tol & Edwards, 2015, 2013), it often results in a worsening of mood in people with tendencies to depression (see also Wilhelm, Gillis, Schubert, & Whittle, 2013), while listening to 'happy' music can result in an improved mood (see also Dillman Carpentier et al., 2008).

This connection between depression and negative music listening outcomes is not surprising when one considers the role depression plays in impairing abilities to regulate affect and in decreasing motivation to engage in mood-improving activities, believed to be related to diminished dopamine processing (Forbes and Dahl, 2005; Tye et al., 2013). People with depression also demonstrate an attentional bias towards negative stimuli (Gotlib, Krasnoperova, Neubauer Yue, & Joormann, 2004; Platt, Murphy, & Lau, 2015) and difficulty disengaging from negative stimuli, (Foland-Ross et al., 2013) suggesting that they may not recover from negative emotions induced by music listening as quickly as others.

The negative effects of music may in fact be due to the potential for music to amplify general patterns of maladaptive coping strategies, such as rumination or emotion-focused coping (Garrido & Schubert, 2015b; Miranda & Claes, 2008, 2009; Thompson, Reece,

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& Di Benedetto, 2014). Thus Segal et al. (2006) found that depressive relapse could be predicted by reactivity to sad music in some participants (see also Wilhelm et al., 2013). In the current study, therefore, we followed the approach of scholars such as Aldao (2013) – who emphasizes the importance of context on affect regulation – by looking at the influence of dispositional psychological processes such as coping strategies on music listening outcomes.

However, some people have only minimal awareness of the effect such music is having on their mood, tending to believe that they will benefit from their behaviour (Garrido & Schubert, 2015a, 2015b). This is similar to findings in relation to the rationales offered by people with depression for other maladaptive behaviours (Barnhofer, Kuehn, de Jong-Meyer, & Williams, 2006).

Therefore, researchers and clinicians interested in tapping into the potential of music to provide highly accessible and cost effective means for self-regulation of mood are faced with a conundrum: music usually has more positive mood effects when self-selected (Nair et al., 2013; Schubert, 2010), yet people who are depressed may have difficulty making optimal music selections to enhance mood. Thus, treatment programs involving completely self-selected music in health contexts without the presence of a therapist to moderate negative effects, such as in residential aged care facilities or in mobile applications for self-use by depressed adolescents, run the risk of facilitating the use of music in such a way as to exacerbate existing mental health issues.

In the present study we wished to explore approaches to achieving a balance between participant freedom and the need to guide music selections to some degree in order to compensate for unhealthy self-selection strategies. The development of a program that is able to achieve such a balance could provide a basis for the design of future therapeutic programs in a variety of healthcare settings.

Of further interest in the current study is that some of the theories about the benefits of sad music suggest that while the negative affect experienced may be unpleasant for some people initially, listeners can obtain psychological benefits such as catharsis or the opportunity for self-reflection from doing so. Earlier research looked only at the immediate response of listeners to sad music (Garrido & Schubert, 2013, 2015b). If long-term psychological benefits are obtained from listening to sad music, however, we could expect that while mood deterioration might occur at an initial listening session, the long-term effects would be more positive. The aim of the current research was therefore to investigate three primary research questions:

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- 1 Is a 'prescribed' musical playlist that allows some personal freedom in listening choice effective for improving the mood of the listener?
- 2 Does rumination promote greater sadness following exposure to sad music?
- 3 What differences exist between the short and long-term affective responses to happy and sad music?

Hypotheses

We hypothesized that listening to happy music would result in mood improvements regardless of the rumination propensity of the listener, after both short and long term listening, and that short-term listening to sad music would result in mood deteriorations regardless of the rumination propensity of the listener. It was further hypothesized that after long-term listening to sad music, mood deterioration would be experienced by people who ruminate, but not those who do not ruminate. We also explored how thought patterns found in the diaries could be differentiated based on whether the individual was a ruminator or not a ruminator.

Method

This research was conducted under a Realism paradigm (Sayer, 2000; Sobh & Perry, 2006), which takes a middle ground between constructivism and positivism (Hall, 2013). Realism values comparison of multiple data sources and varied analytical methods to allow comparisons of 'perceptions' of reality (Sobh & Perry, 2006). Thus multiple methods of data collection and analysis were taken in this study to enable a wholistic approach to understanding the research questions and the representation of multiple perspectives (Johnson, Onwuegbuzie, & Turner, 2007). Both quantitative and narrative data were collected in parallel in order to enable individual perspectives to illuminate the quantitative findings (Creswell, Plano Clar, Gutmann, & Hanson, 2003). Narrative data were analysed using both content analysis techniques and thematic analysis.

Participants

The sample consisted of 177 undergraduate students from a university in Australia who participated voluntarily in the study in exchange for course credit. The total sample included 62 males and 104 females (gender information was missing for 11) with a mean age of 20.6 years ($SD = 2.2$, range = 17–36).

Procedures

To find a viable compromise between the need to provide some freedom of listening choice to participants while compensating for possible maladaptive self-selection strategies, playlists were pre-selected, but included music thought to appeal to a variety of tastes and to allow some latitude in how the playlists were used. Given the potential for sad music to have a negative impact on participants, this freedom of listening choice was also ethically important. We further instructed participants that they were free to desist from participating in the experiment if they were experiencing troubling negative effects. Measures were also in place to ensure that adequate counseling services were available for participants who experienced any adverse effects from the music listening. In addition, we took care to ensure that the playlists did not contain lyrics with reference to suicide or self-harm because of the potentially adverse effects on vulnerable participants (Definis-Gojanovic, Gusic, & Sutlovic, 2009).

After obtaining ethics approval, participants were randomly assigned to either the Happy Listening Group (HLG) ($n = 94$; 2 males, 87 females, 5 no gender given) or the Sad Listening Group (SLG) ($n = 83$, 59 males, 16 females, 8 no gender given). Participants completed an online survey including a pre-experiment mood measure in their own time prior to the first week of the experiment. In a separate session, participants completed another online survey in which they listened to a musical playlist and completed additional mood measures before and after the listening session. A link to an online site containing the same musical playlist heard in the lab was then provided to each participant. Participants were requested to individually listen to the playlist at least two times per week for the next four weeks. Participants could choose whether to listen to all the songs on the playlist or only some at each listening because we wanted to avoid them feeling obliged to regularly listen to music that caused an unpleasant affective reaction. Rather, participants were asked to record diaries showing which tracks they listened to and why, so that we could assess compliance with the listening instructions and how effective the playlists were in regulating mood when used in an ecologically realistic setting. Following the four weeks of listening, participants completed a post-experiment mood measure (see Table 1 for a summary of measures and the time of their administration).

Table 1
Measures administered at each time point.

Time of measurement	Measures
Pre-experiment (Week 0)	<ul style="list-style-type: none"> • POMS-Short (wording: 'how have you been feeling in the past few days') • RRQ
Pre-listening session (Week 1)	<ul style="list-style-type: none"> • POMS-Short (wording: 'how do you feel right now')
Post-listening session (Week 1)	<ul style="list-style-type: none"> • POMS-Short (wording: 'how do you feel right now') • Liking, familiarity and level of interest in each song
Weeks 1–4	<ul style="list-style-type: none"> • Qualitative diary entries about use of playlist and its effect recorded semi-weekly (8 in total)
Post-experiment (Week 4)	<ul style="list-style-type: none"> • POMS-Short (wording: 'how have you been feeling in the past week')

Musical stimuli

In order to ensure that the music was likely to convey the intended emotions, playlists were drawn from songs that were most frequently nominated as 'happy' or 'sad' by participants in previous studies (Garrido & Schubert, 2015a, 2015b). Six 'sad' songs and seven 'happy' songs were chosen to create two playlists of approximately 29 min duration each. Both playlists contained a mixture of genres (see Table 2) to ensure that a variety of tastes were allowed for.

Measures

Two psychometric measures were used as indicated in Table 1: the Rumination subscale of Trapnell and Campbells' Rumination Reflection Questionnaire (RRQ, Trapnell & Campbell, 1999); and a Mood Disturbance Index (MDI) based on the short form of the Profile of Mood States (POMS-Short: Curran, Andrykowski, & Studts, 1995). The former provided a measure that could indicate tendencies to depression since rumination is highly predictive of clinical depression (Joorman, 2005; Spasojevic & Alloy, 2001), while the latter provided a measure of current episodes of mood disturbances including depression, anxiety and stress. Participants were also asked to rate each piece from their assigned playlist according to how much they liked it, were familiar with it and found it interesting on a scale of 1–10 (1 = Strongly Disagree, 5 = Neither Agree nor Disagree, 10 = Strongly Agree).

Analysis

MDI was calculated at four time points: Pre-experiment, Pre-listening session, Post-listening session, and Post-experiment. Repeated measures ANOVAs were performed for Experiment Effects (time points of: Pre-experiment and Post-experiment), and for Listening Session Effects (time points of: Pre-listening and Post-listening).

Both deductive and inductive approaches were utilized in the thematic analysis of the listening diaries, enabling us to draw on both existing theory and the data itself. Data were first categorised according to two broad subject-areas which included: (i) participant response to the prescribed music, and (ii) factors that influenced that response. On subsequent runs through the data NVIVO was used in an iterative process that allowed codes and sub-codes to be derived both deductively and inductively. Thus codes were created based on the theoretical knowledge of the authors, while allowing the data itself to also inform the creation of new codes. Reflective memos were made about the coding decisions throughout the process.

In this stage 1246 segments of data were assigned to 32 codes by two of the authors. Based on assessment of a sub-section of the data (118 data units), inter-rater reliability was 0.64 (Cohen's

Kappa), which is classified as 'substantial agreement' (Viera & Garrett, 2005). In an iterative process involving discussion among the authors and constant comparison to assess and re-assess the patterns of response against the developing themes, the codes were clustered or organized into four broad themes, each with their own sub-themes: (i) the effect of the music, (ii) influences on the effects, (iii) resistance to the effects, and (iv) the overall effect of participation.

Content analysis was also performed by investigating word-frequencies and patterns of word use in the listening diaries by means of the Linguistic Inquiry and Word Count software (LIWC, Tausczik and Pennebaker, 2010). This program calculates percentages of several word categories used in the analysed text including positive affect words, and use of words relating to specific topics such as motion or death, for example. This method has previously been used to predict coping style in bereavement (Pennebaker, Mayne, & Francis, 1997), health improvement in trauma recovery (Pennebaker, 1993), social integration (Pennebaker & Graybeal, 2001) and deceptiveness (Newman, Pennebaker, Berry, & Richards, 2003). Numerical values in relation to the impact of the music were also derived from the diary entries by assigning responses that participants described as positive a score of 1, neutral or mixed responses with a score of 0 and negative responses with a score of –1. This enabled a numerical tracking of the effect of the music upon mood across 8 time points (twice weekly for 4 weeks), yielding twice-weekly Mood Impact scores and an aggregated Total Mood Impact Score that was calculated as a sum of the 8 ratings.

Results

Preliminary analysis

Skewness and kurtosis analyses demonstrated that base-lines MDI ($S=0.19$, $K=-0.42$), Rumination ($S=0.30$, $K=-0.36$), Familiarity ($S=-0.47$, $K=0.42$), Liking ($S=-0.38$, $K=0.03$) and Interest ($S=0.04$, $K=0.37$) were reasonably normally distributed. A MANOVA was conducted with five dependent variables (baseline MDI, Rumination, Liking, Familiarity and Interest) and Listening Group (Happy and Sad) as the grouping factor. The test revealed no overall significant difference between Listening Groups $F(2, 136)=0.43$, $p=0.65$. The average rating of liking for the songs was 6.9 ($SD=1.6$), familiarity was 8.0 ($SD=1.5$), and interest was 6.3 ($SD=1.6$), thus indicating a positive response to each song on average at the initial listening (5 = neutral).

Short-term effects

Two between-within subjects ANOVAs were conducted to assess the impact of the listening session on MDI (one for the HLG and another for the SLG). Time (pre-listening and post-listening) was the within-subjects factor, and the upper and lower quartiles

Table 2
Musical stimuli.

Sad Playlist			Happy Playlist		
Track Name	Genre	Duration	Track Name	Genre	Duration
Someone Like You, Adele	Singer-songwriter	4'44	Levels, Avicii	Electronic	3'41
Tears in Heaven, Eric Clapton	Classic rock	4'31	Yeah 3X, Chris Brown	Pop	3'59
Adagio for Strings, Samuel Barber	Classical	6'59	Mr. Jones, Counting Crows	Rock	4'33
How To Save A Life, The Fray	Rock	4'00	Forbidden Friendship, John Powell	Instrumental/ soundtrack	4'11
Somewhere over the Rainbow, Eva Cassidy	Jazz	5'02	What Makes You Beautiful, One Direction	Pop	3'18
Fireflies, Ron Pope	Singer-songwriter	3'54	Good Time, Owl City & Carly Rae Jepsen	Pop	3'23
			Tiny Dancer, Elton John	Classic rock	6'15
	Total:	29'10		Total:	29'20

of Rumination were used to create a Rumination Group variable (High and Low), which was the between-subjects factor. Results revealed a significant main effect of Time on MDI in the Listening session for the HLG ($F(1, 38) = 11.8, p = 0.001, \text{Wilks' } \lambda = 0.76, \text{Partial } \eta^2 = 0.24$), with MDI dropping significantly from baseline levels after the lab session, indicating a positive affective impact for people in the HLG. There was no significant effect of Time for the SLG ($F(1, 25) = 1.4, p = 0.24, \text{Wilks' } \lambda = 0.94, \text{Partial } \eta^2 = 0.05$). There was no significant interactive effect of Rumination Group in either the HLG ($F(1, 38) = 0.2, p = 0.62$) or the SLG ($F(1, 25) = 0.6, p = 0.47$). These results supported the hypothesis that happy music would result in mood improvement regardless of rumination scores. However the hypothesis that sad music would result in mood deterioration was not supported although a positive response was not found either.

Long-term effects

A between-within subject ANOVA was conducted with Time (Pre-experiment and Post-experiment) as the within subjects factor and Rumination Group (High and Low) as the between subjects factor. Happy and Sad Listening Groups were analysed separately. No significant main effect of Time on MDI was found for either SLG ($F(1, 32) = 0.1, p = 0.35, \text{Wilks' } \lambda = 0.9, \text{partial } \eta^2 = 0.03$) or HLG ($F(1, 38) = 2.2, p = 0.15, \text{Wilks' } \lambda = 0.95, \text{partial } \eta^2 = 0.05$). There was no interaction effect between Rumination Group and Time for either SLG ($F(1, 32) = 0.3, p = 0.61, \text{Wilks' } \lambda = 1.0, \text{partial } \eta^2 = 0.01$), or the HLG ($F(1, 32) = 0.03, p = 0.85, \text{Wilks' } \lambda = 1.0, \text{partial } \eta^2 = 0.001$). Thus the hypotheses regarding the effects of long-term listening were not supported in this analysis.

Since these results were somewhat unexpected, it was decided to look more closely at the week-by-week impact of the music as recorded in the listening diaries. Individual MANOVAs were conducted for SLG and HLG with the 8 Mood Impact scores as the dependent variables and Rumination Group as the fixed factor. Analysis of SLG revealed a significant overall difference in mood impact according to Rumination Group ($F(2, 32) = 5.4, p = 0.01$). Post-hoc analyses showed no significant differences between rumination groups in affective impact at the first diary entry ($F(1, 34) = 0.8, p = 0.39$). However, by the end of the experiment significant differences were found ($F(1, 34) = 10.9, p = 0.002$), with high ruminators experiencing declining levels of positive impact from the music while positive affective response increased for low ruminators (Fig. 1). Conversely, when analyzing HLG alone, a MANOVA revealed no significant difference in mood impact according to Rumination Group ($F(2, 40) = 1.4, p = 0.26$). This analysis thus demonstrated some support for the hypothesis that sad music would result in mood deterioration for people with high scores in rumination after long-term listening, but not for low ruminators. However, since no significant results were returned for HLG, the hypothesis that happy music would result in mood improvement after long-term listening was not supported.

Table 3

Pearson correlation co-efficients for Total Mood Impact, Rumination and word categories.

	Rumination	Total Mood Impact
Total Mood Impact	-0.06	1
Past tense	-0.02	-0.16
Present tense	-0.06	0.01
Future tense	0.07	-0.02
Social words	-0.06	-0.07
Negative emotion	0.05	-0.46**
Anxiety words	-0.01	0.21
Sad words	0.04	-0.56**
Anger words	0.06	-0.14
Positive emotion	-0.11	0.30*
Inclusive words	0.06	0.30*
Exclusive words	-0.19*	-0.01
Motion words	-0.08	0.26*
Achievement words	0.04	0.34**
Religion words	-0.03	0.39**
Death words	0.25**	-0.29*

* $p < 0.05$.

** $p < 0.01$.

Content analysis

After calculating patterns of word usage with LIWC, a Pearson correlation analysis revealed significant correlations between rumination and use of words about death (Table 3). Results also revealed that Total Mood Impact was positively correlated with the number of words relating to motion, achievement, inclusive words (such as 'and', 'with', 'include') and religion.

A MANOVA was also conducted with the various word categories as the dependent variable and Listening Group as the fixed factor. Overall results were significant ($F(21, 137) = 6.85, p < 0.001$). Post-hoc analyses revealed significant differences between groups for use of words in the present tense, positive emotion words, words relating to anger and sadness, inclusive words, motion and death (Table 4).

Thematic analysis

Four primary themes were identified during the thematic analysis. The first involving the effect of the music at each listening involved a variety of descriptions relating to the intensity or relative duration of the effects (see Table 5). The other three themes, being more complex, will be discussed individually below.

Influences on the effect

Participants often found *personal meaning* in the music, picturing themselves in imaginary situations even when they had not experienced events like those described in the lyrics. For other participants, lyrics were meaningful because they did relate to personal experiences: "This song tells a sad story of romance that I can relate to, bringing me back to a similar situation in my life"

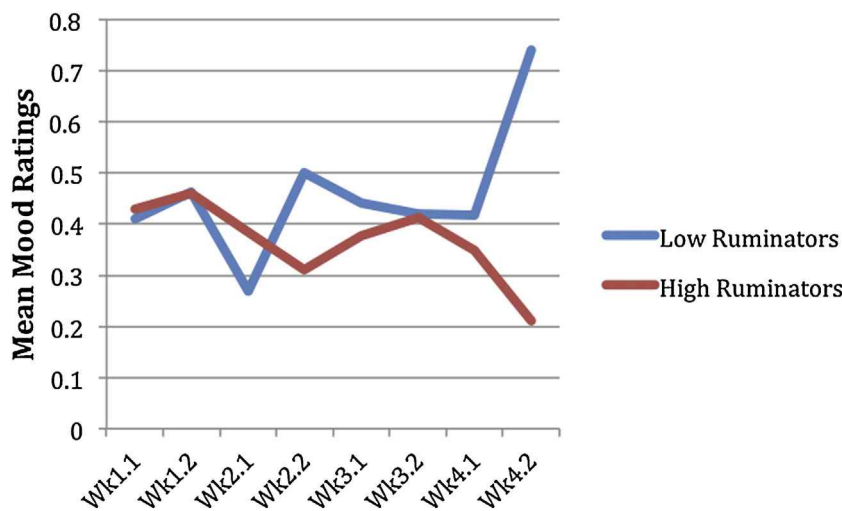


Fig. 1. Mean ratings of affective impact for High and Low ruminators across 8 diary entries.

Table 4

Post-hoc ANOVAs of word categories between Listening group.

	F	p	Cohen's d	Happy Music group		Sad Music group	
				M	SD	M	SD
Present tense	4.3	0.04	0.31	6.9	2.1	6.3	1.8
Positive emotion	15.7	<0.001	0.63	4.1	1.0	3.5	0.9
Anger	7.7	0.006	0.63	0.2	0.2	0.1	0.1
Sad	30.7	<0.001	-1.21	0.5	0.3	1.0	0.5
Inclusive	8.6	0.004	0.53	4.4	1.0	3.9	0.9
Motion	12.4	0.001	0.44	1.2	0.5	1.0	0.4
Death	15.2	<0.001	-0.66	0.01	0.03	0.05	0.08

(Male, aged 19). Where participants were less able to draw personal meaning from the song, the affective impact tended to be less powerful.

Both songs with lyrics and instrumental music elicited powerful memories and feelings of *nostalgia*. Much of the time this was a positive experience for participants. For other participants the nostalgia increased feelings of homesickness, or longing for people from whom they were separated. For others, the knowledge that the past is gone forever intensified this negative effect: "I experienced a profound melancholy, not because I'm yearning for that moment to return, but because of the sheer finality and irrevocability of these moments" (Male, aged 21).

Where the music activated negative thoughts such as about death or unhappy memories, the affective outcome also tended to be negative. For many, this was often related to their *mood prior to listening*. For participants who described feeling depressed before listening, the music appeared to feed a cycle of *ruminative thinking*. One participant said: "Since I'm feeling homesick, I knew that listening to this song would keep me in a sad mood or even make me more sad, so I listened to it. . . After listening to this sad song, I will probably continue to listen to other sad songs" (Female, aged 20). The effect of this ruminative thinking could be quite pronounced. One participant reported: "I found that the bad mood I was in became a distinct sadness and I was moving through a number of sad memories that were making me irritable and depressed. Yet, I had no desire to stop listening to the song" (Male, aged 20).

Another powerful prompt of affective responses was *the beat* or "danceability" of the music. Participants described themselves as feeling "stronger and faster", "lively", "pumped", "energized", "rejuvenated" and "refreshed" after listening. Descriptions of involuntary foot tapping, or other physical compulsions such as dancing were common. Slower music had the opposite effect on arousal

levels, causing participants to relax and calm down, an effect that was sometimes desirable, but sometimes caused participants to feel "sleepier" than they would have liked.

Resistance of effect

Participants devised numerous ways of resisting the intended mood effect of the music when it did not match their desired outcome, whether assigned to HLG or SLG. For example, participants engaged in *selective listening*, choosing music from their assigned playlist that they thought most likely to relax, motivate, or uplift them, or avoiding songs that would elicit sad memories or prove too distracting or arousing. Other participants listened to the entire playlist in a particular order so that they would hear preferred music or music that matched their desired mood outcome last.

Participants also *counteracted the effect* of the assigned playlists by selecting other music to listen to afterwards. Other participants deliberately created a *mental resistance* to the emotional tone of the music. For example, one participant said: "I am not in the mood for so many slow, sad songs. I am building a wall and staying happy" (Male, aged 24). Similar strategies were reported by people assigned to the HLG where the music did not match their desired mood at the time.

Similarly, participants attempted to minimize undesired mood effects by listening to the playlists in situations that tended to *dilute* the effect or *distract* them from the music, such as by deliberately putting the music on when there were other people around. Others listened to the music while engaging in other tasks such as housework, cooking, study or reading to avoid getting too absorbed in the music.

Table 5
Themes and sub-themes identified in the diary entries.

Themes	Sub-themes	Examples	
Effect of music listening	Duration	"The music helped the mood I was in at the time of listening, but after each piece had finished I felt frustrated again." "I sort of 'rode' this feeling throughout the entire day."	
	Intensity	"I was shocked and overwhelmed by the extent to which it affected me."	
Influences on effect	Involuntary response	"I felt as though the music was controlling me."	
	Decreasing impact over time	"I am beginning to find that the effect is wearing off the more I listen to it."	
	Personal meaning in lyrics	"I miss my fiancé who is overseas. The music made me think about what our reunion will be like." "I suppose that because it's a breakup song I should be sad but I can't relate to the sadness because I've never had a break up."	
	Prompting nostalgic memories	"It reminds me of spending time at home with my Dad" "It does make me reminisce about past times in my own life that are similar."	
	Ruminative thoughts	"Since I'm feeling homesick, I knew that listening to this song would keep me in a sad mood or even make me more sad, so I listened to it." "The music served as a backdrop for mulling over the previous events of the day, with a main focus on negative events."	
	Beat and rhythm	"This song always seems to make me want to tap my foot." "I felt that every time I walked my movements were in sync with the music. It was the tempo in particular that influenced my body movements."	
	Prior Mood	"The music did not sound as good as it did last week, and it didn't change my mood because I wasn't in a neutral state while listening."	
	Resistance of effect	Selective listening	"It was way too slow and sleepy sounding so I turned it off after a minute."
		Counteractive listening	"After attempting to listen to this song I returned to listening to more calming music."
		Mental resistance	"While I took off my headphones I forced myself to forget about the song and all those feelings." "I didn't let their expression enter my energy field."
Effect of participation in experiment	Distraction or dilution	"I listened to it on the bus on my iPod because at least this way I'm mildly distracted and so I still hear it but its not overbearing."	
	Overfamiliarity	"I am finding it very hard to listen to these pieces now because I have listened to them so much."	
Effect of participation in experiment	Preference for own music	"If I need to be uplifted, I'm going to find something within the genres I prefer rather than a piece that I would not usually listen to."	
	Increased awareness of effect of music on mood	"I have learned some things about myself and the reason for my preferences for certain genres over others." "I have enjoyed keeping this diary as a way of observing and reflecting on the factors that influence the way I react to certain songs."	
	Inability to counteract real-life stress	"My mood was stressed due to the amount of work that I had and as I was listening to the music I did not feel a change in my mood."	

Overall effect of the listening and diary exercise

In addition to the effect that the music had on participants at each listening, some overall trends were noted.

Participants reported becoming *over-familiar* and somewhat *bored* with the music: "I am finding it hard to listen to these pieces now because I have listened to them so much" (Female, aged 21). The tipping point for many participants was Week 3, although as depicted in Fig. 1 the affective impact of the music, particularly for high ruminators peaked in Week 1.

Participants frequently commented that although the music was pleasant, they would *prefer to listen to their own music*: "If I need to be uplifted, I'm going to find something within the genres I prefer that will uplift me, rather than a piece that I would not usually listen to just to be uplifted" (Female, aged 22).

As the experiment progressed student-participants were also becoming more overwhelmed with assessments and exams, and were less likely to become engaged in the music when listening: "When I am in a stressed, high focused state of mind music doesn't penetrate my soul as much" (Male, aged 20). They reported that the effects were *not strong enough to counter-balance the real-life stressors* they were experiencing.

For some participants the task of listening to the prescribed music and recording their responses to it had *raised their consciousness* of how music influenced their mood. One participant said: "I realized I don't normally think too much about how my mood is affected by the music I listen to, but these diaries are definitely making me more aware" (Female, aged 20). Several participants came to the realization that their previous listening choices had not always had a positive impact on their mood: "I realized the

music I had put on had a slow tempo and the lyrics were sad. I noticed I was feeling worse and decided to put on some music that I normally listen to when I am cheerful. After a few songs I noticed I was no longer wallowing and had actually improved my mood! The realization that I was making myself more sad highlighted the power music can have" (Female, aged 22). Another said:

I'm glad that I did choose those songs to listen to instead of turning to slow and sad music that I usually am inclined to listen to when I'm feeling down...The more I listened to the songs mentioned the more I began to forget the painful feelings that I had harboured earlier today. It just made me realise that the situation I was in wasn't as bad as I thought, and that wallowing in negative emotions just makes it worse. Tomorrow is another day filled with endless possibilities (Female, aged 24).

Discussion and conclusions

The study reported in this paper aimed to assess the effectiveness of a listening program for improving the mood of 177 undergraduate students, and to explore the effect of rumination on both short and long-term affective outcomes. Multiple methods were used to analyze the data, including iterative and hermeneutic coding by the researchers as well as quantitative analysis.

The results tended to confirm findings in previous studies that happy music has a more positive effect than sad music on the mood of listeners in a single listening session (Garrido & Schubert, 2015a, 2015b). However, unlike previous studies, sad music was not found to cause any significant increases in mood disturbance after a single

listening session. The reason for these differences in findings may be accounted for by differences in the music selection processes. In previous studies, Garrido and Schubert asked their participants to self-select music that they knew made them feel sad. In the current study, however, music was researcher selected and thus, while the music might have been recognized as 'sad' by the listeners as suggested by the content of diary entries, it lacked personal significance. This highlights the differing impacts that personally relevant 'sad' music is likely to have on listeners as compared to generically 'sad' music.

Despite the positive effect of happy music in the initial listening session, in the long-term (from Pre-experiment to Post-experiment) no significant mood differences as measured by the POMS were found for either the happy or the sad music group regardless of rumination scores. However, the twice-weekly mood ratings from the diary entries picked up slightly different effects in those assigned to the sad music playlist. The scores derived from diary entries effectively measured short-term responses to the music at each listening, but allowed us to track how these responses changed over the course of the experiment in order to shed further light on the processes occurring and to enable some further understanding of the results from the POMS measures. The results from the diary entries revealed that while responses to happy music stayed fairly stable in all listeners over the course of the 4-week experiment, people with high scores in rumination assigned to the sad listening group reported less positive responses to their assigned music over time than low ruminators assigned to the same playlist.

Thematic and content analysis of the diaries revealed more about the possible reasons for these effects. Many participants reported that the affective impact of the music was simply too transient to have any lasting effect on mood particularly as real-life stressors increased. While responses were mostly positive to the music at each listening, these effects often lasted only for the duration of the music. Where longer lasting effects might have been possible, participants sometimes actively attempted to counteract the effects of the music via selective listening, by following the playlists with their own freely selected music, by rearranging the order of songs on the playlist, by mentally resisting its affective tone, or by distracting themselves or diluting the music's effect. Thus while the immediate effect of the music at each listening may have been initially powerful as recorded in the diary entries, the use of these strategies may have meant that there was little overall effect on daily mood. This might account for the non-significant results from the POMS measurements.

However, patterns of word usage as detected by LIWC demonstrated some deeper processes that may have been occurring in some listeners. Our analyses showed that responses to the sad music playlist contained significantly more words about sadness and death than diary responses to the happy music playlist. Deeper thematic analysis showed that where sad memories, dissatisfaction with the present, or ruminative thinking were prompted by the music, the affective outcome tended to be negative.

On the other hand, we found that positive affective responses were associated with use of words relating to social inclusion, motion, achievement, and religion. Usage of these types of words may be indicative of the presence of healthy coping styles such as seeking social support, active coping and turning to religion (Anderson, Marwit, Vandenberg, & Chibnall, 2005; Carver, Scheier, & Weintraub, 1989). Where positively perceived memories, optimistic thoughts about the present or oneself were prompted, the affective outcome tended to be positive.

Thus, it appears that the affective impact of the music is connected to the thinking patterns that it elicits. This in turn is related to the individual's own habitual thinking patterns and coping style. For people with high scores in rumination who are prone to becoming

stuck in cycles of negative thinking sad music could have led to increasingly negative thoughts with each repeated listening to the music.

From the strategies used to resist the affective tone of the playlists we can further infer that the use of 'prescribed' music in health contexts may not be effective unless the listener is receptive to the music and the affective end intended. For example, where participants were already feeling tense or anxious, high arousal music tended to cause irritation and annoyance. On the other hand, irritation was caused by low arousal music where participants wished to increase or maintain their energy or motivation levels.

These results thus confirm findings in other studies that freely selected music is preferred by participants (Biagini et al., 2012; Schubert, 2010). This was true of the current sample even where they reported a high level of liking for the prescribed music. However, for logistic reasons it is not always possible to provide each individual with their own music. In residential care settings for example, group listening may be common. Nevertheless, the current study indicates that a given song will have widely different mood effects on different individuals.

In addition to the receptiveness of the listener, in order to have a positive affective impact the music also needs to prompt positive thoughts or memories. While some participants seemed to have a high level of awareness about the impact of music on their moods and emotions, some were less aware of the thinking patterns that were being activated by music or of the fact that more positive outcomes could be achieved by listening to different music. However, the listening and diary task as a whole was able to act so as to raise the consciousness of many participants about this issue. Several participants became more aware of the thoughts being prompted by the music, and reported beginning to select music with a greater degree of deliberateness so as to achieve more positive affective outcomes. It may be that programs that target raising awareness of the effects of music listening will enable young people to "take responsibility" for their music choices and thus make selections designed to support their wellbeing (Skewes McFerran & Saarikallio, 2014).

Implications for further research

These findings provide further additional information about the dilemma outlined in the introduction. People prefer to listen to self-selected music, but for people with impaired mood regulation capacities, the requisite skills to select music effectively may be compromised. Therefore further attention, advice, and support in choosing music listening selections is needed. Participants respond more to music that is personally relevant, both in terms of the lyrical content and genre preference. While 'prescribing' music may therefore be of limited effectiveness, increasing awareness and deliberateness of music choice may be effective in helping people in depressed moods to develop healthier strategies for regulating their moods with music. In particular, people with tendencies to ruminative coping styles can be helped to learn the kinds of music that are likely to trigger negative thinking patterns and alternative music that may instead promote more positive messages about the individual and the world in general. This may be one of the reasons why Segal and colleagues (2009) found that participants who had undergone Cognitive Behavioral Therapy were less likely to suffer a depressive relapse despite a high level of reactivity to sad music. In that study it may be that people who had become more aware of the thinking patterns likely to trigger a relapse were more adept at avoiding the negative thinking that might otherwise have been prompted. Thus programs designed to raise awareness of music use and its impact could serve as an effective and enjoyable strategy for increasing understanding of maladaptive behaviours in general.

This study is limited by its use of a student population of a relatively narrow age range, its lack of controlled experimental situations and an imbalance of gender across the conditions. Future studies should be designed so that gender is balanced across groups although randomized, and should attempt to replicate these results in broader samples. However, the current study goes some way towards further illuminating the influence of personal, musical and situational variables on the affective impact of music listening. It also adds further to current research on the benefits and otherwise of listening to sad music. It further highlights the difference between the short-term and long-term affective impacts of music listening programs, suggesting some of the cognitive mechanisms by which music influences mood in everyday life, and indicating that while researcher-selected music may be useful for a single listening session, awareness raising programs are likely to be more useful to create long-term changes to listening habits (Garrido, Bangert, & Schubert, in press). These findings have important implications for the use of music in healthcare settings, for clinicians striving to find appealing methods for promoting effective mood regulation strategies, and for the use of music in every day life to optimize mood and mental health.

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