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Abstract

The need to belong is a fundamental human motivation and the absence of attachment can cause problems. Ostracism has been found to evoke psychological distress and is widely used in social animals and human interpersonal relationships as a form of punishment. Many anecdotes suggest that music might help alleviate the negative effects of ostracism. The current study examined this possibility in a laboratory setting. The results of this study were not fully consistent with the hypothesis. Listening to either a happy or sad song did not buffer people from a later experience of ostracism. The music did, however, help people to recover their sense of control after ostracism.

Acknowledgement

People are social animals and constantly identify themselves as members of different groups. A famous quote by John Donne (1975) says, "no [man] is an island." Baumeister and Leary (1995) indicated that satisfying the need to belong is fundamental for human beings. Anthropologist Coon (1946) emphasized the universality of the social group in different human societies. There are various forms of societies, but people all form these groups naturally. Studies show that group attachment predicts important outcomes, such as social support and collective self-esteem (Smith, Murphy, & Coats, 1999). Belonging is not only essential for people's social success, but it also affects hormones that contribute to health outcomes (Uchino, 2006). For example, Knox et al. (2000) showed that social support is related to less underlying atherosclerosis in women at risk of developing heart disease. Because the need to belong is so essential, social exclusion is often used as punishment by humans and other social animals such as non-human primates, lions, and wolves (Gruster & Masters, 1986).

Ostracism is defined as an interpersonal situation where individuals or groups are ignored and excluded by other individuals or groups (Williams, 2007). The original term (*ostrakismos*) was created by Athenians who cast their votes on small pieces of clay (*ostraca)* around 500 B.C.. This procedure was used to determine whether a community member should be exiled. Gruter and Master (1986) have argued that ostracism has an evolutionary value. It can be used to eliminate members who are burdensome to group survival, or harmful to group cohesiveness. The ostracized group members are vulnerable on their own, and are less likely to survive. Therefore Haselton and Buss (2000) proposed that an ostracism detection system might have evolved. This system could identify the potential risk of being ostracized so that organisms can change their behaviors to avoid the dangers of social exclusion.

Ostracism is still ubiquitous in current society. It can involve a large range of behaviors from interpersonal neglect, to exclusion from different institutions. Ostracism can cause significant psychological distress. It creates a pain response; it threatens the need for belonging, self-esteem, meaningful existence, and sense of control; it also increases anger and sadness (Williams, 2007). Eisenberger, Lieberman, and Williams (2003) found that ostracism activates the anterior cingulate cortex, a brain region that is also active when people experience physical pain. Because of the pervasiveness of ostracism, many people experience its negative effects daily. If people have been ostracized for a long time, they become passive, helpless, and submissive (Williams, 2007).

The literature also suggests that some interventions can alleviate the negative effects associated with ostracism. For example, DeWall et al. (2010) found that people who took the pain reliever acetaminophen reported less pain from social rejection compared to people taking placebo pills. Some tasks have also been found to help people recover from the negative effects of ostracism. A study found that focused-attention, such as breathing meditation, helped people to recover faster compared to a control group (Molet, Macquet, Lefebvre, & Williams, 2013). Moreover, one study showed that people's concept of self can influence their recovery from some psychological distress of ostracism. People with higher interdependent self-construal showed better recovery of belongingness and meaningful existence (Ren, Wesselmann, & Williams, 2013). In the current study, the focus is also on a possible intervention for coping with ostracism.

Music and Ostracism

All cultures have some form of music, and various forms of it have existed for many millennia (Brown, 1991). Researchers have emphasized the mood regulating effect of music.

People use music to manage their mood and arousal, both on their own and in therapeutic settings (DeNora, 2000; North, Hargreaves, & Hargreaves, 2004; Roth, 2004). One reason why music can be used for this purpose is that listening to music results in the release of opioid peptides in the brain, a class of neurotransmitters that alleviates pain. Thus, people listening to music after surgeries required less opiate drugs (Cepeda, Carr, Lau, & Alvarez, 2006). Furthermore, music can modulate basic physiological responses. Listening to music with a slow tempo decreases heart rate, respiration, and blood pressure, whereas listening to faster music can increase them (Bernardi et al., 2009).

In addition, music is known to foster social connection and interpersonal trust (Huron, 2001). For example, people often claim that music is their way to reconnect with the world when they are excluded and many contestants in singing competitions began creating and listening to music when their peers rejected them. These anecdotes hint that music might help alleviate the psychological distress of ostracism. In support of this idea, research has found that a 30-minute singing lesson is associated with increased levels of oxytocin, a neuropeptide that mediates social affiliation (Grape, Sandgren, Hansson, Ericson, & Theorell, 2003).

Other evidence also suggests that music might foster social connection. Recent research on music and group processes suggested that music might have evolved to communicate information about the mental state of a group to many individuals at once (Loersch & Arbuckle, 2013). These authors argued that people's musical reactivity, the extent to which a person becomes emotionally involved in music, is connected to their social behaviors in other non-musical domains. In one study, people who had been ostracized became more sensitive to the emotional content of music. As mentioned before, ostracism reduces levels of belonging (Williams & Zadro 2005), and people are more likely to join a group after they are ostracized.

Furthermore, Baumeister and Leary (1995) proposed that once people join a group, the need of joining another group decreases. According to the evidence listed above, listening to music may bond an individual and a group, and shield people from the psychological distress associated with ostracism. In this project, I will seek to find out if this is the case. Participants will listen to one of two types of music (i.e., either a happy or sad song) before they experience ostracism in a two-minute virtual ball-tossing game. My hypothesis is that listening to music, regardless of the type, will establish a link between a person and the group that created the music, and hence it will help buffer them from the negative effects of ostracism.

Method

Participants

One hundred and forty undergraduate students at University of Colorado-Boulder completed the study for partial course credit. Ninety-eight were females, and forty-two were males.

Materials and Procedures

The experiment was constructed and administered through Qualtrics. It utilized a 3 (sad music, happy music, or no music) x 2 (ostracized or included) between-subjects experiment design. Upon entering the lab, participants first completed a baseline mood assessment; they then were randomly assigned to listen to sad music, happy music, or watch a silent neutral video. Afterwards, participants again rated their current mood so that I could examine whether the music influenced their mood. After this second mood assessment, participants played a virtual ball-tossing game in which they were either included or excluded. Next, participants reported their sense of belonging, self-esteem, meaningful existence, control, and their mood, as experienced during the game. After these assessments, participants filled out the need to belong

(Leary, Kelly, Cottrell, & Schreindorfer, 2012) and musical reactivity scales (Loersch & Arbuckle, 2013). In order to examine people's psychological recovery from ostracism, participants next rated their current sense of belonging, self-esteem, meaningful existence, control, and their mood. Finally the participants provided demographic information.

   Mood.   After completing the consent process, participants rated their baseline mood using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). This measure asked participants to rate their current emotional state on a scale of 1 (Very slightly or not at all) to 5 (Extremely). The PANAS contains twenty words describing emotions and feelings (ten positive and ten negative; e.g., irritable, distressed, excited, enthusiastic). This scale was administered three times in the experiment: immediately upon arrival, after the music manipulation, and following the ostracism measures (see below). In order to calculate summary mood scores for each of these time points, participants' average response to the ten negative items was subtracted from their average response to the ten positive items.

   Music Manipulation.   Participants were then randomly assigned to listen to negative music, positive music, or complete a no-music control condition. Participants listened to an instrumental song, or no song for two minutes and forty-five seconds in each condition. In both music conditions, participants were notified that the experimenter was interested is in the emotion modulating ability of music, and were told to get into the music as much as possible. In the positive music condition, participants listened to the happy song, *Hot Pants Road*, by the J.B.'s. In the negative music condition, participants listened to the sad song, *Still Hurting*, by Jason Robert Brown. In the no music control condition, participants watched a silent neutral video that contained footage from the video game *Minecraft*. Participants were instructed that the

purpose of this task was to examine people's ability to extract information from videos without any sound, and were told to watch the video carefully and try to understand what it was about.

Ostracism Manipulation.   Next, participants played Cyberball, a computer-based ball-tossing paradigm designed by Williams et al. (2000) to create a moderate experience of ostracism. Participants are told that their task is to mentally visualize the game, such as how the other participants look, what is happening in the surrounding, and so on. During the game, participants toss a ball with two computer-generated characters. The game is programed into two conditions. In the inclusion condition, participants get the ball throughout the game; in the ostracism condition, participants get the ball at the beginning of the game and then never get it again. Many studies have shown that this form of ostracism increases self-reported distress, diminishes levels of belonging, self-esteem, control, and meaningful existence, and increases anger and sadness (reviewed by Williams & Zadro, 2005). Participants were randomly assigned to play one of the two versions of Cyberball, which lasted for approximately two minutes.

Ostracism Measures (immediate).   When they finished playing Cyberball, participants were given a standard ostracism questionnaire (Williams, 2009), which includes assessments of sense of belonging (i.e., "I felt 'disconnected'," "I felt rejected"), self-esteem (i.e., "I felt good about myself," "My self-esteem was high"), meaningful existence (i.e., "I felt invisible," "I felt important"), sense of control (i.e., "I felt powerful," "I felt I was unable to influence the actions of others"), and mood (i.e. "Good," "Bad"). These questions asked the participants how they felt about each of these different constructs during the Cyberball game. Participants indicated their agreement with each item using a five-point scale ranging from 1 (not at all) to 5 (extremely).

Additional Scales.   After the immediate ostracism assessments, I measured participants' need to belong (Baumeister & Leary, 1995) and musical reactivity (Loersch & Arbuckle, 2013)

using standardized questionnaires. The 10-item need to belong scale was used to assess people's

motivation to affiliate with others (Leary, Kelly, Cottrell, & Schreindorfer, 2012). For each

statement, participants rate to what extent they agree or disagree on a five-point scale ranging

from 1 (strongly disagree) to 5 (strongly agree). Sample items include: "I seldom worry about

whether other people care about me" (reverse scored), and "I want other people to accept me."

Next, participants were asked to complete the musical reactivity questionnaire (Loersch &

Arbuckle, 2013). This questionnaire contains 15 statements and participants were asked to rate to

what extent they agree or disagree with each statement on a seven-point scale ranging from 1

(not at all) to 7 (completely). For example, items include: "When I listen to music, I can feel it in

my body," and "When I listen to music, I can feel it affect my mood."

Ostracism Measures (delayed).   Finally, participants completed a second round of the

ostracism measures listed above (i.e., sense of belonging, self-esteem, meaningful existence,

sense of control, and mood). Instead of rating how they felt during the game, participants were

asked to rate their current feelings in these domains. This was done in order to examine how well

they recover from ostracism after a short period of time.

Results

First, I examined the effect of the music manipulation on participants' change in mood;

calculated by subtracting the baseline mood score from the post-music mood score (higher scores

represent an increase in mood). This variable was submitted to a 3 (music: positive, negative, or

no music) X 2 (gender: male vs. female) ANOVA. There was a significant interaction between

these two factors (see Figure 1), $F(2,134) = 3.25$, $p = .04$. Simple effects analyses showed female

participants were affected by the music manipulation, $F(2,134) = 10.86$, $p < .01$, but men were

not, $F < 1$. Women who listened to positive music ($M = .41$, $SD = .78$) experienced a significant

increase in mood compared to women who did not listen to music (M = -.35, SD = .60), $F(2,134)$ = 12.83, p < .04. Women who listened to negative music (M = .07, SD = .66) also experienced significant increase in mood compare to women who did not listen to music, $F(2,134)$ = 4.23, p = .02. Finally, women who listened to positive music experienced a marginally significant increase in mood compared to those who listened to negative music, $F(2,134)$ = 2.87, p = .06.

Because only females were affected by the music, I restricted all subsequent analyses to this group. I next examined whether my manipulations influenced participants' experience of ostracism. To examine this, the immediate ostracism measures, including the sense of belonging, self-esteem, meaningful existence, sense of control, and mood were submitted to a 3 (music: positive, negative, and no music) X 2 (ostracism: exclusion, and inclusion) ANOVA. The ostracism manipulation had a significant effect on many of these variables. Women who were ostracized had a lower sense of belonging (M = 3.08, SD = .49) than those who were not (M = 3.60, SD = .45), $F(1,92)$ = 198.52, p < .01. A similar pattern held for self-esteem, meaningful existence, sense of control, and mood. Women who were ostracized had a lower self-esteem (M = 2.64, SD = .55) than those who were not (M = 3.37, SD = .49), $F(1,92)$ = 43.83, p < .01. Women who were ostracized had a lower meaningful existence (M = 2.04, SD = .90) than those who were not (M = 3.72, SD = .64), $F(1,92)$ = 107.15, p < .01. Women who were ostracized had a lower sense of control (M = 1.57, SD = .68) than those who were not (M = 2.93, SD = .83), $F(1,92)$ = 79.26, p < .01. And women who were ostracized had worse mood (M = 2.35, SD = .78) than those who were not (M = 3.75, SD = .60), $F(1,92)$ = 99.59, p < .01. There were no

significant or marginally significant effects of music or interactions between music and ostracism.[1]

Next, the need to belong and musical reactivity scores were submitted to a 3 (music: positive, negative, and no music) X 2 (ostracism: exclusion, and inclusion) ANOVA. The ostracism manipulation had an effect on participants' need to belong and musical reactivity. Women who were ostracized had a higher need to belong ($M = .71$, $SD = .55$) than those who were not ($M = .46$, $SD = .54$), $F(1,92) = 5.98$, $p = .02$. The effect of ostracism manipulation on participants' musical reactivity was marginally significant. Women who were ostracized had a lower musical reactivity ($M = 4.74$, $SD = .94$) than those who were not ($M = 5.09$, $SD = .82$), $F(1,92) = 3.34$, $p = .07$. There was no significant effect of the music manipulation or interactions between music and ostracism on either of these variables, Fs < 1.50, ps > .33.

Finally, the effect of music on the psychological recovery from ostracism was examined. Each of the delayed ostracism measures was submitted to a 3 (music: positive, negative, and no music) X 2 (ostracism: exclusion, and inclusion) ANOVA. The ostracism manipulation continued to have an effect on these variables. Women who were ostracized had a lower sense of belonging ($M = 4.02$, $SD = .98$) than those who were not ($M = 4.47$, $SD = .80$), $F(1,92) = 9.80$, p < .01. Women who were ostracized had a lower self-esteem ($M = 3.29$, $SD = .60$) than those who

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[1] The only main effect of music manipulation to approach significance was for mood, $F(2,92) = 1.92$, $p = .15$. However, simple effects analyses found no significant differences between the different music conditions. No other main effects of music were significant, Fs < 1, ps > .54. The only interaction to approach significance was for meaningful existence, $F(1,92) = 1.99$, $p = .14$. Simple effects analysis, however, found no significant differences between conditions, aside from the strong main effect of ostracism. No other interactions were significant, Fs < 1, ps > .41.

were not ($M = 3.45$, $SD = .52$), $F(1,92) = 1.69$, $p < .20$. Women who were ostracized had a lower meaningful existence ($M = 3.65$, $SD = .77$) than those who were not ($M = 4.14$, $SD = .55$), $F(1,92) = 14.31$, $p < .01$. Women who were ostracized had a lower sense of control ($M = 3.01$, $SD = .59$) than those who were not ($M = 3.19$, $SD = .53$), $F(1,92) = 1.51$, $p = .22$. And women who were ostracized had worse mood ($M = 3.70$, $SD = .70$) than those who were not ($M = 3.99$, $SD = .61$), $F(1,92) = 4.19$, $p = .04$.

The only main effect of the music manipulation to approach significance was for meaningful existence, $F(2,92) = 2.23$, $p = .11$, and sense of control, $F(2,92) = 1.81$, $p = .17$. Although there were no significant differences among conditions, women who listened to negative music ($M = 2.29$, $SD = .84$) had the highest scores for meaningful existence, followed by women who did not listen to music ($M = 2.11$, $SD = .76$), and then women who listened to positive music ($M = 2.05$, $SD = .55$). For sense of control, women who listened to positive music had a significantly higher sense of control ($M = 3.25$, $SD = .58$) than those who did not listen to music ($M = 2.97$, $SD = .57$), $F(2,92) = 3.39$, $p = .04$, and tended to have a higher sense of control than women who listened to negative music ($M = 3.04$, $SD = .52$), $F(2,92) = 1.91$, $p = .15$. The negative and no-music conditions did not differ, $F < 1$.

There was no significant interaction between music and ostracism for participants' ratings for their current sense of belonging, mood, self-esteem, or meaningful existence. However, the interaction between these two factors was marginally significant for the sense of control (see Figure 2), $F(2,92) = 2.74$, $p = .07$. Among women who were excluded during Cyberball, those who listened to positive music ($M = 3.08$, $SD = .13$) had a somewhat higher sense of control than women who did not listen to music ($M = 2.87$, $SD = .11$), $F(2,92) = 1.65$, $p = .20$. Women who listened to negative music ($M = 3.18$, $SD = .16$) also had a higher sense of

control than women who did not listen to music, ($M = 2.87$, $SD = .11$), $F(2,92) = 2.31$, $p = .11$.

Finally, women who listened to positive music did not differ from women who listened to

negative music, $F < 1$, $p > .62$.

The pattern of results was quite different for women in the inclusion condition. Here,

women who listened to positive music ($M = 3.44$, $SD = .14$) had a significantly higher sense of

control than women who listened to negative music ($M = 2.93$, $SD = .14$), $F(2,92) = 4.65$, $p = .01$.

Women who did not listen music ($M = 3.18$, $SD = .16$) also had a somewhat higher sense of

control than women who listened to negative music, $F(2,92) = 1.45$, $p = .24$. Finally, women

who listened to positive music had a somewhat higher sense of control than women who did not

listen to music, $F(2,92) = 1.51$, $p = .23$.

Discussion

This study sought to examine the modulating effect of music on the negative experience

of ostracism. In addition, how ostracism relates to the need to belong and musical reactivity was

also explored. The music manipulation used in this study did not improve people's reaction to

the immediate negative effects of ostracism. The music did, however, help women to recover

their sense of control, a finding partially consistent with the hypothesis. Women who listened to

positive music and negative music had a better sense of control compare to women in the no-

music control condition. Although not all results were consistent with the hypothesis, there are a

number of reasons why this might be the case.

Many limitations existed in this study. Firstly, the sample size was small. Because male

participants were not affected by the music manipulation, they were excluded from the rest of the

data analyses. I ended up examining data from only ninety-eight participants, which was

somewhat low for a 3 X 2 between-subjects experimental design. Secondly, a control group that

does not involve any task was not presented. As mentioned before, focused-attention was found to help people recover from the psychological distress of ostracism (Molet, Macquet, Lefebvre, & Williams, 2013). The instruction given before participants watched the video in the control condition might have instantiated focused-attention. It is possible that actively engaging attention during this task helped buffer participants' from the negative experience after ostracism. Thus, having a control group that does not involve any task would be optimal.

Thirdly, the procedure in this study did not exactly replicate what happen in the music-related anecdotes mentioned in the introduction. It seems that people often dive into music after they feel excluded. For this study, the original intention was to examine whether listening to music would buffer people from the effects of ostracism and thus the current procedure was adopted. However I recently started a follow-up project in which the focus is on whether music will help people recover from ostracism. In the follow-up study, participants listen to music after their ostracism experience. I hope to see a stronger effect of music in the results. Fourthly, the experimenter-picked songs did not manipulate the mood of male participants in this experiment. In one study, researchers found that listening to music before diurnal surgery changed the immune stress and neurohormonal response to the surgery, and listening to self-picked music especially decreased plasma cortisol levels during and after the surgery compared to experimenter-picked new age music (Leardi et al., 2007). This finding indicates that music is specific to each individual. Thus, the beneficial aspects of music might not be fully utilized because experimenter-picked songs were used in the current study. Finally, the duration of musical exposure was fairly short. People might need more time to foster bond with a music genre, a singer, or a song. As mentioned before, researchers found higher serum levels of oxytocin after a 30-minute singing lesson (Grape, Sandgren, Hansson, Ericson, & Theorell,

2003). The duration of songs in the current study is less than ten percent of the musical exposure used in that research, and this could contribute to the non-significant findings.

To rectify these issues, a larger sample size is necessary. It is also important to replicate the behavioral pattern observed in different anecdotes, listening to music after ostracism. Moreover, researchers should consider having both self-selected music and experimenter-selected music conditions. Two control conditions might be necessary to determine whether music functions differently from any task that requires attention. Furthermore, the long-term modulating effect of music should be explored. It is fascinating that people spend so much time and resources to seek out and create music. Finding out whether music can alleviate social pain could be useful to determine and create new interventions and shield people from the negative effects of ostracism.

Conclusion

Although the current study did not fully support the hypothesis that music could buffer one from the psychological distress of ostracism, it does help shed light on the future direction of research on music and social threat. Music was not found to help with the immediate impact of ostracism. But it was found to help in recovering the sense of control for female participants. This suggests that music might help people recover from ostracism though it might not help buffer the immediate experience of ostracism. However, further evidence is needed in order to draw any strong conclusion regarding how music impacts the experience of ostracism.

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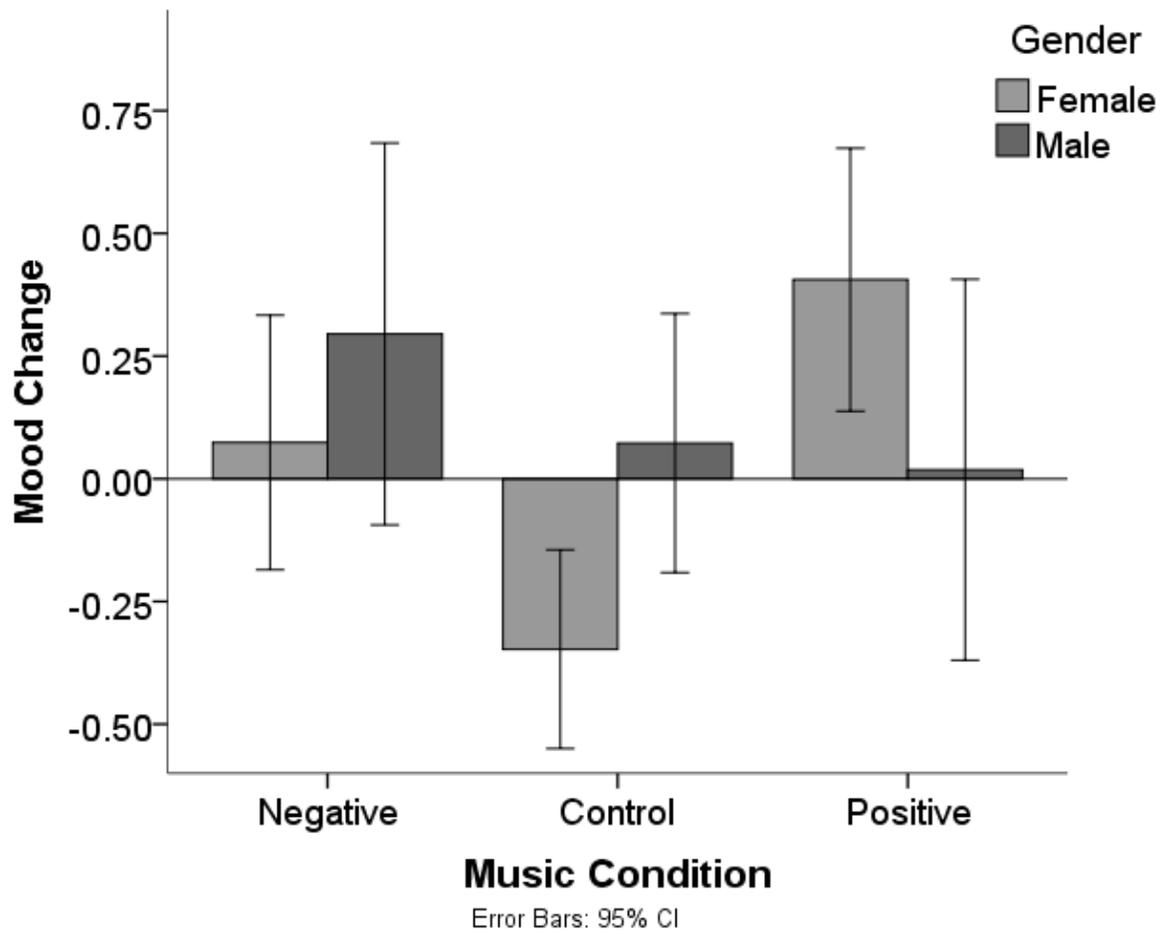
Figures

Figure 1. Mood change scores as a function of different music conditions and genders. Error bars
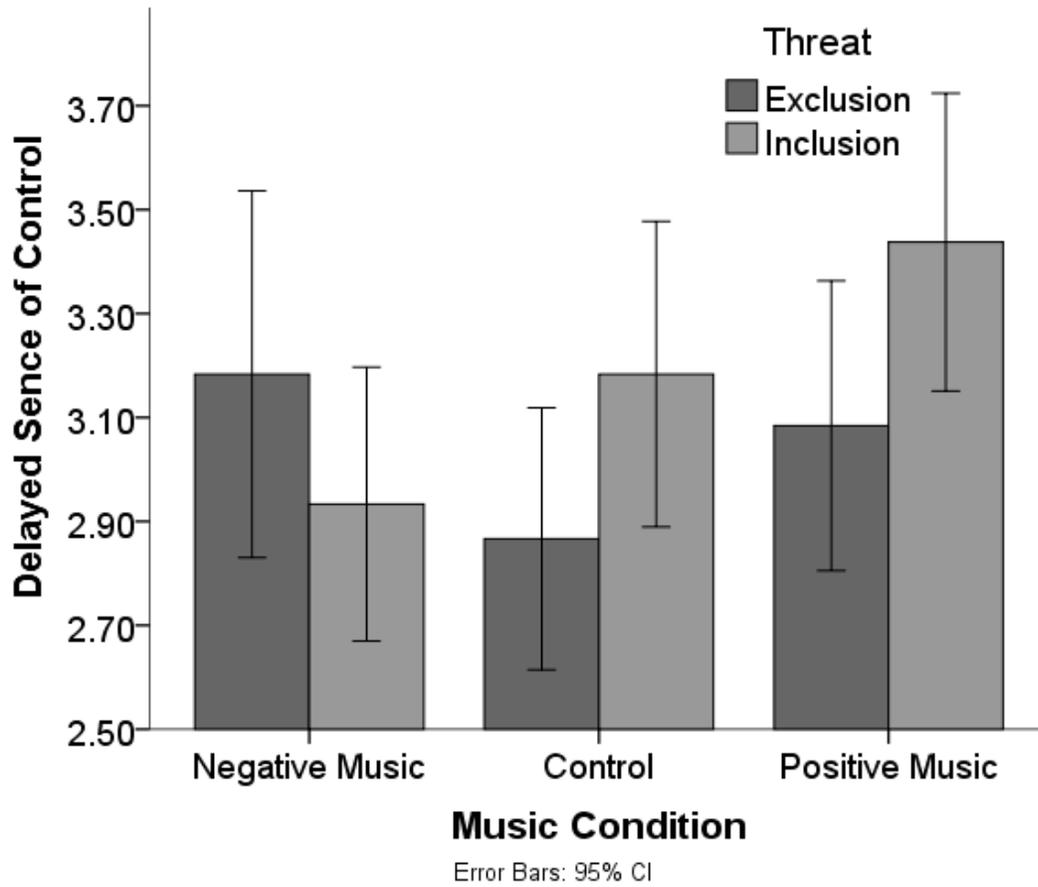
represent the 95% confidence interval.

Figure 2. Mean of delayed sense of control measure as a function of music condition and threat

(ostracism). Error bars represent the 95% confidence interval.