The Power of Notes: The Psychological Impact of Music on Feelings of Spirituality

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Abstract

Although music has been used in spiritual contexts throughout history, not much is known about how the characteristics within music that elicit feelings associated with spirituality. This study was designed to shed light on this question through researching the effects of three psychological dimensions of music – intensity, valence, and depth – on feelings of spirituality in listeners. Additionally, the moderating effects of personal spirituality on the psychological effects of music were analyzed. One hundred and twelve participants listened to short clips of music that had been scaled with respect to their intensity, valence, and depth, and rated how they felt on 14 items. Results showed that each of the three dimensions was significantly associated with ratings associated with spirituality. Moreover, personal spirituality moderated the effects of music on ratings. These findings offer future directions through which to study music and spirituality.

The Power of Notes: The Psychological Impact of Music on Feelings of Spirituality

Music is an integral element of human life that has played a particularly important role in many religious and spiritual forms of cultural expression (Miller & Strongman, 2002; Penmen & Becker, 2009; Scherer, 2004). For example, in Pentecostal churches, music is often used to facilitate religious experience (Miller & Strongman, 2002), and can create a strong, positive emotional response that sometimes leads to ecstasy (Penmen & Becker, 2009). Outside of religious services, people are also "moved" by music in ways that they interpret as having spiritual meaning (Scherer, 2004; Konenci, 2005). Clearly, the experience of listening to music has some effect on peoples' emotions, including those related to feelings of "spirituality." This aspect of music – the connections it has with the transcendent and spiritual – is a relatively unexplored area of study in the literature on music and emotion.

What are the elements of music that produce feelings associated with spirituality? This research project explored how characteristics of instrumental music affect spiritual feelings. In the first part of the project, a sample of instrumental music was scaled based on variations in three fundamental psychological dimensions – specifically, its intensity, valence, and depth. In the second part of the project, participants in a laboratory study listened to those music selections to examine the features of music that are responsible for its spiritual effects.

There are two areas of difficulty in addressing the relationship between features of music and feelings of spirituality. One difficulty comes from the lack of consensus regarding the definition and nature of spirituality (Ellison, 1983; Elkins, Hedstrom, Hughes, Leaf, & Saunders, 1988; Fleck & Fleck, 2006; Friedman & MacDonald, 1997;

Jagers & Smith, 1996; King & Crowther, 2004; MacDonald, 2009). The concept of spirituality has often overlapped with similar constructs such as religiosity, transcendence, and connectivity. In fact, the term, spirituality, has often been used interchangeably with religiousness (Proeschold-Bell, Yang, Toth, Rivers, & Carder, 2013; Slater, Hall, & Edwards, 2001) or suggested to be one component of religiousness (Hill & Pargament, 2003; Pargament, 1997, 1999; Zinnbauer, Pargament, & Scott, 1999). Indeed, research on spiritual music has often viewed "spirituality" through the lens of religiosity (Miller & Strongman, 2002; Penmen & Becker, 2009). Although Penman and Becker studied the feeling of "ecstasy" experienced by Pentecostals – a Christian group that uses music as an essential part of their religious worship – and Miller and Strongman studied mood variations in Pentecostal church participants before, during, and after the musical portion of the service, both studied feelings associated with spirituality within a religious context, and neither looked at intrinsic, musical characteristics that related to spirituality.

Moreover, the relationship between transcendence and spirituality is often blurred. Indeed, spirituality has been suggested as a component of transcendence (Gabrielsson, Lindstrom, & Erik, 2011; Yaden, Hood, Haidt, Vago, & Newberg, 2017). Indeed, Yaden and his colleagues (2017) suggested that spiritual experiences may fall under the catch-all, umbrella term of "self-transcendent experiences" that includes aspects of mystical, spiritual, religious, and near death experiences. They defined self-transcendent experiences as transient mental states marked by decreased self-salience and increased feelings of connectedness. This idea of decreased self-salience is reflected in

the idea of psychological decentering, which was described as a component of spirituality (Ho & Ho, 2007).

Finally, the relationship between spirituality and connectivity has also been explored, albeit less fully than its relationships with religiosity or transcendence. Spirituality has been associated with feelings of connection to the world, to nature, and to humankind to varying degrees, but few studies have thoroughly researched connectivity as an intrinsic aspect of spirituality (Liu & Robertson, 2011).

Due to the varying ideas surrounding spirituality, this study used 14 ratings that assessed aspects of spirituality, ratings that were intended to measure a broad conception of spiritual experience that includes both connective and transcendental elements. These 14 ratings were developed by exploring the language used to describe spiritual experiences to find common, reoccurring ideas that cropped up in the literature on spirituality, transcendentalism, religiosity, and other related ideas. These ideas included feelings associated with connections to nature, higher power, and humanity; deep emotions; inner stillness; love for humanity; being overwhelmed; being empowered; detachment from worldly concerns; relaxation; a desire to do good things; hopefulness; sadness/wistfulness and having the same kinds of struggles as other people do (see Hill & Pargament, 2003; Ho & Ho, 2007; Kass, Friedman, Leserman, Zuttermeister, & Benson, 1991; Kennedy, Macnab & Ross, 2015; Konenci, 2005; Liu & Robertson, 2011; Miller & Strongman, 2002; Yob, 2010). While this is not an all-encompassing list, it aims to capture a broader conception of spirituality that draws upon separated and yet related ideas of religiosity, transcendence, and connectivity.

In addition to the ambiguity associated with spirituality, the second difficulty in this study lies in measuring the features of music that elicit psychological effects. Research on the psychological effects of music has generally studied musical characteristics such as tempo, style, mode, and genre (Hunter, Schellenberg, & Schimmack, 2010; Ladining & Schellenberg, 2012). For instance, Hunter and colleagues conducted a study in which they altered the tempi (fast/slow) and mode (major/minor) of a selection of songs and tested listeners' perceptions of emotions conveyed by the piece. They found that listeners consistently rated songs with faster tempi and major mode as happier, rated songs with slower tempi and minor mode as sadder, and exhibited mixed emotional responses (including higher happiness and sadness ratings) for pieces that had mixed cues for happiness and sadness (through a fast-minor pairing or a slow-major pairing). Other studies related to spirituality have specifically looked at how musical features such as melody, harmony and rhythm affect perceptions of spirituality (Atkins & Schubert, 2014).

However, these ways of characterizing music by tempo, style, mode, and genre do not directly reflect the psychological features of music as perceived by listeners. Because this study focused upon the psychological effects of music, a way to characterize music in terms of its psychological characteristics was needed. Therefore, this research relied upon a recent study by Greenberg et al. (2016) that used a novel way to describe musical selections based on a set of 38 attributes of music. In their study, 76 participants with no formal music training independently rated 102 musical excerpts of mixed genres on these 38 personality traits (Greenberg, Kosinski, Stillwell, Monteiro, Levitin, & Rentfrow, 2016). A principal components analysis with varimax rotation found that these 38

personality attributes loaded onto three, independent factors: intensity, valence, and depth. Specifically, attributes that loaded highly onto intensity included intense, forceful, abrasive, and thrilling. Attributes that loaded highly onto valence included fun, happy, lively, enthusiastic, and joyful. Attributes that loaded onto depth included intelligent, sophisticated, inspiring, complex, poetic, deep, emotional and thoughtful. The present research project drew on a subset of 21 of the 38 attributes used in the Greenberg et al. (2016) study by selecting characteristics that loaded the most highly – either positively and negatively – on each of the three dimensions.

In studying the effects of musical characteristics on subjective experiences associated with spirituality, this project also focused on whether individual differences in spirituality moderate the effects of music on spiritual feelings. In general, studies on individual differences have suggested that openness and empathy – and to a lesser extent agreeableness – are personal characteristics that predict stronger emotional responses to music (Eerola, Peltola, Putkinen, & Schafer, 2018; Glasgow, Cartier, & Wilson, 1985; Rawlings & Ciancarelli, 1997; Rawlings, Barrantes, Vidal, & Furnham, 2000). Indeed, a study by Vuoskoski and Thompson (2012) found that people who score high in openness and empathy rated sad songs as more enjoyable and had higher intensity of emotional responses. Other studies have looked at how differences between introverts and extraverts (Daoussis & Kelvie, 1986) and between musicians and non-musicians relate to emotional responses to music (Lychner, 2008).

This study focused on individual differences in spirituality, as it is the most relevant to this research. Many reliable and widely applied measures of spirituality exist, such as the Ironson-Woods Spirituality/Religiousity Index (Ironson, Solomon, Balbin, et

al., 2002), the Spirituality Assessment Scale (Howden, 1992; Fry, 2001; Brennan, 2002, 2004, 2008; Kaslow, Price, Wyckoff, Grall, Sherry, & Young, 2004), and the Spiritual Well-Being Scale (Ellison 1983; Dalmida, Holstad, Diiorio, & Laderman, 2009). I measured spirituality using a novel index by Liu and colleagues (2011) that included questions measuring connectivity to nature, mankind, and a higher power, alongside other features of spirituality. Although this measure has been used to assess workplace spirituality and well being (Garg, 2017; Krishnakumar, Houghton, & Neck, 2016), it has not been used in studies regarding music and spirituality.

In brief, this project explored how three fundamental psychological features of music – its intensity, valence, and depth – affect subjective experiences that are often associated with spirituality, seeking to identify the characteristics of instrumental music that tend to evoke spiritual responses. This study conceptualized spirituality broadly by measuring it through ratings based on ideas that cropped up repeatedly in the literature on spirituality, transcendentalism, and connectivity (see Hill & Pargament, 2003; Ho & Ho, 2007; Kass, Friedman, Leserman, Zuttermeister, & Benson, 1991; Kennedy, Macnab & Ross, 2015; Konenci, 2005; Liu & Robertson, 2011; Miller & Strongman, 2002; Yob, 2010). Finally, this study also looked at how individual differences in spirituality moderated spiritual responses to music.

Methodologically, this study was divided into two parts: a pilot study and main study. In the pilot study, participants rated a selection of musical clips on 21 characteristics that assess the three dimensions of intensity, valence, and depth found by Greenberg et. al. (2016). Then, after the average intensity, valence, and depth of each clip was calculated, the main study assessed the responses evoked by each clip through 14

ratings that relate to aspects of spirituality. Because individual levels of spirituality might moderate "spiritual" responses to music, participants in the main study also completed a measure of general spirituality (Liu & Robertson, 2011).

STUDY 1: Pilot Study

The goal of Study 1 was to obtain ratings of valence, intensity, and depth for 48 short clips of instrumental music.

Method

Participants

One hundred and six participants gave online informed consent to participate in this study, which was approved by the Duke Institutional Review Board. Eighty-five participants were recruited from the Interdisciplinary Behavioral Research Center (IBRC) pool and the remaining 21 participants were Duke undergraduate students from the departmental subject pool. Participants from the IBRC pool included Duke undergraduates, graduate students, and staff as well as community members from Durham. There were no restrictions based on age, gender, education level or other variables for participants at the IBRC pool. Participants at the IBRC were reimbursed $13.00 in cash for participating the study, which lasted one hour or less. Duke undergraduate students enrolled in a psychology course received 1.0 unit of research credit. No data from participants were excluded.

Materials

Forty-eight instrumental songs were selected from *YouTube*, with an effort made to choose six songs selected that could possibly fall into each combination of high/low valence, high/low intensity, and high/low depth in order to have a broad sample of

selections. The instrumental music reflected a variety of instruments, including piano, violin, guitar, drums, ukulele, and flute. Clips also included orchestral arrangements, solo instrument music, and background music. The selections also varied in rhythm, tempo, key, pitch, and melody to achieve a broad range of possible affective states. Each clip was trimmed to 30 seconds.

Procedure

Participants were told that the aim of Study 1 was to investigate how people respond to various kinds of music. They were not specifically informed about the three psychological dimensions of valence, depth, and intensity, and spirituality was not mentioned. Participants signed an informed consent form, and then were told to listen to each music clip and rate it on the 21 characteristics on a 6-point scale (1 = not at all, 2 = slightly, 3 = somewhat, 4 = moderately, 5 = very, 6 = extremely).

The 21 characteristics were: intense, happy, intelligent, tense, fun, sophisticated, abrasive, depressing, inspiring, strong, joyful, complex, mellow, enthusiastic, poetic, reflective, sad, deep, gentle, lively, and party music. Positive characteristics that loaded onto *intensity* were intense, tense, abrasive, and strong; gentle and mellow negatively loaded. Characteristics that positively loaded onto *valence* were happy, joyful, enthusiastic, and lively; characteristics that negatively loaded were depressing and deed. Characteristics that positively loaded onto *depth* were intelligent, sophisticated, complex, poetic, inspiring; the characteristic that negatively loaded onto depth was party music.

The order of the clips presented was randomized so that each listener heard 16 randomly selected clips in a random order. The undergraduate participants at Duke University came to the same classroom for testing, and spent 30 minutes listening to the

eight musical selections and rating them on 21 characteristics. Students brought their own laptop and headphones. At the IBRC, participants came to a standard lab room, and spent one hour listening to 16 musical selections, which they rated on 21 characteristics. Computers and 13 headphones were provided by the IBRC.

Results

An average rating for intensity, valence, and depth was computed for each music clip based on all participants who rated the 21 characteristics for that clip. The number of ratings per clip was between 20 and 30 participants.

STUDY 2: The Psychological Impact of Music on Feelings of Spirituality

With a set of scaled musical stimuli in hand, a laboratory experiment was conducted to determine how intensity, valence, and depth of the musical selections affect feelings of spirituality.

Method

Participants

One hundred and twelve participants participated in this study, which was approved by the Duke Institutional Review Board. All participants were recruited from the IBRC pool, which includes Duke undergraduates, graduate students, and staff as well as community members from Durham. There were no restrictions based on age, gender, education level or other variables. Participants were paid $12.00/hr. Data from 10 participants were excluded due to incompletion.

Procedure

Participants were informed that the study broadly examines the relationship between instrumental music and spirituality, but were given no other information. Participants were directed to a lab room with 13 computers and headphones. A research assistant stayed in the room with the participants to answer any questions. Participants signed an informed consent form and then read instructions that stated:

> In the first part of this study, you will listen to sixteen 30-second music clips and rate how each musical selection makes you feel. Click the arrow at the top of each page to play the music . . . Then, rate how the music makes you feel. Please tell the research assistant if you do not hear the music or if you have any questions.

The participants then listened to a randomized selection of 16 of the 48 clips. After listening to each clip, the Qualtrics questionnaire asked participants, "To what extent does the music make you experience each of the following things?" Participants rated 14 reactions on a 7-point slider scale with the labels "not at all" (1), "moderately" (4), and "strongly" (7). The order of the 14 reactions was randomized. Participants rated the degree to which they experienced each of the following reactions: a deep emotional feeling (either positive or negative), a connection to others, an inner stillness, feelings of love for other people, a connection to a higher-being or higher-power, a connection to nature, a feeling of being overwhelmed, a feeling of being empowered or strengthened, detachment from worldly concerns, feeling that you face the same kinds of struggles as everyone else, relaxation, desire to do good things, feelings of sadness or wistfulness, and feelings of hopefulness.

Participants then completed the 16 items on the measure of spirituality, introduced by Liu and Robertson (2011). Lastly, participants answered demographic questions.

They were asked to fill in their age and to "select the racial categories or categories with which you most closely identify" (American Indian or Alaska Native, Asian or Asian American, Black or African American, native Hawaiian or Other Pacific Islander, and White). Lastly, they were asked to indicate their sex, given the following choices: male, female, other, and prefer not to answer.

Results

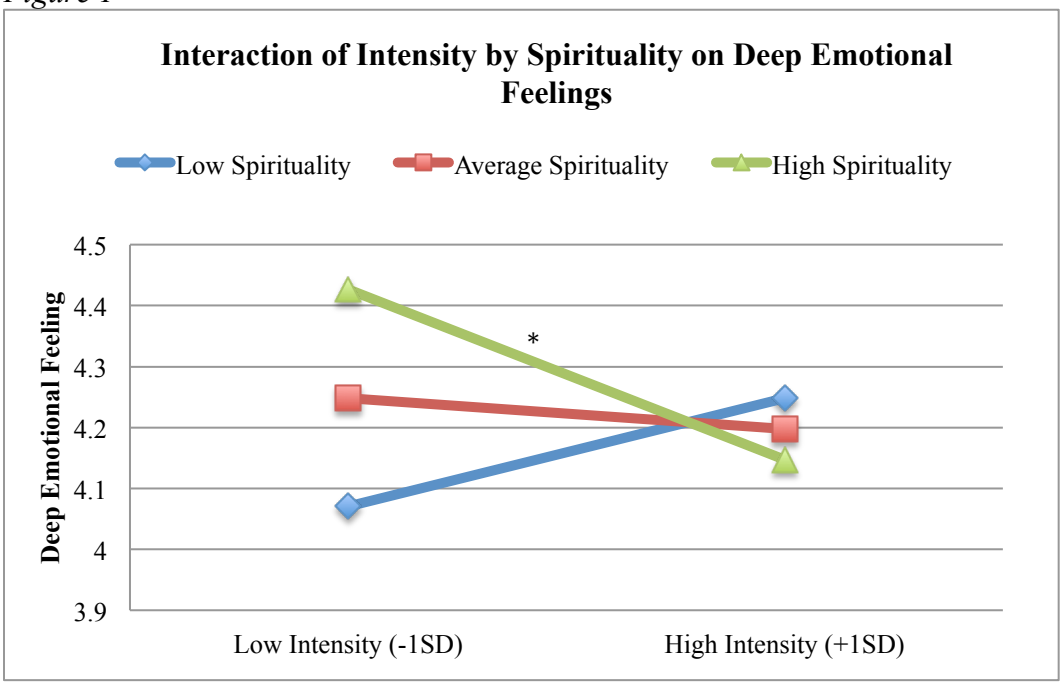
A multi-level modeling (MLM) analysis was conducted on each of the 14 ratings using clip intensity, valence, and depth as Level 1 predictors and spirituality scores as a Level 2 predictor. The parameters in the model included main effects of intensity, valence, depth, and spirituality; two-way interactions of intensity by valence, intensity by depth, valance by depth, intensity by spirituality, valence by spirituality, and depth by spirituality; and the three-way interaction of intensity by valence and depth. The remaining three-way interactions and the four-way interaction were not included both because the model became excessively complex and difficult to interpret, and these higher-level effects were not of conceptual interest.

Rating 1: A Deep Emotional Feeling

The MLM analysis on ratings of "a deep emotional feeling (either positive or negative" revealed main effects of valence and depth, and an interaction of intensity and spirituality. The main effect of valence showed that positive valence was associated with lower ratings of deep emotion than negative valence, B = -.026 [95% CI: -.042, -.009], t(1549.37) = -3.04, p = .002. The main effect of depth showed that clips with greater depth were associated with higher ratings of deep emotion than clips with less depth, B = .051 [95% CI: .017, .085, t(1549.88) = 2.91, p = .004.

The intensity by spirituality interaction, B = -.040 [95% CI: -.067, -.013, t(1545.74) = -2.91, p = .004), was examined by calculating and plotting the effects of intensity at low (-1 SD), average (M), and high (+1 SD) levels of spirituality. As can be seen in Figure 1, for participants who were high in spirituality, intensity was negatively correlated with ratings of a deep emotional feeling, (B = -.033, z = -2.18, p = 0.030). For participants who were of average spirituality and low spirituality, no significant relationships between music intensity and ratings of deep emotion were found.

Figure 1



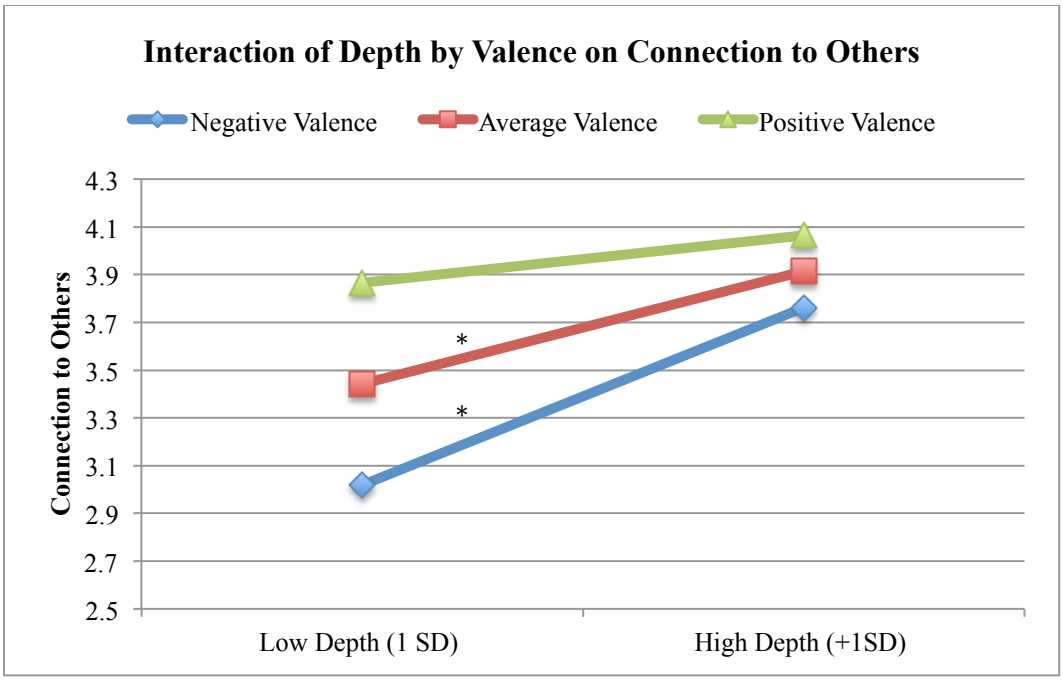
Rating 2: Connection to Others

Ratings of "a connection to others" revealed main effects of intensity, valence, and depth, and an interaction of valence and depth. The main effect of intensity showed that clips with higher intensity were associated with lower ratings of a connection to others, B = -.108 [95% CI: -.129, -.086], t(1557.936) = -9.85, p < .001. The main effect

of valence showed that positive valence was associated with higher ratings of a connection to others than negative valence, $B = .044$ [95% CI: .028, .059], $t(1553.590) = 5.54$, $p < .001$. The main effect of depth showed that clips with greater depth resulted in higher ratings of a connection to others, $B = .061$ [95% CI: .028, .093], $t(1554.206) = 3.67$, $p < .001$, but this effect was qualified by a valence by depth interaction, $B = -.005$ [95% CI: -.009, -.002], $t(1551.633) = -2.79$, $p = .005$.

This interaction was examined by calculating and plotting the effects of depth at negative (-1 SD), average (M), and positive (+1 SD) levels of valence. As shown in Figure 2, for clips with negative valence, depth was moderately positively associated with ratings on a connection to others, ($B = 0.096$, $z = 3.69$, $p < .001$). For clips with average valence, depth was slightly positively associated with ratings on a connection to others, ($B = 0.061$, $z = 3.66$, $p < .001$). No significant relationship was found for clips with positive valence. Thus, the main effect of depth was obtained only for clips that were negative or average in valence.

Figure 2



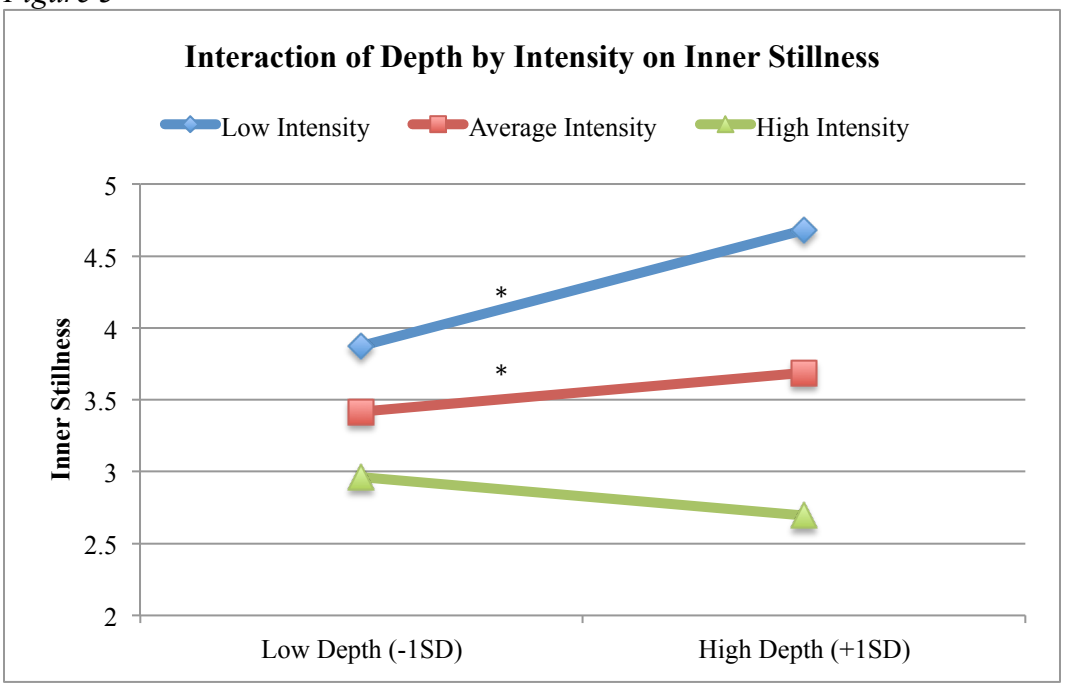
Rating 3: Inner Stillness

The MLM analysis on ratings of "inner stillness" revealed main effects of intensity and valence, and an interaction of intensity and depth. Not surprisingly, the main effect of intensity showed that clips with higher intensity were associated with lower ratings of inner stillness than clips with lower intensity, B = -.173 [95% CI: -.194, -.153], t(1561.847) = -16.7, p < .001. The main effect of valence showed that positive valence was associated with lower ratings of inner stillness, B = -.051 [95% CI: -.066, -.036], t(1556.954) = -6.81, p < .001.

The intensity by depth interaction, B = -.017 [95% CI: -.025, -.008], t(1557.455) = -3.70, p < .001, was examined by calculating and plotting the effects of depth at low (-1SD), average (M), and high (+1 SD) intensity. As shown in Figure 3, depth was negatively associated with ratings of inner stillness for clips with low intensity, (B = 0.104, z = 5.33, p < .001) but positively associated with ratings of inner stillness for clips

with average intensity, (B = 0.035, z = 2.21, p = 0.027). Depth was not related to inner stillness for clips with high intensity.

Figure 3



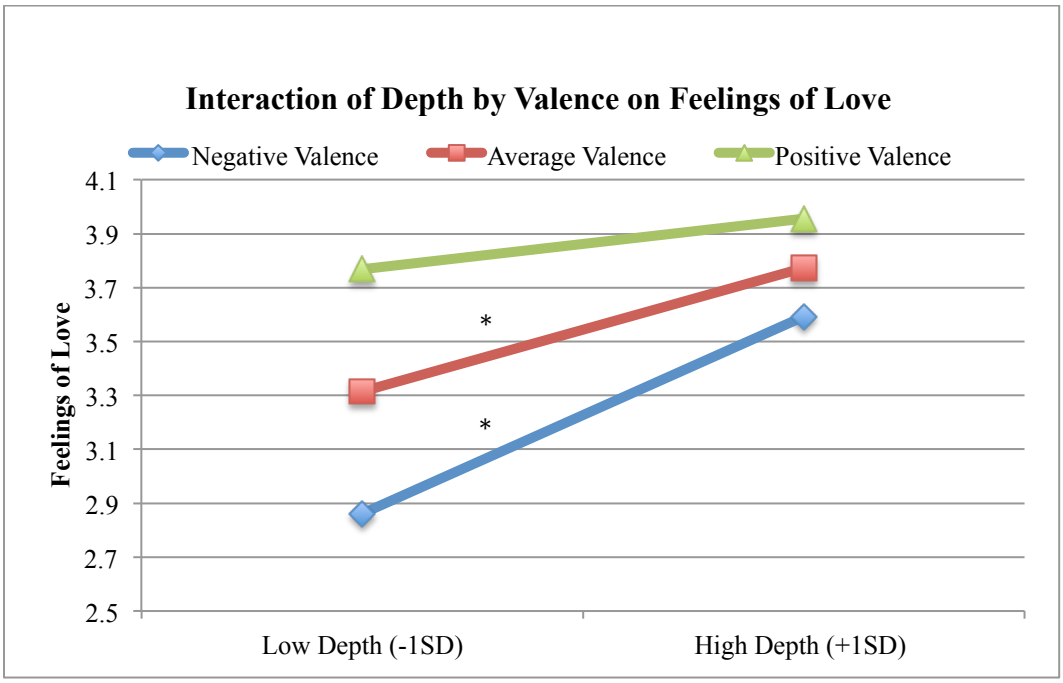
Rating 4: Feelings of Love for Other People

Ratings of "feelings of love for other people" revealed main effects of intensity, valence, depth, and spirituality, an interaction of valence and depth, and an interaction of intensity by spirituality. The main effect of intensity showed that clips with higher intensity resulted in lower ratings of a feeling of love for other people than lower intensity clips, B = -.161 [95% CI: -.182, -.140], t(1558.122) = -15.0, p < .001. The main effect of valence showed that positive valence caused higher ratings of feelings of love for other people than negative valence, B = .048 [95% CI: .033, .064], t(1553.756) = 6.22, p < .001. The main effect of depth showed that clips with greater depth resulted in higher ratings of feelings of love for other people than clips with less depth, B = .059

[95% CI: .027, .091], $t(554.375) = 3.64$, $p < .001$. The main effect of spirituality showed that participants who scored higher in spirituality rated their feelings of love for other people higher than those lower in spirituality, $B = .302$ [95% CI: .061, .543], $t(101.960) = 2.49$, $p = .014$.

The valence by depth interaction, $B = -.005$ [95% CI: -.009, -.002], $t(1551.790) = -2.82$, $p = .005$, was examined by calculating and plotting the effects of depth at negative (-1SD), average (M), and positive (+1SD) valence. As can be seen in Figure 4, depth was positively associated with feelings of love for clips with both negative valence, ($B = 0.094$, $z = 6.85$, $p < .001$), and average valence, ($B = 0.059$, $z = 3.63$, $p < .001$), although the effect was stronger for negative than average valence.

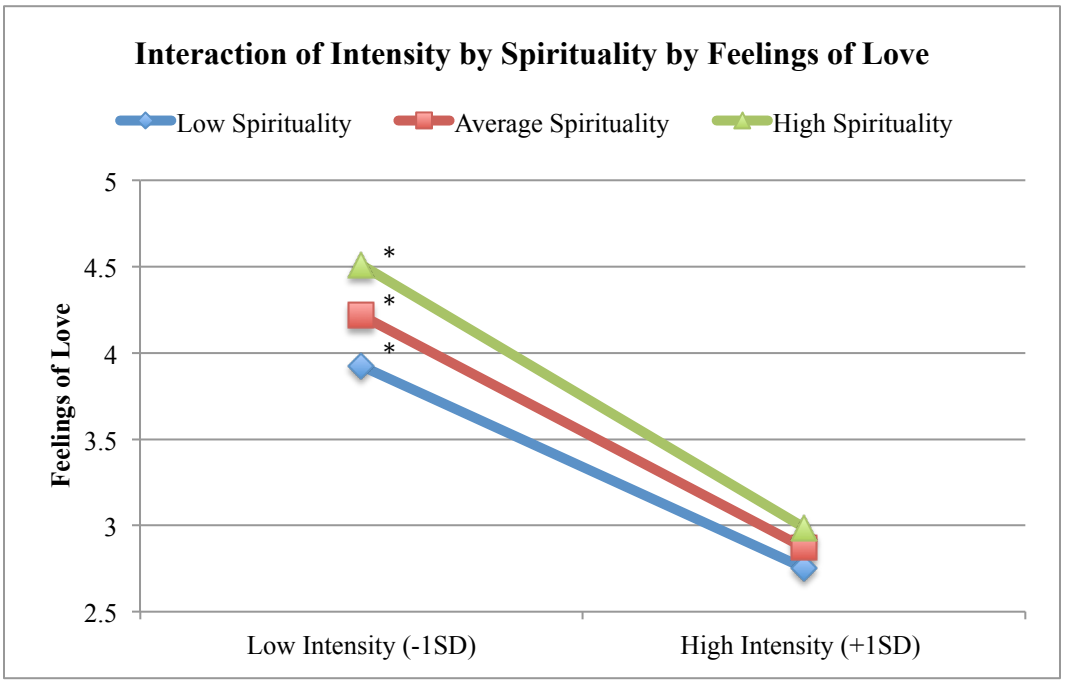
Figure 4



The intensity by spirituality interaction, $B = -.031$ [95% CI: -.056, -.006], $t(1549.339) = -2.43$, $p = .015$, was examined by calculating and plotting the effects of

intensity at low (-1SD), average (M), and high (+1SD) spirituality scores. As Figure 5 shows, intensity was negatively associated with ratings on feelings of love for participants low in spirituality, B = -0.140, z = -10.4, p < .001, average in spirituality, B = -0.161, z = -15.0, p < .001, and high in spirituality, B = -0.182, z = -12.8, p < .001. However, the relationship was stronger as spirituality increased.

Figure 5

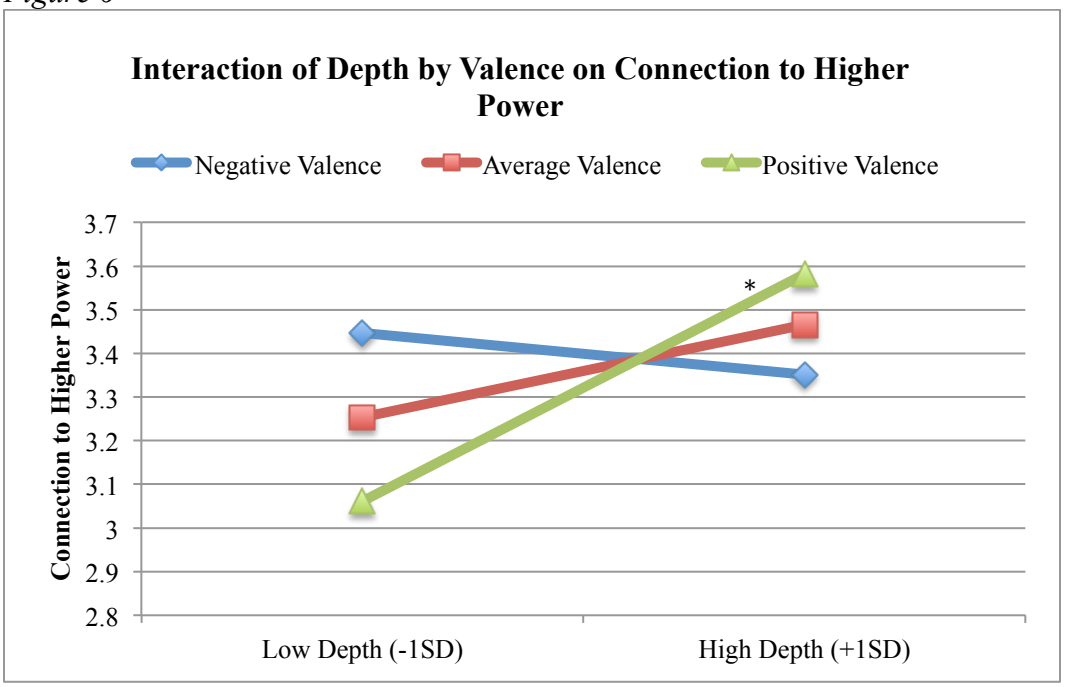


Rating 5: Connection to a Higher Being or Higher Power

Analyses of participants' ratings of "a connection to a higher being or higher power" revealed only an interaction of valence by depth, B = .006 [95% CI: .002, .010], t(1546.387) = 2.99, p =.003. Calculating and plotting the effects of depth at negative (-1SD), average (M), and positive (+1SD) levels of valence (Figure 6) showed that, for clips with positive valence, depth was positively associated with feeling a connection to a

higher power, (B = 0.067, z = 2.44, p = 0.0145). No significant relationships were found for clips with average or negative valence.

Figure 6



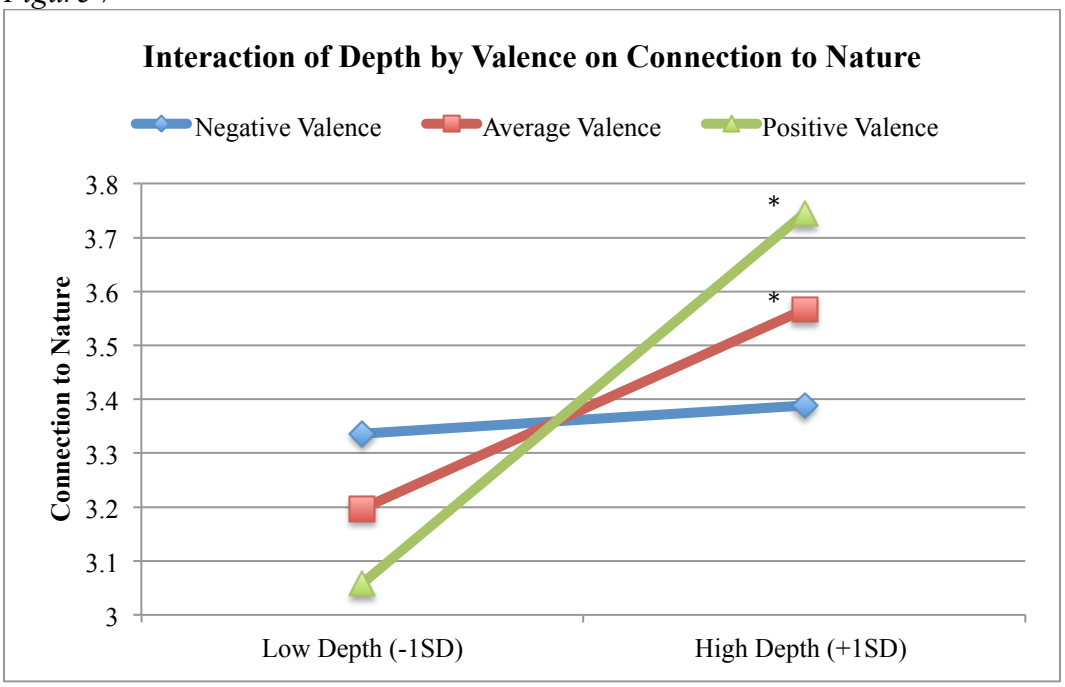
Rating 6: A Connection to Nature

The MLM analysis on feelings of "a connection to nature" revealed main effects of intensity and depth, an interaction of valence by depth, and an interaction of intensity by spirituality. The main effect of intensity showed that clips with higher intensity resulted in lower ratings of a connection to nature, B = -.176 [95% CI: -.199, -.154], t(1562.869) = -15.47, p < .001. The main effect of depth showed that clips with greater depth caused higher ratings of a connection to nature, B = .048 [95% CI: .014, .081], t(1558.543) = 2.76, p = .006.

The valence by depth interaction, B = .006 [95% CI: .002, .010], t(1555.553) = 3.10, p = .002, was examined by calculating and plotting the effects of depth at negative (-1SD), average (M), and positive (+1SD) valence. As illustrated in Figure 7, depth was

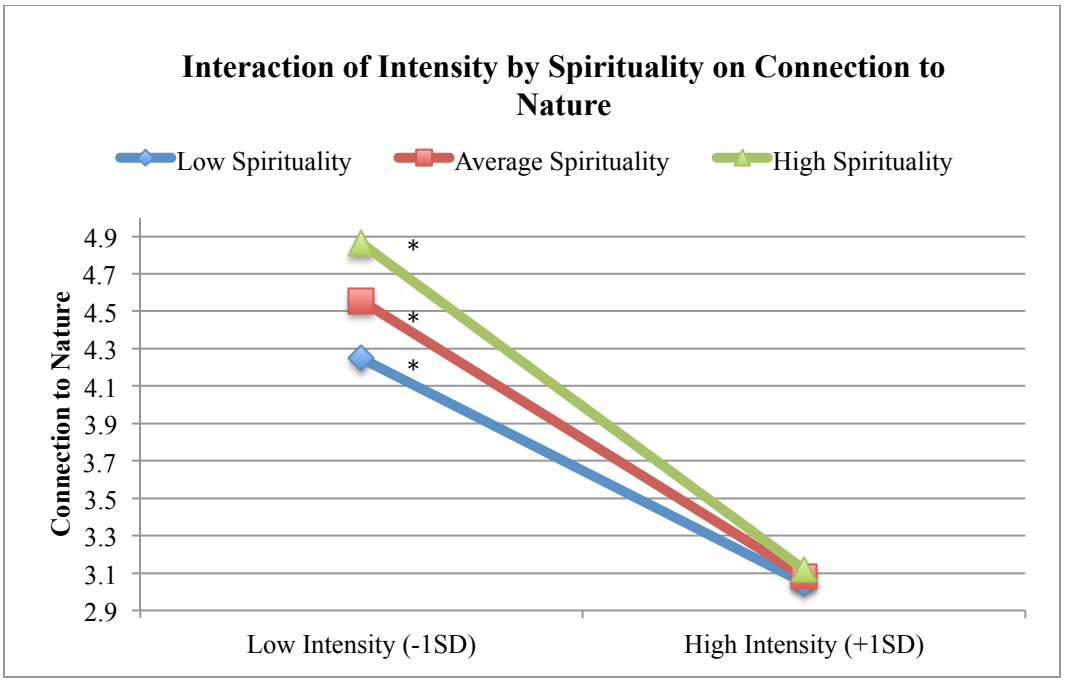
strongly positively associated with ratings of a connection to nature after participants' listened to clips with positive valence, (B = 0.088, z = 3.26, p = 0.001), and average valence (B = 0.048, z = 2.75, p = 0.006), but not negative valence.

Figure 7



After plotting the effects of intensity at low (-1SD), average (M), and high (+1SD) levels of spirituality, the intensity by spirituality interaction, B = -.048 [95% CI: -.075, -.021], t(1552.700) = -3.54, p < .001, showed that intensity was negatively associated with ratings of a connection to nature for all three groups (see Figure 8): low in spirituality, B = -0.144, z = -10.0, p < .001; average in spirituality, B = -0.176, z = -15.4, p < .001; high in spirituality, B = -0.209, z = -13.8, p < .001.

Figure 8



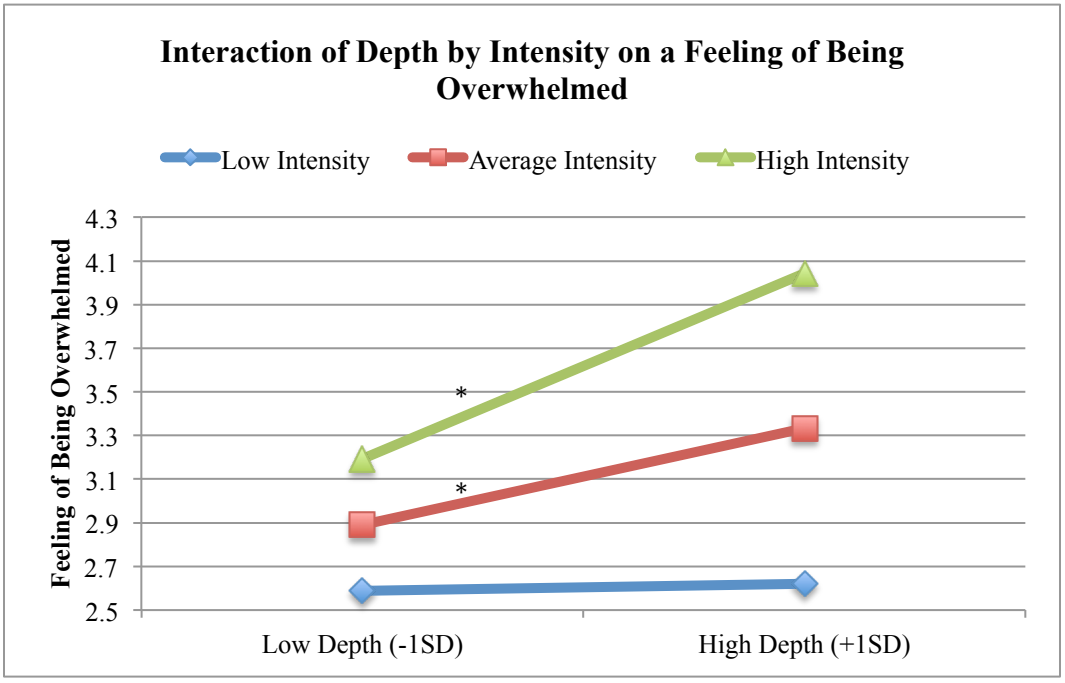
Rating 7: A Feeling of Being Overwhelmed

Main effects of intensity, valence, and depth were obtained on ratings of "a feeling of being overwhelmed," along with an interaction of intensity by depth, and an interaction of intensity by spirituality. Clips with higher intensity produced higher ratings of a feeling of being overwhelmed than clips of lower intensity, B = .121 [95% CI: .010, .143], t(1549.822) = 11.04, p < .001. In addition, positive valence was associated with lower ratings of a feeling of being overwhelmed than negative valence, B = -.026 [95% CI: -.042, -.011], t(1546.655) = -3.30, p = .001, and clips with greater depth were associated with higher ratings of a feeling of being overwhelmed than clips of lower depth, B = .057 [95% CI: .024, .090], t(1547.102) = 3.43, p =.001. So, overall, feelings of being overwhelmed were associated with intense, negatively valenced, and deeper music.

The intensity by depth interaction, B = .013 [95% CI: .003, .022], t(1546.976) = 2.66, p = .008, was examined by calculating and plotting the effects of depth at low (-

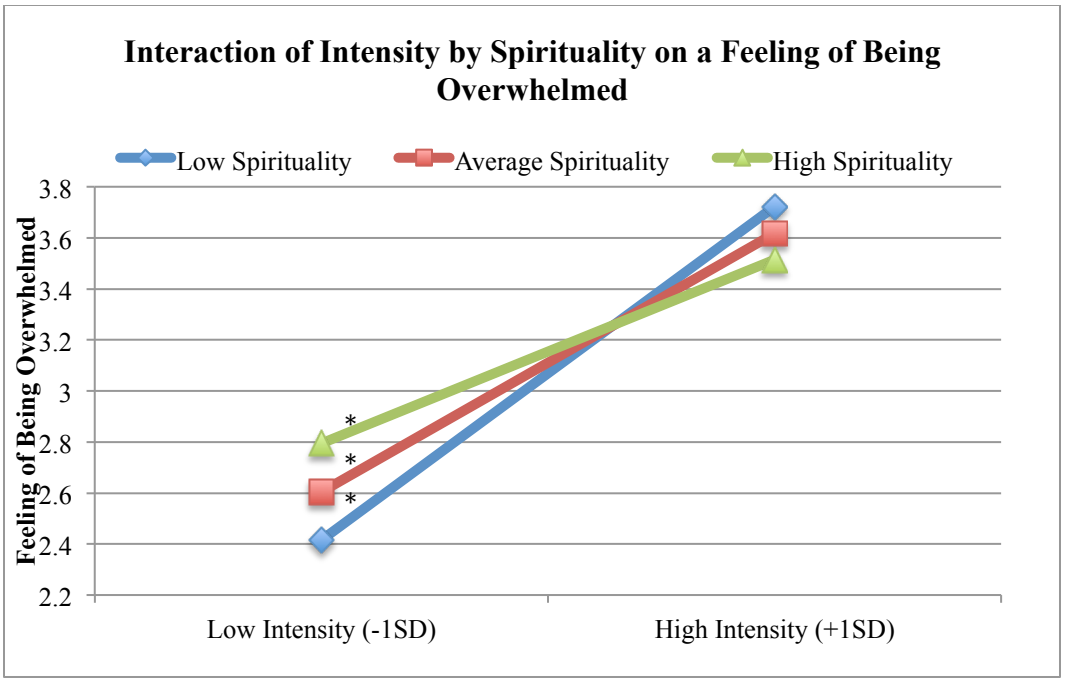
1SD), average (M), and high (+1SD) levels of intensity. As seen in Figure 9, for clips with high or average intensity, depth produced higher feelings of being overwhelmed: high intensity, $B = 0.110$, $z = 3.79$, $p < .001$; average intensity, $B = 0.057$, $z = 3.42$, $p < .001$.

Figure 9



The intensity by spirituality interaction, $B = -.052$ [95% CI: -.077, -.026], $t(1543.473) = -3.95$, $p < .001$, was examined by calculating and plotting the effects of intensity at low (-1SD), average (M), and high (+1SD) levels of spirituality. As Figure 10 shows, intensity increased feelings of being overwhelmed for participants who were low in spirituality, $B = 0.156$, $z = 11.4$, $p < .001$, average in spirituality, $B = 0.121$, $z = 11.0$, $p < .001$, and high in spirituality, $B = 0.086$, $z = 5.92$, $p < .001$.

Figure 10

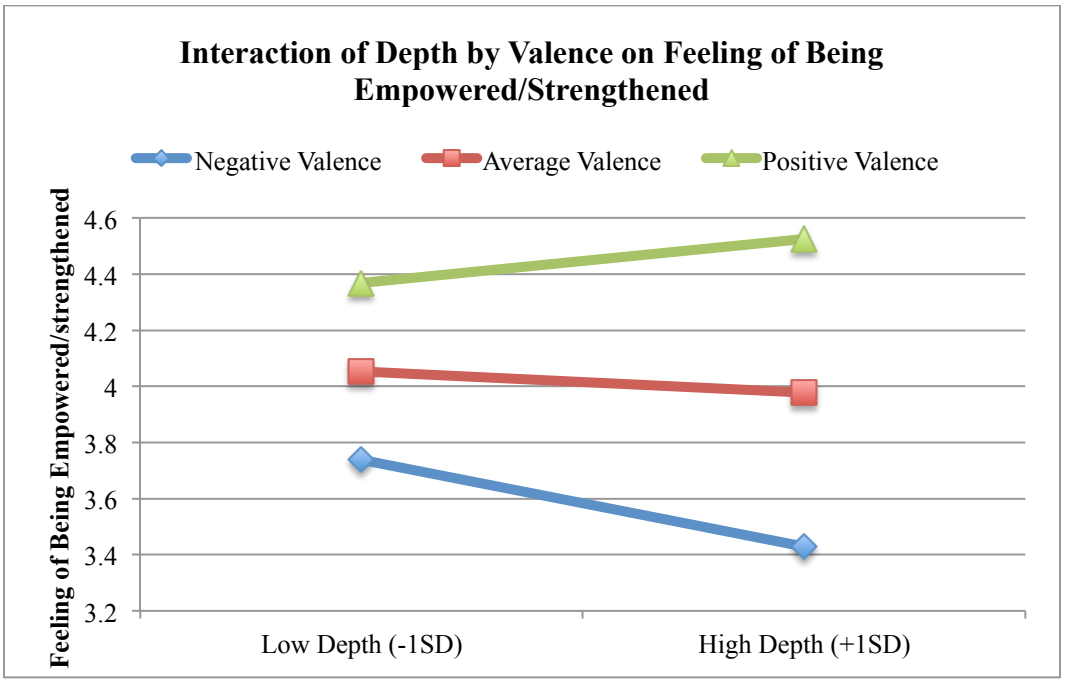


Rating 8: A Feeling of Being Empowered or Strengthened

Main effects of intensity and valence, an interaction of valence by depth, an interaction of intensity by spirituality, and an interaction of valence by spirituality were obtained on ratings of "a feeling of being empowered or strengthened." Clips with higher intensity produced higher ratings of feeling empowered or strengthened, $B = .063$ [95% CI: .040, .087], $t(1564.339) = 5.34$, $p < .001$, and clips with positive valence were associated with higher ratings of a feeling of being empowered or strengthened than negatively-valenced clips, $B = .068$ [95% CI: .051, .085], $t(1559.114) = 7.93$, $p < .001$.

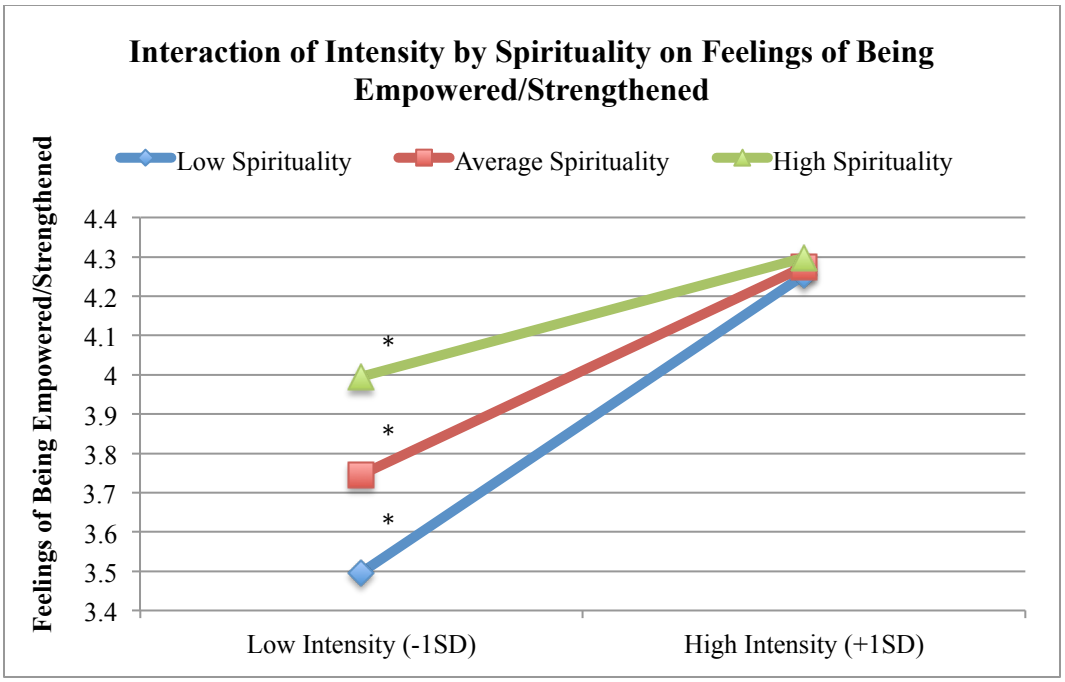
The valence by depth interaction was also significant, $B = .005$ [95% CI: .001, .009], $t(1556.758) = 2.47$, $p = .014$. Calculating and plotting the effects of depth at negative (-1SD), average (M), and positive (+1SD) levels of valence showed that, as seen in Figure 11, there are no significant relationships for depth by valence at the $\alpha = 0.05$ level.

Figure 11



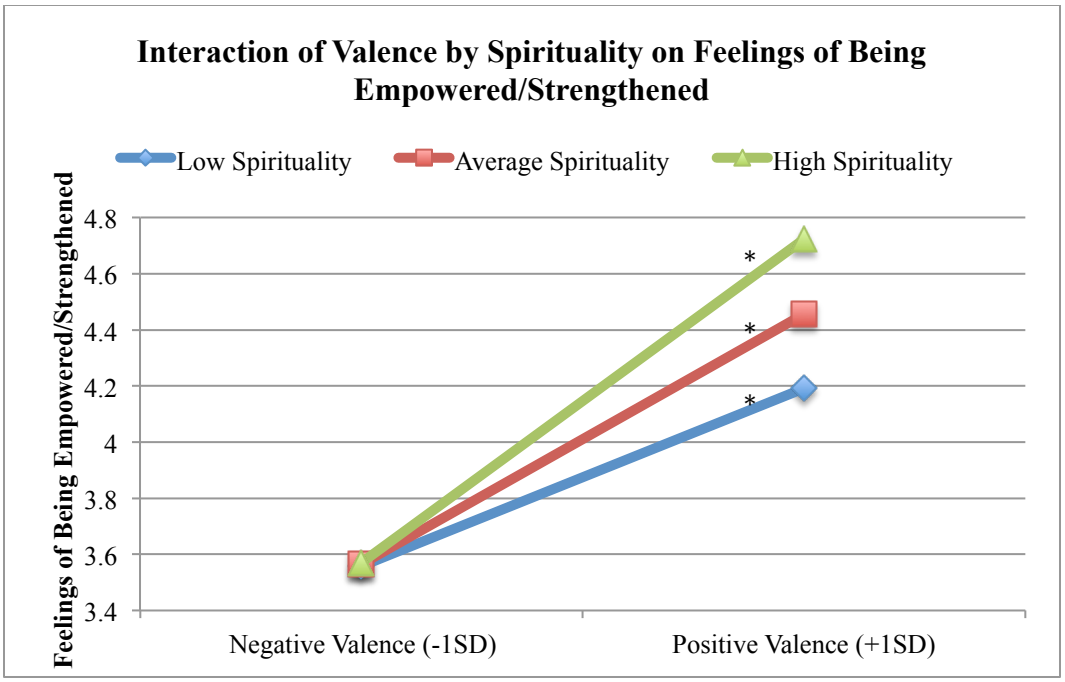
The intensity by spirituality interaction, B = -.040 [95% CI: -.068, -.012], $t(1553.794) = -2.83$, $p = .005$, was examined by calculating and plotting the effects of intensity at low (-1SD), average (M), and high (+1SD) levels of spirituality. As Figure 12 illustrates, intensity was positively associated with feelings of being empowered/strengthened at all levels of spirituality: low spirituality, $B = 0.091$, $z = 6.08$, $p < .001$; average spirituality, $B = 0.063$, $z = 5.32$, $p < .001$; high spirituality, $B = 0.036$, $z = 2.30$, $p = 0.022$.

Figure 12



The valence by spirituality interaction, $B = .029$ [95% CI: .006, .052], $t(1556.460) = 2.49$, $p = .013$, was examined by calculating and plotting the effects of valence at low (-1SD), average (M), and high (+1SD) levels of spirituality. As can be seen in Figure 13, positive valence clips produced higher feelings of being empowered/strengthened for individuals low in spirituality ($B = 0.048$, $z = 4.10$, $p < .001$), average in spirituality ($B = 0.068$, $z = 7.91$, $p < .001$), and high in spirituality ($B = 0.089$, $z = 7.53$, $p < .001$).

Figure 13

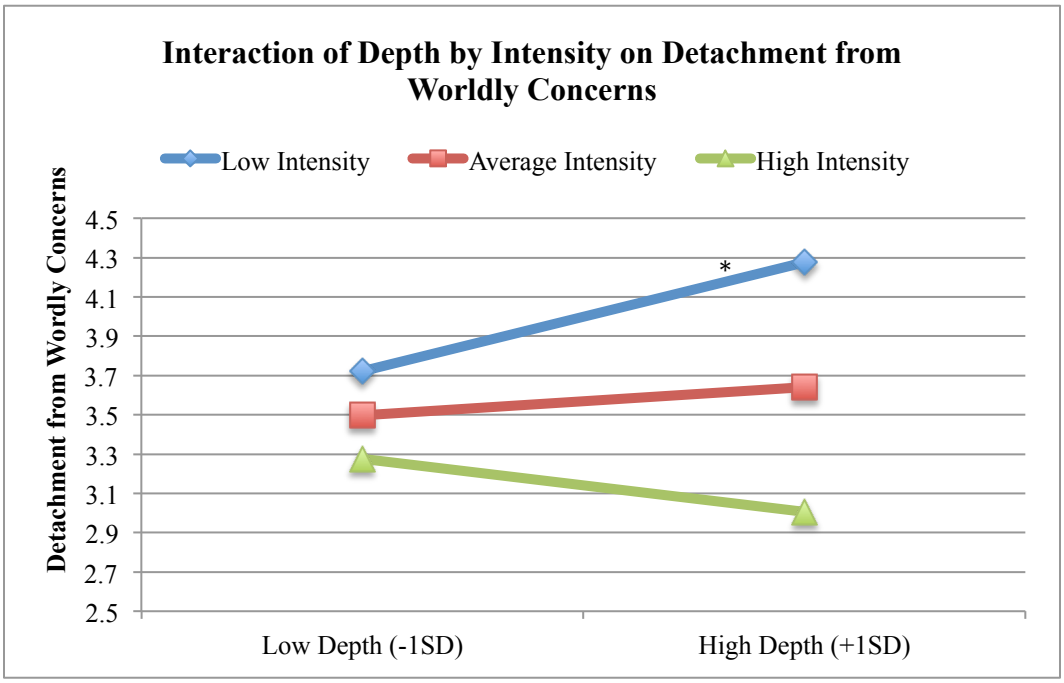


Rating 9: Detachment from Worldly Concerns

Analysis of participants' ratings of "detachment from worldly concerns" revealed main effects of intensity and valence, an interaction of intensity by depth, and an interaction of intensity by spirituality. Clips with higher intensity produced lower ratings of detachment from worldly concerns than clips with lower intensity, B = -.103 [95% CI: -.126, -.079], t(1560.926) = -8.61, p < .001. Clips with positive valence produced higher ratings of detachment than clips with negative valence, B = .034 [95% CI: .017, .051], t(1556.165) = 3.94, p < .001.

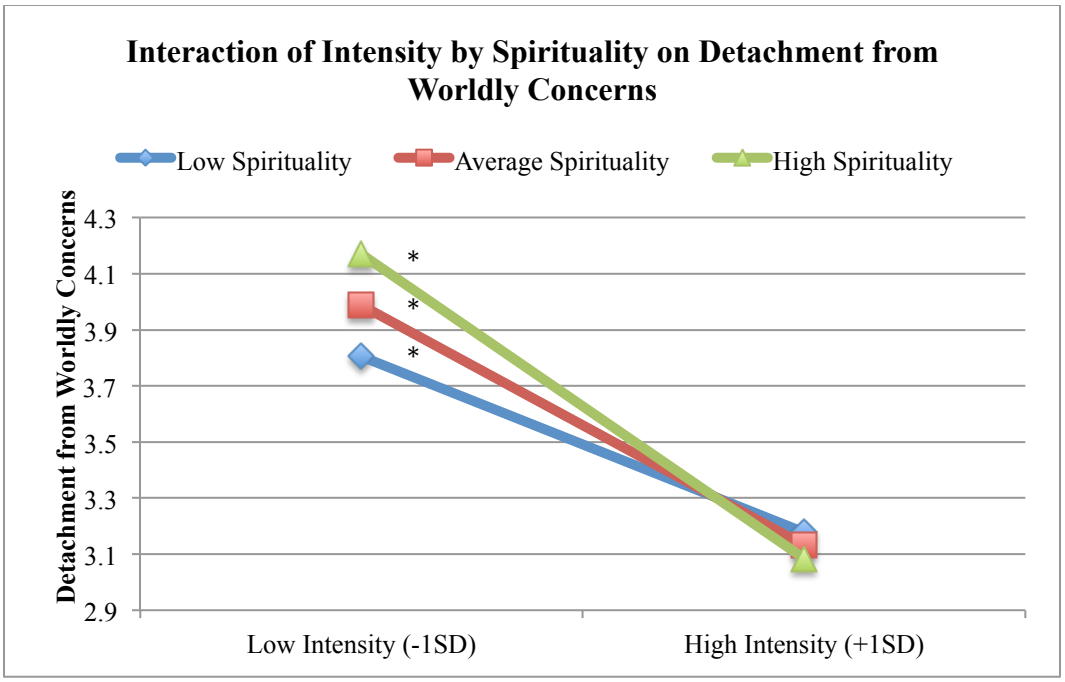
The intensity by depth interaction, B = -.013 [95% CI: -.022, -.003], t(1556.652) = -2.46, p = .014, was examined by calculating and plotting the effects of depth at low (-1SD), average (M), and high (+1SD) levels of intensity. (See Figure 14.) For clips with low intensity, depth caused more detachment from worldly concerns, B = 0.071, z = 3.18, p = 0.002.

Figure 14



The intensity by spirituality interaction, B = -.040 [95% CI: -.068, -.012], $t(1551.334) = -2.83$, $p = .005$, was examined by calculating and plotting the effects of intensity at low (-1SD), average (M), and high (+1SD) levels of spirituality (see Figure 15). Intensity was negatively associated with detachment from worldly concerns for participants low in spirituality, (B = -0.075, z = -4.63, $p < .001$), participants average in spirituality, (B = -0.103, z = -8.58, $p < .001$), and participants high in spirituality, (B = -0.130, z = -8.96, $p < .001$).

Figure 15

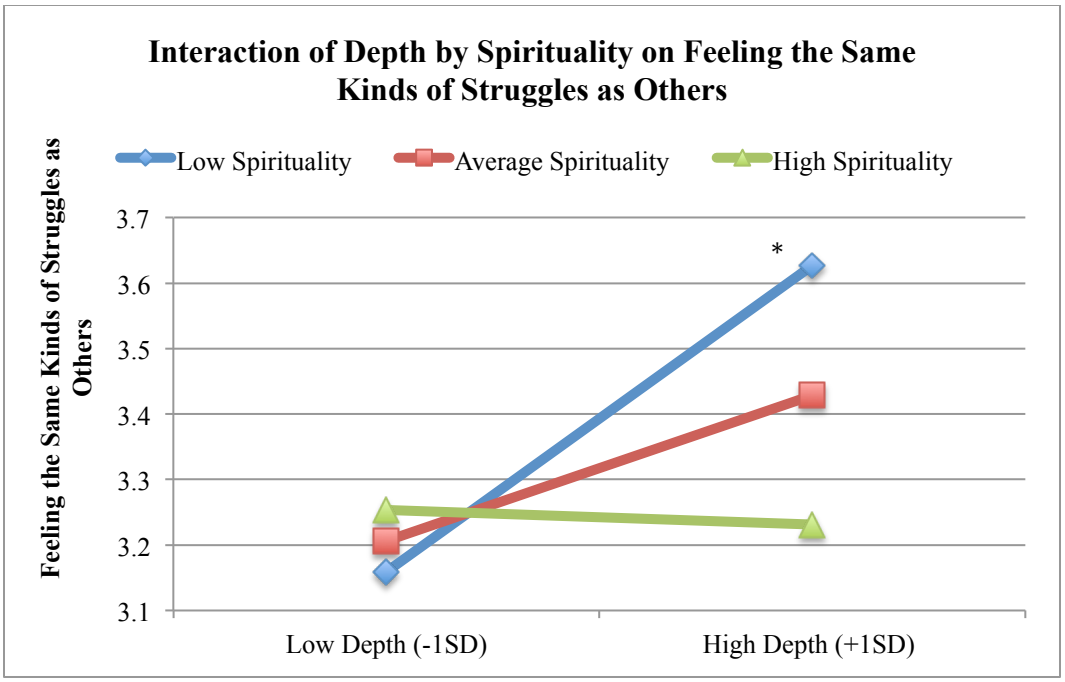


Rating 10: Feeling the Same Kinds of Struggles as Others

Ratings of "feeling the same kinds of struggles as others" revealed a main effect of valence and an interaction of depth by spirituality. First, positive valence was associated with lower ratings of feeling the same kinds of struggles as others than negative valence, B = -.044 [95% CI: -.059, -.028], t(1548.658) = -5.47, p < .001.

The depth by spirituality interaction, B = -.047 [95% CI: -.083, -.010], t(1545.917) = -2.51, p = .012, was examined by calculating and plotting the effects of depth at low (-1SD), average (M), and high (+1SD) levels of spirituality. As seen in Figure 16, depth caused participants who were low in spirituality to feel that they experienced the same kinds of struggles as others, B = 0.060, z = 2.85, p = 0.004, but this effect was not significant for participants who were average or high in spirituality.

Figure 16



Rating 11: Relaxation

The MLM analysis on ratings of "relaxation" revealed main effects of intensity and depth. Clips with higher intensity were associated with lower ratings of relaxation than clips of lower intensity, B = -.268 [95% CI: -.289, -.246], t(1572.252) = -24.1, p < .001, and clips with greater depth were associated with higher ratings of relaxation than clips with less depth, B = .046 [95% CI: .013, .078], t(1566.872) = 2.72, p = .006.

Rating 12: Desire to do Good Things

Analyses of participants' ratings of "desire to do good things" revealed main effects of intensity, valence, and depth. Clips with higher intensity produced lower ratings of a desire to do good things, B = -.103 [95% CI: -.125, -.081], t(1562.473) = -9.18, p < .001, clips with positive valence produced higher ratings of a desire to do good things, B = .095 [95% CI: .080, .111], t(1557.501) = 11.77, p < .001, and clips with

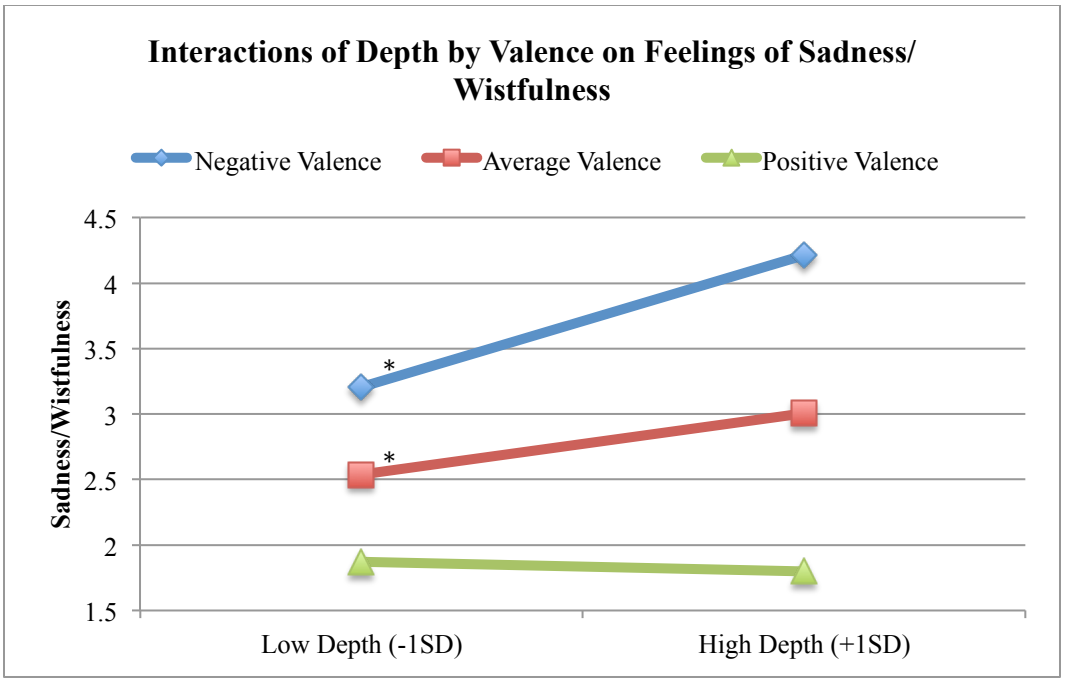
greater depth produced higher ratings of a desire to do good things, B = .043 [95% CI: .009, .076], t(1558.207) = 2.51, p = .012.

Rating 13: Feelings of Sadness or Wistfulness

The MLM analysis on ratings of "feelings of sadness or wistfulness" revealed main effects of valence and depth, an interaction of valence by depth, and an interaction of valence by spirituality. The main effect of valence showed that clips with positive valence were associated with lower ratings of sadness or wistfulness, B = -.149 [95% CI: -.165, -.133], t(1562.124) = -18.3, p < .001. The main effect of depth showed that clips with greater depth were associated with higher ratings of sadness or wistfulness, B = .068 [95% CI: .035, .101], t(1562.945) = 4.00, p < .001.

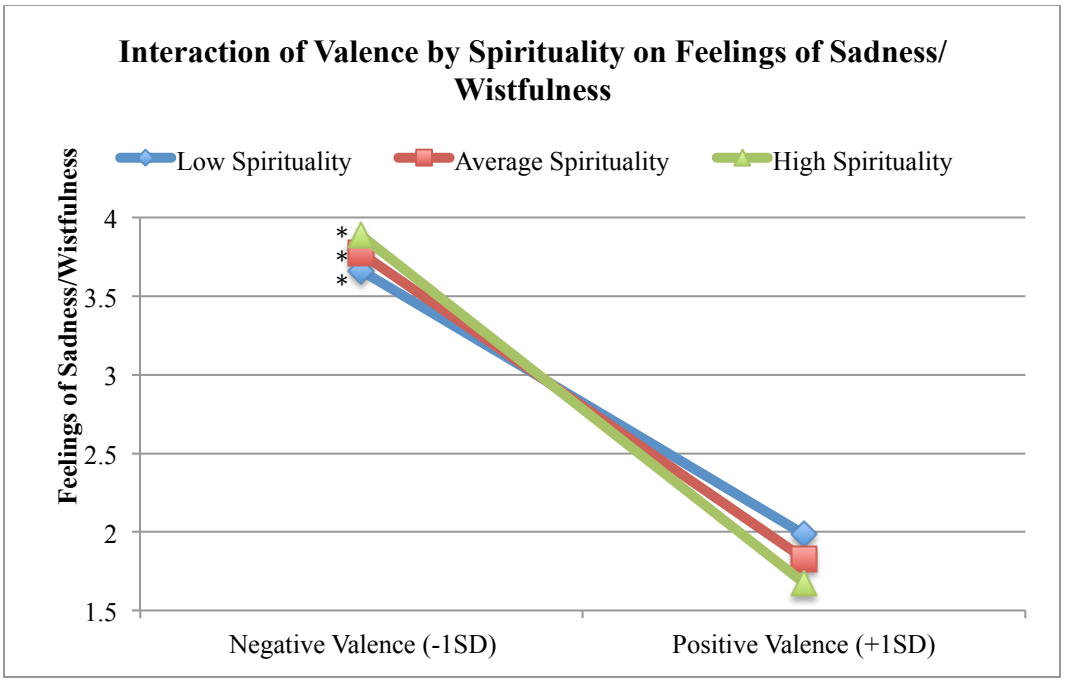
The valence by depth interaction, B = -.012 [95% CI: -.016, -.008], t(1559.523) = -6.07, p < .001, was examined by calculating and plotting the effects of depth at negative (-1SD), average (M), and positive (+1SD) levels of valence. As illustrated in Figure 17, depth was positively associated with ratings of feelings of sadness/wistfulness for clips average in valence, (B = 0.068, z = 3.99, p < .001), and for clips with negative valence (B = 0.147, z = 5.49, p < .001).

Figure 17



The valence by spirituality interaction, B = -.030 [95% CI: -.052, -.008], t(1559.188) = -2.71, p = .007, was examined by calculating and plotting the effects of valence at low (-1SD), average (M), and high (+1SD) levels of spirituality (see Figure 18). Not surprisingly, positive valence was negatively associated with feelings of sadness/wistfulness for participants low in spirituality, (B = -0.128, z = -11.5, p < .001), average in spirituality, (B = -0.148, z = -18.2, p < .001), and high in spirituality, (B = -0.169, z = -15.3, p < .001).

Figure 18

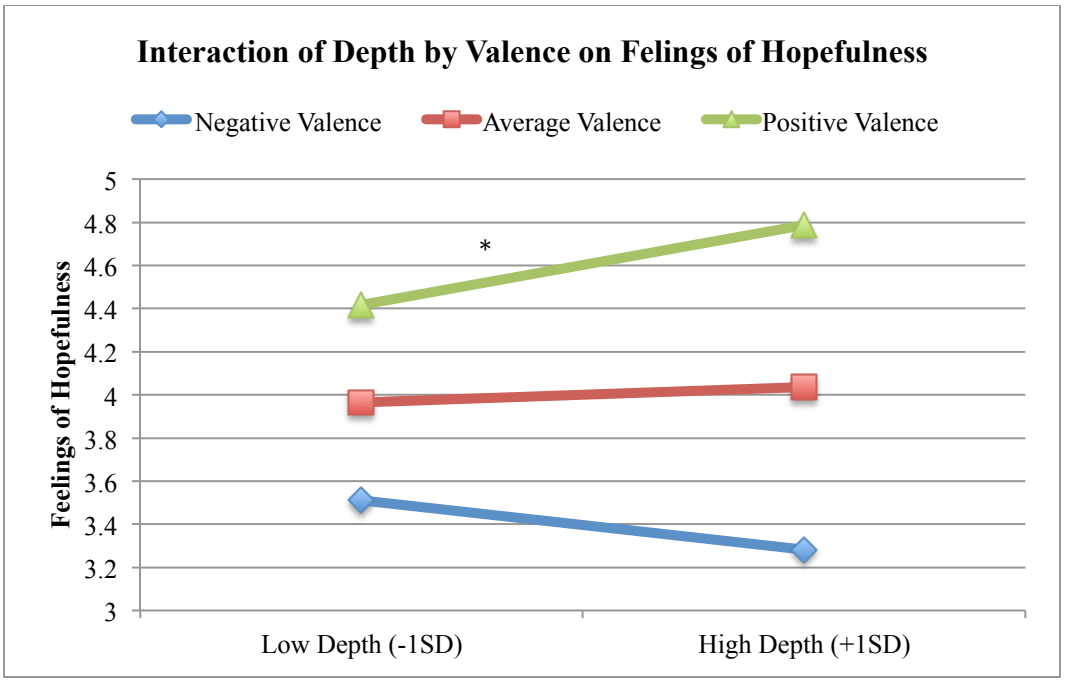


Rating 14: Feelings of Hopefulness

Analyses of participants' ratings of "feelings of hopefulness" revealed main effects of intensity and valence, and an interaction of valence by depth. Clips with higher intensity produced lower ratings of hopefulness, B = -.092 [95% CI: -.116, -.068], $t(1562.457) = -7.59$, $p < .001$, and clips with positive valence produced higher ratings of hopefulness, B = .092 [95% CI: .075, .109], $t(1557.493) = 10.5$, $p < .001$.

The valence by depth interaction, B = .006 [95% CI: .002, .010], $t(1555.255) = 2.78$, $p = .006$, was examined by calculating and plotting the effects of depth at negative (-1SD), average (M), and positive (+1SD) levels of valence. As shown in Figure 19, for clips with positive valence, depth was positively associated with feelings of hopefulness, ($B = 0.048$, $z = 3.09$, $p = .002$).

Figure 19



Discussion

The goal of this study was to examine the effects of the three fundamental characteristics of music – intensity, valence, and depth (Greenberg et al., 2016) – on feelings and thoughts associated with spiritual experiences. Throughout the world, music is used in religious and spiritual contexts, from the traditional djembe drum used in African healing ceremonies to the pipe organ used in many Western churches. The use of music in spiritual settings suggests that certain qualities in music may evoke spiritual feelings. The results of this study support this idea and specifically indicate that variations of intensity, valence, and depth in instrumental music are significantly associated with ratings of spiritual feelings.

To organize the complex patterns of findings across the 14 ratings, I will first discuss the main effects of intensity, valence, and depth. I will then discuss the two-way

interactions that appeared with sufficient regularity that patterns can be discerned, specifically the interactions of valence by depth and intensity by spirituality.

Music Intensity

The intensity of the music clips was significantly related to 10 of the 14 subjective ratings. Specifically, intensity was negatively correlated with ratings that involved a connection to others (Rating 2), inner stillness (3), feelings of love for other people (4), a connection to nature (6), detachment from worldly concerns (9), relaxation (11), desire to do good things (12), and hopefulness (14). On the other hand, intensity was positively correlated with a feeling of being overwhelmed (7) and a feeling of being empowered or strengthened (8). Intensity was not associated with ratings that involved a deep emotional feeling (1), a connection to a higher being or higher power (5), feeling the same kinds of struggles as others (10), or feelings of sadness or wistfulness (13).

Of course, it's not surprising that intense music would induce lower feelings of inner stillness (3) and relaxation (11) than less intense music, or that intense music would increase feelings of being overwhelmed (7) and strengthened (8). This finding is, to a certain extent, in-line with research that found that loudness, measured as the physical strength and amplitude of the music, is associated with emotions of power or anger (Gabrielle & Stromboli, 2001).

However, it is perhaps less obvious that less intense music would induce feelings of connection to other people (2) and to nature (6). To my knowledge, no study has looked at the relation between feelings of connection and intense music in particular, and the finding that feelings of connection are stronger after listening to less intense music suggests that feelings of connection are evoked more through peaceful music than intense

music. This finding could have clinical implications for music therapy. Understanding what kinds of music correlate with feelings of connection could come in useful for selecting songs used in therapy sessions. Patients with emotional detachment, as one example, may benefit from less intense music as it is associated with feelings of connection.

Music Valence

Valence was significantly correlated with 9 of the 14 ratings. Positive valence music was associated with a connection to others (2)**,** feelings of love for other people (4), a feeling of being empowered/ strengthened (8), detachment from worldly concerns (9), a desire to do good things (12), and hopefulness (14). Negative valence music was associated with a deep emotional feeling (1), inner stillness (3), a feeling of being overwhelmed (7), feeling the same kinds of struggles as others (10), and feelings of sadness or wistfulness (13).

Although research has found that prosocial music can lower aggression and raise prosocial tendencies, these studies have studied only songs with prosocial lyrics (Greitemeyer, 2009a, 2009b, 2011; Jacob, Guegon, & Boulbry, 2010). This finding that positively valenced music, without lyrics, is associated with prosocial tendencies as well suggests that instrumental music can also elicit positive feelings toward others. This finding could, moreover, add to existing literature regarding the potential of music to enhance empathy, which has looked at how active music-making affects empathy development (Kokal, Engel, Kirschner, Keysers, 2011; Rabinowitch, Cross, & Burnard, 2012). Future studies focusing on instrumental music are needed to clarify the relationship between positive-valence music, prosocial tendencies, and empathy.

Although negative correlations between valence and feelings of sadness or wistfulness (13) might be expected, other findings are less so. In particular, negative correlations between valence and both a feeling of being overwhelmed (7), and inner stillness (3), possibly imply that negative valence music evokes conflicting emotions within an individual. Indeed, inner stillness seems to suggest a meditative or peaceful state, which seems at odds with feeling overwhelmed. Although it is hard to explain this result due to the dearth of research on this specific matter, it is possible to imagine situations in which a feeling of inner stillness could be accompanied with feelings related to a "positive" sense of being overwhelmed, in a manner of saying. Perhaps language played a role here, and participants interpreted a feeling of being overwhelmed as suggesting feelings of awe and wonder rather than a negative sense of feeling overburdened or overloaded.

Music Depth

Depth correlated positively with 7 of the 14 ratings, including a deep emotional feeling (1), a connection to others (2), feelings of love for other people (4), a connection to nature (6), a feeling of being overwhelmed (7), relaxation (11), and feelings of sadness or wistfulness (13). Depth was not significantly negatively correlated with any of the 14 ratings.

It made sense that depth – which was assessed by the psychological attributes of intelligent, sophisticated, complex, poetic, and inspiring – was positively correlated to ratings related to spirituality. This is in-line with previous qualitative research that described spirituality as the "depth dimension of life... linked to artistic creativity and to

feelings of beyondness" (Yob, 2010). It would have been rather surprising if spiritual feelings were associated with more shallow music.

Somewhat unexpectedly, however, depth was positively correlated with only half of the ratings on spirituality, less than the other two dimensions of valence and intensity, which correlated with 9 out of 14 and 10 out of 14 ratings, respectively. However, whereas the other two dimensions were both positively and negatively correlated with the ratings, only positive correlations were seen with depth. This suggests that while spiritual feelings can be associated with both positive and negative valence, and with high and low levels of intensity, they are usually associated only with high depth.

Of the 14 ratings, only a connection to a higher power (5) was not significantly correlated with any of the three psychological dimensions of music. This was particularly surprising for depth and because dimensions correlated in the same directions with connection to nature (6) and connection to others (2). This inconsistency possibly suggests that connection to a higher power is more different than similar to connection to nature and other people. Although research has studied the connective and emotional potential of music (Cross & Morley, 2009; Davies, 2001; Liu & Robertson, 2011; Lundqvist, Carlsson, Hilmersson & Juslin, 2009; Scherer 2004), this finding implies that different kinds of connection are elicited by different musical characteristics. More research in this area is needed to illuminate the relationship between musical traits and feelings of connection to different entities.

On the other end, three ratings correlated with all three psychological dimensions. A connection to others (2) and feelings of love for other people (4) correlated negatively with intensity, positively with valence, and positively with depth. Additionally, a feeling

of being overwhelmed (7) correlated positively with intensity, negatively with valence, and positively with depth. Remarkably, while all three of the ratings correlated with high depth, the correlations for valence and intensity ran in different directions for the former two (a connection to others and feelings of love) versus the latter (a feeling of being overwhelmed). This is consistent with the traditional idea that spirituality can involve somewhat conflicting experiences, as described, for instance, as "[being] associated with stillness, silence, and peace, and, alternatively, with ecstatic surges and exuberant shouts" (Yob, 2010). What this finding further suggests, however, is that these conflicting experiences are related to differences in the fundamental psychological dimensions of music, specifically in intensity and valence.

On a broader level, the significant results involving these predictor variables suggest that there is something within music, in the "personality" of the piece, as described by Greenberg et al. (2010), that evokes feelings associated with spirituality. This could provide support that the music itself can convey real emotions (Cooke, 1959; Scherer, 2004), instead of findings that suggest music indirectly elicits emotions via evoking an emotional, episodic memory in listeners (Kivy, 1999; Konenci, 2008a, 2008b; Zangwill, 2004), or that emotions are subjective in the sense that they are projected into the music by the listener (Davies, 2001). The results of this study contrast with the findings of a previous study, which found that none of a selection of instrumental pieces aroused a feeling of reverence in listeners (Schoen, 1927). Schoen concluded that music reported to arouse a devotional attitude had probably been previously heard with sacred words or was reminiscent of sacred music, but that there was nothing "within" the instrumental music that caused these feelings. However, this, more comprehensive study

that used 14 ratings on spirituality, instead of one trait, suggests that there are intrinsic, psychological features within music that are significantly associated with feelings of spirituality.

Valence by Depth Interactions

The moderating effects of one predictor variable on another also created many interesting patterns of results. In particular, the valence of the music moderated the relationship between depth and the following ratings: a connection to others (2), feelings of love for other people (4), a connection to a higher power (5), a connection to nature (6), sadness/wistfulness (13), and hopefulness (14). Three ratings had similar patterns of interactions, as depth increased feelings of connection to others (2), love for other people (4), and sadness/wistfulness (13) only for music clips that were characterized by negative or average valence. Additionally, two other ratings had similar patterns of interactions, as depth increased ratings of connection to a higher power (5) and hopefulness (14) only for positive valence music.

As a main effect, depth correlated positively with 7 of the 14 ratings. However, valence by depth only had a significant positive correlation with only 4 of 14 ratings. One of these four ratings was not correlated with depth as a main effect. Indeed, although there were no significant correlations between depth and ratings of connection to a higher power, (5), a significant positive correlation between depth and connection to a higher power (5) appeared for positive valence music. As discussed earlier, connection to a higher power (5) was unique in that it was the only rating not affected by the three dimensions of music. This two-way interaction is the only case where a significant relationship occurs between depth and a connection to a higher power. This finding

suggests that connection to a higher power is, in fact, related to at least one of the three psychological dimensions as originally assumed. Indeed, a MLM analysis with other Level 2 parameters, such as individual differences in religiosity, could potentially reveal more significant results for this rating.

Moderating Effects of Spirituality

Although personal spirituality as measured by the Liu and Robertson (2011) Spirituality Scale, as a main effect, did not relate to any of the 14 ratings, it moderated many of the relationships between the three psychological dimensions and the ratings of spiritual feelings. In particular, spirituality scores moderated the effects of music intensity on ratings of a deep emotional feeling (1), a connection to nature (6), a feeling of being overwhelmed (7), a feeling of being empowered/ strengthened (8), and detachment from worldly concerns (9). It also moderated the effects of valence on ratings of a feeling of being empowered and strengthened (8) and feelings of sadness/wistfulness (13). In total, personal spirituality levels moderated more than half (8 out of 14) effects of intensity or valence.

It is rather surprising that spirituality moderated so many effects of intensity and, to a lesser extent, valence. It was additionally surprising that these significant results only arose with two-way interactions involving spirituality, and not when spirituality was tested by itself. This pattern suggests that individual levels of spirituality between people do not play as big of a role in eliciting feelings of spirituality as the psychological dimensions of music do.

The fact that significant results arose from the interactions between personal spirituality and the psychological dimensions of music, however, suggests that feelings of

spirituality cannot be easily explained by a) personal spirituality levels or b) the psychological characteristics of the musical selection. This may seem self-evident, but this is an important realization because the current debate over the "realness" of musical emotions often oversimplifies these two sides: that music either conveys real emotions (Cooke 1959; Davis, 2001; Scherer, 2004) or that the emotions in music are subjective in the sense that they are projected into the music by the listener, and do not exist as an objective component of the music itself (Kivy, 1999; Konenci, 2008; Zangwill, 2004). Without getting into the semantics of objective versus subjective, this study suggests that these two ideas are not mutually exclusive, and that both the intrinsic qualities of music and individual differences play a role in evoking feelings of spirituality in listeners.

Specifically, these results found that these individual spirituality differences play a larger role when the music is varying in intensity and, to a lesser extent, valence, than when the music is varying in depth. This could potentially explain the lack of significant results for the Lowis and Hughes (1997) study, in which they found that variations in personal spirituality had no significant correlations with emotional responses to "spiritual" versus "secular" pieces. It is possible that the music choices used by Lowis and Hughes (1997), intended to capture variations between "spiritual" and "non-spiritual" music, unintentionally varied across more than one psychological dimension of music: depth. The results of this study suggest that spiritual people are less sensitive to changes in music depth than they are to changes in intensity or valence, and could possibly explain why they found no significant results, in contrast to the many significant results found in this study. This study suggests that different people, regardless of personal spirituality levels, respond similarly to the depth of a piece.

These results also beg the question: why are people higher in spirituality more sensitive to the effects of music? It is possible that "spiritual" people are spiritual precisely because stimuli in their environment, including music, produce the emotional effects that are associated with spiritual experience. There may be something in spirituality that involves a heightened sensitivity to changes in external stimuli. Additionally, it is possible that spiritual people score higher in openness as well, and have a greater curiosity and appreciation for art, adventure, and novel experiences.

The Psychological Impact of Music

The three psychological dimensions of music mapped out by Greenberg et al. (2016) were associated with many reactions to the music clips, suggesting that their model can be applied in future psychological studies on music. Each of the three psychological dimensions (intensity, valence, and depth) was significantly associated with ratings that were designed to capture elements of spiritual experience. Moreover, two-way interactions of valence by depth and of intensity by spirituality moderated the effects of music on participants' reactions.

Certain findings were expected, and others were surprising for each of the psychological dimensions. Finding that ratings on inner stillness (3) and relaxation (11) were negatively correlated with music intensity supported, to an extent, findings that musical loudness is associated with feelings of power or anger (Gabrielle & Stromboli, 2001). However, this study also provided support for the contrary, by showing that less intense music was associated with higher ratings on inner stillness and relaxation.

It was somewhat surprising that ratings on connection to nature and others were also negatively associated with intensity. Indeed, while it is generally understood that

music can connect people, promote group cohesion and bonding, and promote cooperative behavior (Cross & Morley, 2009; Davies, 2001; Liu & Robertson, 2011; Scherer 2004; Lundqvist, Carlsson, Hilmersson & Juslin, 2009), it is not well understood whether particular music types evoke more connective feelings than other types. The findings of this study suggest that music with lower intensity can better promote feelings of connection to nature and others. Moreover, another interesting relationship was finding that positive valence music increases pro-social inclinations, specifically feelings of love for other people (4) and a desire to do good things (12). Although research has found that prosocial song lyrics can elicit prosocial tendencies (Greitemeyer, 2009a, 2009b, 2011; Jacob, Guegon, & Boulbry, 2010), the present research suggests that positively valence instrumental music can also increase prosocial feelings.

The two-way interactions raised interesting patterns as well. It was surprising that that connection to a higher power was associated with different variations on the three psychological dimensions than the other two forms of connection. Although both connection to nature and others were negatively correlated with intensity and positively correlated with depth, a connection to a higher power was not correlated with any psychological dimension until the interactions of valence by depth were tested. This could suggest that feelings of connection to a higher power is more rare than the other forms of connection, and requires a more nuanced interaction between psychological dimensions to elicit. This makes sense, as traditionally we consider feelings of connection with a "god-like entity" as considerably more rare, profound, and somewhat associated with divine revelations from a spiritual, all-mighty being.

Psychologically, it is also possible that feelings of connection to a higher power are more dependent on individual differences between people than on the dimensions of music. Perhaps only certain people are able to experience feelings of a connection to a higher power through music. Although there were no significant associations with personal spirituality, it is possible that individual differences in religiosity, emotional reactivity, or empathy could lead to significant results for this rating.

Moreover, spirituality exhibited a rather large moderating effect on the psychological dimensions, particularly on intensity and, to a lesser extent, on valence. This finding could be used to clarify the debate over the "realness" of musical emotions. The debate centers on the following question: can music really convey emotions, or are the emotions we feel from listening to music simply reflections of our own subjective selves? Igor Stravinsky, a famous 20th century Russian Neo-Classical composer, echoed the second line of thought, by saying, "music…. Is powerless to express anything at all, … if [it]… appears to express something, this is only an illusion" (Lowis & Hughes, 1997). Moreover, there has been little empirical evidence to support the idea that music can convey spirituality. Indeed, Schoen (1927) reported on the mood effects of music and noted that none of a selection of instrumental music had evoked feelings of devotion in listeners. He concluded that music reported to arouse a devotional attitude had probably been previously heard with sacred words or was reminiscent of sacred music (Schoen, 1927).

However, these findings suggest that music does convey emotions, specifically feelings of spirituality; that variations in the psychological dimensions of music can be directly associated with changes in feelings of spirituality. This study suggests that these

two sides do not have to be incompatible: music can both convey real emotions, but these emotions can also reflect the personal characteristics of the listener. A speculative way to conceptualize the relationship between emotions and music could be through the idea that the emotional reactivity of music follows a kind of pattern-recognition. Music may have patterns within it that certain people are more sensitive to. These patterns could be structural patterns of tempo, mode, and key, and/or these patterns could be psychological variations in intensity, valence, and depth, as used in this study. These patterns exist, inherently in the music, and are, by themselves, associated with changes in emotion. However, people may recognize and interpret these patterns differently due to their own subjective perceptions.

Thus, it is possible for music to have "real" emotions tied within its patterns, and it is simultaneously also possible that interpretations of these emotions may differ between individuals. What was surprising was that personal spirituality level by itself was not related to ratings on spirituality. This suggests that perhaps the intrinsic, psychological dimensions of music play more of a role on feelings of spirituality than individual differences in spirituality can. Individual differences play an effect, but they can only play a moderating effect on the psychological dimensions of music. This suggests that these psychological dimensions play a larger role in eliciting feelings associated with spirituality in listeners than personal spirituality levels.

Outside of this rather philosophical debate, this study also has real-world implications. On a broad level, a fuller understanding of the qualities of music that elicit feelings of spirituality could address a public curiosity about why some music "moves" us in spiritual ways. On a clinical level, a more nuanced understanding of the

relationships between music characteristics and feelings of spirituality could help physicians and therapists develop more personalized and targeted treatment plans for patients with detachment disorders, feelings of self-loss, alienation from others, and depersonalization. Associations between less intense music and connectivity could help music therapists select music that can promote feelings of connection in patients. Patients with emotional detachment, as one example, may benefit from less intense music as it is associated with greater feelings of connectivity with humanity and nature. Moreover, understanding how personal spirituality moderates the psychological effects of music could help music therapists understand who may benefit more or less from certain musical songs.

Like all research, this study has various limitations. For one, the music clips were only 30-seconds long, which could affect the extent and depth of feelings experienced by listeners. Given their brevity, however, it is perhaps surprising that the music had no many significant effects on participants' feelings. Secondly, participants in the main study knew that the study was on ‘‘music and spirituality," although they were not informed about specifics regarding the primary variables of interest. Nevertheless, this information could have caused participants with a greater propensity for spiritual feelings or liking for music to participate in the study. A larger and more representative sample size could be used in future studies to replicate these findings. Indeed, having more participants would make it easier to use longer clip samples, as fewer participants could rate each one.

Future research could explore the moderating effects of other variables. Some possible options include openness, agreeableness, and empathy, traits that have been

associated with responses to sad music (Glasgow, Cartier, & Wilson, 1985; Rawlings & Ciancarelli, 1997; Rawlings, Barrantes, Vidal, & Furnham, 2000), and that could potentially be associated with spiritual music as well. Moreover, cultural-specific studies of this type could be conducted, as descriptions of spirituality vary between cultures, and expressions of spirituality often reflect cultural norms. Although this study used only instrumental music, future research could also look at the differences between how instrumental and non-instrumental music evoke spiritual feelings, which could help elucidate the effects of words in music. Overall, this study is simply a start and can be taken in many directions to better understand the question of why music moves us.

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