

ALLEGHENY COLLEGE

The Effects of Music on Compassion

A Senior Comprehensive Project

Presented by:
Stephen Anderson

In partial fulfilment of the requirements for the degree of Bachelor of Science

April 4th, 2016

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Abstract

Most current researchers define *compassion* as an idiosyncratic emotion that arises when acknowledging the suffering of others that is followed by a genuine motive to help. There is evidence that the experience of negative emotions (e.g. sadness) can act as a catalyst for the expression of compassion when witnessing suffering: research has demonstrated that negative mood can engender helping (Weyant, 1978), enhance acuity of perception of suffering in others (Hills, Werno, & Lewis, 2010), and lead to greater physiological reactivity to emotionally provocative stimuli (Yuan, Chen, Yang, Ju, & Norman, 2014). This study investigated whether negative mood induced by music can influence compassion. Participants were presented with images depicting the Syrian Refugee crisis with or without sad music, and were assessed on compassion through measures of self-report, helping, and time spent viewing the images. Participants without music reported more compassion and spent a shorter amount of time viewing the images. Results on the helping measure were not analyzed due to floor effects. Though differences between compassion scores were non-significant, with time scores approaching significance, manipulation checks suggest that the results may have contradicted the hypotheses due to emotional regulation, distraction, and /or reactance effects in participants who viewed the images with music.

In *The Essence of the Heart Sutra*, the Dalai Lama (2005) succinctly expressed the Buddhist philosophy of compassion: "According to Buddhism, compassion is an aspiration, a state of mind, wanting others to be free from suffering. It's not passive-it's not empathy alone-but rather an empathetic altruism that actively strives to free others from suffering" (p. 49). Indeed, the virtue of compassion is venerable in nearly all religions and philosophies. However, until recent years, the use of the word "compassion" in scientific research was strictly limited to its pertinence to empathy and altruism. That is, *compassion* was typically not considered a distinct research subject, but was included in a constellation of terms involving *tenderness* that were associated with empathy (Batson & Shaw, 1991). However, researchers are beginning to identify compassion as a distinct subject that is related, but not identical to empathy and altruism. Empathy can be described as somewhat of an affective mirroring; that is, it is the vicarious experience of another person's emotional state. Consistent with the Dalai Lama's elucidation, compassion in Psychology refers to a specific emotion that is facilitated by the perception of suffering and includes a genuine motive to help (Goetz, Keltner, & Simon-Thomas, 2010).

The historically embraced association between music and emotion is a transparent and central component of music psychology, philosophy, and music therapy. Thus, it is intuitive that music and compassion, which are both fundamental and universal assets to society that are largely valued for their emotional elements, would overlap. The potential relationship between music and compassion, including the lattice of processes that incite it, are investigated here.

Mood and Compassion

Evidence suggests that the experience of negative emotions plays a crucial role in both situational and dispositional compassion. Research has identified a "tend-and-befriend" response to stress, which involves the development of amiable and cooperative behaviors in the presence of negative, stressful emotions. It has been suggested that this strategy is a female manifestation

of the fight-or-flight response with similar, but different bio-behavioral underpinnings. In females, the fight-or-flight response may have been evolutionarily maladaptive due to the types of circumstances that facilitate the response, which could present dangers to infants. Thus, in the presence of danger and threat, females were more likely to "tend" to their offspring in order to ensure safety and allow for the survival of subsequent generations. "Befriending" was a strategy to bolster safety that was developed due to the evolutionary advantages of group affiliation (Taylor et al., 2000). In fact, female need for group affiliation in the presence of threat has been identified as among the most profound behavioral differences between males and females (Belle, 1987). It is important to note that the tend-and-befriend strategy is present in both males and females, but tends to be more pronounced in the latter (Gerin, Milner, Chawla, & Pickering, 1995). Thus, negative emotions that arise in the presence of threat and subsequently result in augmented susceptibility to others' emotions may be of greater relevance to females rather than males.

There is evidence that consistent exposure to stressors that generate negative emotions may have implications for dispositional compassion. For example, individuals of low socioeconomic status (SES) backgrounds, who are consistently subject to more stressful experiences than those with higher socioeconomic backgrounds, tend to exhibit more compassionate responses to others' suffering (Stellar, Manzo, Kraus, & Keltner, 2012). These individuals also exhibit a heightened awareness of external stimuli and stressors (Kraus, Piff, & Keltner, 2009). Furthermore, although the influence of low-SES is primarily a trait dimension, these individuals also exhibit a higher level of compassion that is influenced by circumstantial context. Specifically, low-SES individuals display higher dispositional compassion, as well as

augmented physiological reactivity and self-reported compassion when presented with compassion-inducing situations (Stellar et al., 2012).

Research has found a myriad of associations between the induction of mood and perception of emotional expression in others. There is evidence that individuals in a depressed mood (induced by music) are more accurate in their evaluations of facial expressions, which may be a result of an attempt to revitalize their emotional state (Hills, Werno, & Lewis, 2010). That is, they are more vigilant in their assessment of others as a means of avoiding negative social interactions that could further damage their state. Additionally, elated individuals are less eager to employ cognitive resources, which may result in inattentiveness when perceiving nuances in other people's expressions (Hills et al., 2010). Although Hills et al. (2010) found that assessments of facial expressions tend to be more accurate in those of a depressed mood, an earlier study by Bouhuys, Bloom, & Groothuis (1995) evidenced that depressed individuals are more likely to perceive negative emotions, such as sadness or fear, when presented with facial expressions that are ambiguous. Specifically, this study used a Musical Mood Induction Procedure (MMIP, see section "Music and Mood") to induce elated or depressed mood in otherwise mentally healthy participants. When presented with faces that expressed an equal level of positive and negative emotions, those in the *depressed* condition were more likely to identify a higher level of negative emotions. In this study, participants were not assessed for accuracy: the presented faces were ambiguous, but not neutral as they expressed a juxtaposition of positive and negative emotions. As such, there were no definitive answers and participants in the depressed-mood condition were more likely to *subjectively* identify negative emotions.

The combination of these two studies indicates that depressed individuals, compared to neutral or elated individuals, may be more accurate overall in the perception of emotions while

simultaneously exhibiting a negative bias. There is neurological evidence to support this: negative-mood individuals exhibit greater physiological reactivity to emotionally unpleasant stimuli, while positive mood buffers these effects (Yuan, Chen, Yang, Ju, & Norman, 2014). These studies suggest that even temporary changes in mood via music in otherwise non-depressed individuals may result in a propensity to perceive suffering in others.

Mood and Helping

Early research suggested that the induction of an elated mood increases helping behavior (Aderman, 1972). Subsequent research, however, yielded inconclusive findings regarding the association of mood and helping behavior (Hale & Strickland, 1974). This discrepancy is at least partially explained by interactive effects of mood and costs/benefits. Specifically, a study by Weyant (1978) found that negative-mood participants, compared to neutral-mood participants, tended to help more when presented with situations in which there were high benefits and low costs to helping, and were slightly less likely when there were low benefits and high costs. Elated participants, on the other hand, helped significantly more in each condition. The tendency for depressed individuals to help in circumstances with high benefits may be explained by the negative state relief model, which asserts that empathy is typically accompanied by a temporary state of sadness that the individual becomes motivated to ameliorate (Cialdini, Darby, & Vincent, 1973). Thus, the high benefits of helping may offer relief for the depressed individual, but this will only motivate them to help if there are no high costs that could potentially worsen their already damaged state (Weyant, 1978). Elated individuals, on the other hand, may feel a greater need to help due to a perceived lack of equity between them and others who are suffering (Aderman, 1972).

It has also been argued that, in general, circumstances that generate a primary focus on an individual's own needs tend to decrease his/her propensity to help others (Aderman &

Berkowitz, 1983; Gibbons & Wicklund, 1982). Self-awareness and salience of helping are key components of situational factors that are conducive to helping behavior. Specifically, when self-awareness is focused inward (that is, when one's own needs and desires are of primary importance), individuals become less inclined to attend to others. However, self-awareness of one's own pro-social values that are made salient in situations where opportunities to help are presented tend to increase the individual's inclination to help (Gibbons & Wicklund, 1982). These findings also carry a mood component: when negative emotions are paired with an inwardly focused self-awareness, helping tends to decrease, while that which is adjoined with a focus toward others tends to increase helping (Thompson, Cowan, & Rosenhan, 1980). That is, when an individual is experiencing a negative state and is focused entirely on his/her quandaries, his/her capacity to empathize with and help others is impaired. For example, a study by Thompson et al. (1980) asked participants to imagine a close friend being diagnosed with a terminal illness as a means of inducing a negative state. Half of these participants were asked to concentrate on their own projected reactions to the event, while the other half were asked to focus on that of the friend. Each participant was subsequently provided with an opportunity to anonymously help a graduate student conduct research. Those whose negative emotions were focused outwardly (that is, on their terminally ill friend) were significantly more likely to help the graduate student. In contrast, it has also been found that positive mood may work conjunctly with self-focus to produce helping behavior. Individuals of a positive mood tend to appraise their personal qualities in a positive manner and positive evaluations of one's traits often involve those associated with pro-social behaviors. Thus, individuals of a positive mood, due to their increased affirmative self-evaluations, may be more inclined to demonstrate helping behaviors as a means

of acting in ways that are consistent with their state of positive self-conception (Berkowitz, 1987).

The role of self-awareness in helping behavior is also demonstrated in guilt. Typically, an individual will feel guilty as a result of some prior interpersonal offense. As a result, pro-social behaviors (such as helping) may allow an opportunity for the guilted individual to remedy the negative state generated by his/her perceived wrongdoing (Carlsmith & Gross, 1969). Although this appears consistent with the negative state relief model, the relevance of personal responsibility as it pertains to guilt offers a more nuanced perspective that may refute this model. A study by Rogers, Miller, Mayer, & Duval (1982) found that when an individual feels personally responsible for his/her negative state and the situation allows for this sense of responsibility to become salient, instances of helping behavior tend to increase. This is tantamount to self-awareness as being conscious of one's own transgressions will likely induce guilt, which predictably motivates helping (Carlson & Miller, 1987). This concept may indicate that the negative state relief model is too simplistic as negative states may only be favorable for helping when they are complemented by personal responsibility and salience of this responsibility.

Overall, the association between mood and helping behavior is not entirely conclusive. Much of the research in this area was performed throughout the 1970's and 1980's, and interest currently appears to be stagnant. This is most certainly due to the convoluted nature of mood and helping that consists of a multitude of factors that render it debatable.

Music and Mood

A considerable amount of research has investigated the impact that music can have on emotional states. The emotional content of music is, for many, the very thing that renders it appealing. The nature of the psychologically embedded association between music and emotion,

in light of its ubiquity, is highly complex and is consistently debated by philosophers, scientists, and laypeople. The following section will trace some of these queries.

The concept of music as a catalyst for emotional experience first became pervasive during the Baroque era. This occurred as a result of the appropriation of Greek philosophy into the tenets of musical composition, specifically the concept that certain musical approaches could be utilized to elicit emotions that are ultimately involved in the formulation of an individual's moral character (Whitfield, 2010). That is, emotions can serve to motivate or hinder moral values and behaviors, which can be distilled when evoked through music. The relationship between art and moral emotions, such as compassion, is thus conspicuous and was conceptualized in Greek thought. Aristotle, for example, drew a distinction between pity (conceptually similar to compassion in this context) that is portrayed in the arts and that which is inherent in day-to-day human existence. This, in effect, is a contrast between pity that manifests in either reality or imagination, the former of which acts as an antecedent to palpable moral action and the latter of which serves as an exposition of visceral emotions. In Aristotle's view, pity that exists in the arts and reality, although disparate, can work in tandem as a means of maximizing an individual's moral sensibilities by allowing an otherwise salubrious individual to witness and experience human suffering in a safe environment. Plato's perspective, on the other hand, was more ascetic. He held that, because of the ramifications of emotions on moral character, humans should achieve dominion over their emotional instincts, and that a catharsis of emotion through the medium of art is therefore functionally superfluous (HaCohen, 2001).

In the Baroque era, composers sought to employ music's emotionally revelatory elements through adherence to the Doctrine of Affections. This refers to the notion that a musical composition should be committed to eliciting a consistent, specific emotional state through the

judicious use of mode and melody, particularly as a means of analogizing the sentiment expressed in poetic text from which the music is derived. The extrapolation of emotion expressed in text to that of music is emblematic of the importance of rhetoric in Greek philosophy. Simply put, the Greeks advocated the aptitude of oration in evoking affections, and Baroque era composers integrated this perspective into the notion that music is commensurately capable of emotional communication (Whitfield, 2010).

Parallel to the role of rhetoric in music of the Baroque era, it is perhaps to be expected that modern philosophers have presented a similar analogy of music as a form of communication. It has been argued that music, like spoken language, serves an *assertoric* purpose; that is, it exists as a conduit through which abstract ideas are expressed, but whereas verbal language does so through semantics, music communicates through emotion (Cooke, 1959). Davies (2003) has offered criticisms that, in essence, refer to music's lack of definitive, objective qualities. Although the performer most certainly intends to communicate a specific emotion through music, the method lacks the plenitude that is seen in language. In other words, there is no attempt to objectively articulate or describe the emotion that is being communicated: it is simply portrayed by the performer and inferred by the listener.

This notion is bolstered (in this perspective) through recognition of music's lack of sentience in respect to emotion. When emotion is expressed through typical means, such as vocal or facial expression, it is affixed to the individual. In instrumental music, however, the emotion is a secondary source in that it is *representational* of standard emotion communication (e.g. fast tempo to communicate energy, similar to how a person would portray an energetic state). The utilization of certain artistic qualities to represent abstract concepts has also been referred to as *projection*, describing the usual archetype of an artist extracting an inner sentiment into a tangible

outer form. An artist's success, therefore, is contingent on his/her ability to most authentically realize an inner affectation and imbue it within the art's recipients. This intuitive connection between actual emotions and the artist's symbolic expression of these emotions is highly ubiquitous, though it has been contested (Langer, 1967). In music, the types of symbols that are used for the purpose of projection are usually musical qualities such as mode.

Heinlein (1928) conducted one of the earliest controlled studies that attempted to examine the influence of musical structure on emotional response in participants. This study involved six experiments that each entailed self-reported identification of emotions aroused from exposure to different types of chords. Experiments 1, 2, 3, and 4 served the primary purpose of providing a foundation in knowledge of people's ability to distinguish the major and minor modes in different chordal configurations, comparing responses of musically trained and non-musically trained individuals. These preliminary experiments found (albeit inconsistently) that musically trained individuals were generally more capable at discriminating between nuanced types (i.e. different inversions and volume intensities) of major and minor chords. The principal experiment of the study (experiment five) extended these findings to the propensity to associate the major/minor modes with adjectives that characterize their respective emotional states (e.g. joyful, melancholy, bright, dark). Essentially, musicians and non-musicians were exposed to major and minor chords and asked to indicate which adjectives from a list were best associated with the presented chord. Results of this study were sporadic in that musicians and non-musicians did not significantly differ in how they prescribed emotional adjectives to chords. Thus, it was concluded that, because musically trained participants were more adept in distinguishing between different types of major and minor chords than non-musically trained participants (as indicated by experiments 1-4) and participants of all levels of training were

similar in how they identified emotions in the chords, the major-minor/happy-sad association was deemed by Heinlein as a socially constructed phenomenon. The method of this study, as well as its now archaic status, calls these conclusions into question. Particularly, the sole use of chords was criticized due to the influence of various musical structures on the emotional content of the major and minor modes.

Hevner (1935) followed up on these limitations by attempting to more precisely pinpoint the exact influence of musical mode on emotion. In this experiment, participants were presented with two versions of 10 different musical compositions, both identical in all facets except mode. Thus, it was hypothesized that any significant difference in perceived emotion in the piece must be due to the mode itself, eliminating the inherent flaw in the Heinlein (1928) experiment. The results of this study were considerable as the emotions of major key pieces were rated as highly more emotionally positive (e.g. happy) than their minor key counterparts.

The Hevner (1935) and Heinlein (1928) experiments, although informing for the time, are quite limited in that they do not offer insight into the influence of components of musical structure other than major or minor modes. Among all musical characteristics, tempo, modality, and pitch level have been found to hold the greatest significance in the arousal of emotion; rhythm and harmony are typically subservient as perceived emotions tend to change most frequently with alterations of the former characteristics (Farnsworth, 1969). Perhaps unsurprisingly, fast, major key music infers happiness, while slow, minor key music produces sadness, and music that expresses mixed emotional signals also tends to produce mixed emotional responses (Hunter, Schellenberg, & Schimmack, 2010). Some research has also supported Heinlein's assertions regarding the possibility of the major/minor distinction being socially learned; for example, a study by Crowder, Reznick, & Rozenkratz (1991) found

evidence that infants do not exhibit knowledge of the major/minor distinction. Moreover, musically trained adults perceive the happy/sad associations in keys more readily than those without musical training (Trehub, Cohen, & Guerriero, 1987, cited in Collier & Hubbard, 2001). The Crowder et al. study, however, only used chords presented individually, neglecting the importance of context and horizontal melody. When music is presented horizontally (e.g. in a scale), its emotional association is learned based on intervals. This is indicated by the matter that emotional perception differs between relative (sharing the same key signature) keys (Collier & Hubbard, 2001). Furthermore, Collier & Hubbard (2001) found that all forms of minor scales (as well as major scales) are perceived as happier when ascending rather than descending. Keys that begin on higher notes (such as Bb, Ab, and F#) are also more readily perceived as happy. Thus, a minor mode piece of music may still express a happy mood if it features ascending melodics lines, utilizes high notes, and is performed at a fast tempo.

A growing amount of research has charted the influence of musical structures on subjective physiological (and thus emotional) responses in listeners. Sloboda (1991) asked participants to rate the frequency of which they experienced specific physiological responses (from a list), list three pieces of music that they have previously associated with these physiological sensations, and describe the particular instances within the pieces themselves that catalyzed these responses. The most frequently described physiological responses were *tears*, *shivers*, and *increased heart rate*. Tears were associated with melodic appiogaturas and sequences (particularly, circle of fifths) that returned back to the tonic. Shivers were associated with sudden changes in harmony, and increased heart rate often occurred in response to accelerations in tempo and rhythmic syncopation. A study by Dibben (2004) provides evidence for the role of physiological arousal on intensity of experienced emotion. This study found that

participants rated a higher level of emotional response to positively valenced (e.g. “happy”) music immediately after exercising, suggesting that individuals may use their current physiological state as a means of inferring their emotional response to music. It is worthy to note that physiology had no effect on how participants rated the valence of the music, which suggests a level of independence between expressed and felt emotion (see section “Expressed vs. Felt Emotion”). These findings, however fascinating, should be taken tentatively. As a whole, research on physiological responses to music have been blemished by inconsistent findings, which is likely due to the difficulty of controlling for the multitude of personality and situational factors involved, as well as individual differences in musical expertise (Rickard, 2004).

Music and Language

The aforementioned philosophical inquiry regarding music and language has been explored in scientific research. Much of this research has found similarities between how emotion is communicated through music and of verbal language. For example, it has been found that, in comparison with other musical intervals, the minor third is most typically used in everyday speech as a means of expressing sadness, which directly corresponds to how this interval is often utilized in music (Curtis & Bharucha, 2010). Since the minor third represents the fundamental distinction between the major and minor modes, this may underpin the affective characterization of keys. The respective higher and lower dynamic levels that are intuitively associated with the major and minor modes are also representative of speech, as individuals of a depressed mood tend to speak with an overall lower level of energy than those of a happy or elated mood (Turner & Huron, 2008).

Researchers have debated over the circular nature regarding the origin of the music and language association. That is, many of the above findings are based purely on description and

thus do not offer an explanation for whether speech imitates music, music imitates speech, or if the two mutually influence each other. However, cross-cultural studies have indicated a certain degree of universality in how emotion is expressed in music and speech, and it can thus be inferred that, at least to some degree, musical conventions are derived from visceral patterns of emotional expression in language (Bowling, 2013). The previously cited studies by Crowder, Reznick, & Rozenkratz (1991) and Trehub, Cohen, & Guerriero, (1987, cited in Collier & Hubbard, 2001), which support Heinlein's postulation that individuals may be socialized to prescribe specific emotions with the major and minor modes, are relevant here as they indicate that individuals may learn to associate particular sounds heard in music with certain emotions and extend that association to speech patterns. Moreover, it has been found that musically trained individuals tend to be more adept at the recognition of emotional expression in non-musical speech (Lima & Castro, 2008). This may suggest that an awareness of emotional patterns in music is related to a greater understanding of how emotion is expressed in speech.

Expressed vs. Felt Emotion

Although the distinction between emotions that are *expressed* by music and those that are actually *felt* has been addressed in philosophical ponderings, this distinction has only recently been subject to scientific scrutiny. The prescription of emotions to music has been described as a perceptual-cognitive process; that is, the individual perceives musical stimuli and then cognitively assesses what emotion the music is conveying without physiologically or subjectively experiencing an emotional reaction (Gabrielsson, 2002). Although it is most tempting to view these phenomena purely through the lens of a positive relationship in which the emotion expressed directly corresponds to the emotion experienced, which is an assumption that research has hinged on in the past, this view is much too simplistic. Gabrielsson (2002) documented four different types of emotional elicitations that occur in response to music, using

the terms *internal* and *external* locus to indicate emotions experienced and emotions perceived, respectively. The first and most palpable of these is the previously described *positive* relationship, in which the internal and external loci are congruent in a single listener. Perhaps unsurprisingly, this is the most common type of relationship (Evans & Schubert, 2008; Kreutz, Ott, Teichmann, Osawa, & Vaitl, 2008). The second type of relationship that was observed is a *negative* relationship, which occurs when the listener experiences an emotion that is in direct opposition to the emotion that he/she cognitively interprets as being present. Simply put, a positive emotion elicits a negative reaction, and vice versa. This type of relationship can exist for a number of reasons. For example, an individual may have previously developed an aversive association with a piece of music that may otherwise be described as pleasant. This was displayed in one study in which a participant described Pachelbel's *Canon in D* as eliciting *irritation* due to the piece's overuse, which directly contradicts the piece's uplifting nature (Evans & Schubert, 2008).

Gabrielsson (2002) has also defined instances in which there is *no systematic relationship* between the emotions expressed and emotions felt. This is essentially an umbrella term for any instance in which the emotional response from the listener is neutral or unpredictable, and typically occurs when the listener is perceiving music analytically and thus relying more on cognitive rather than emotional systems. This relationship may also occur when the listener responds differently at different times. Finally, *no relationship* can exist between emotions expressed and emotions felt, which typically occurs when the listener describes an emotional response that is not musically tangible. Many words that are used to describe emotional states in response to music (such as movement, awe, or reverence) are opaque and thus difficult to quantify. In these cases, it is difficult to record a relationship simply because the nature of the emotion itself is enigmatic and not scientifically calibrated. For example, a listener

may feel "moved" by a piece of music, but this is a term that is difficult to precisely appraise because it is has been subject to a multitude of philosophical scrutinies. The perception of movement in music has been discerned as originating in music's existence in time. Because music is organized around time, it creates a sense of movement in the listener. The influence of this sense of movement on the listener's emotions has been described by Stravinsky as arising from the distinction between *psychological* and *ontological* time, with the former referring to an individual's subjective perceptions of time and the latter referring to the objective measurement of time (Storr, 1992). In these terms, an effective communication of emotion in the listener skews the relationship between psychological and ontological time, resulting in the common sentiment of time passing quickly when the listener is dramatically engaged in the music (the relationship between music, movement, and the perception of time, though beyond the scope of this study, has been explored scientifically. See Sievers, Polanksy, Casey, & Wheatley (2012)).

Although the aforementioned terms represent an honest attempt at documenting different emotional responses, their parsimonious nature allow room for nuance. Specifically, an instance of *no systematic relationship* can be accounted for by the myriad of differences between individuals and emotions themselves. Moreover, specific emotions differ in their propensity to facilitate emotion in the listener, and many researchers have utilized a two-dimensional, circumplex model to delineate emotions that are elicited in response to music. This model categorizes emotions in terms of the level of valence, activation, and arousal that they facilitate (Kallinen & Ravaja, 2008; Kreutz et al., 2008). In this context, *valence* refers to the positive or negative quality of the emotion. To use the simplest example, "sad" would be considered negative valence and "happy" would be considered positive valence. *Arousal* refers to the

perceived level of energy in the music, and *activation* (positive or negative) refers to the overall magnitude of emotion that is evoked in the listener.

Using the circumplex model, Kallinen & Ravaja (2008) examined the individual differences in listener reactivity between emotions. Participants were presented with 1-minute excerpts of pieces that were selected based on their previously defined emotional content. Although this study found an overall positive relationship between emotions perceived and felt, positive valence had a greater tendency to elicit a higher level of felt emotion and arousal and positive and negative activation were each associated with an overall lower level of felt than perceived emotion. The former was especially evident when emotions were negative (specifically, fearful and sad). Interestingly, music that was rated as *fearful* elicited high levels of perceived negative valence and negative activation, but was felt as positive valence without the presence of negative activation. This was attributed as resulting from a high level of negative perceived emotion that is presented innocuously (that is, through music), similar to the positive feelings that tend to arise when viewing a horror movie.

Mood Induction

Researchers have utilized the Musical Mood Induction Procedure (MMIP) as a means of influencing individual's emotional states through the use of music. This is an offshoot of standard mood induction procedures that existed prior, the most common of which is the Velten technique (Vastfjall, 2010). The original Velten technique involves participants reading self-referent statements pertaining to either depression or elation and being instructed to attempt to achieve the specific mood to which they were assigned (Velten, 1968). This technique has received extensive criticism due its transparent diffusion of demand characteristics, and is thus viewed as being methodologically flawed (Buchwald, Strack, & Coyne, 1981). The MMIP was

thus conceived as a more valid approach to mood induction, and its use has received support (Davis, 2010; Pignatiello, Camp, & Rasar, 1986).

Music, Mood, and Helping

Some research has specifically examined how the presence of music as an influence of mood may facilitate helping behavior. A study by Fried and Berkowitz (1979) found that participants who were exposed to soothing music were more likely to exhibit altruistic behaviors than those who were exposed to aversive or no music. A study by North, Tarrant, & Hargreaves (2004) found similar results in a field setting: individuals were more likely to help when there was uplifting music playing in the background in comparison to when there was "annoying" music. This study also examined the implications of costs, finding that all individuals were likely to help when costs were low (i.e. signing a petition), but those exposed to uplifting music were more likely to help when costs were high (distributing leaflets). This is consistent with the findings of Weyant (1978). It is notable in these two studies that the presence of music is primarily incidental; that is, since the music played in the background, the induced mood of participants is beyond their physical control. It was mentioned previously that individuals of a negative emotional state who have an internalized sense of personal responsibility for this state tend to exhibit more helping behaviors when this responsibility is made salient (Rogers et al. 1982). Thus, it is possible that the lack of salience and personal responsibility (and therefore guilt) that exists when negative mood is induced by music may decrease the individual's willingness to help. It is important to note, however, that the aforementioned studies only compared elated music with *aversive* music. Music that induces a depressive state may or may not be enjoyable to the listener, and research has not specifically linked depressive mood induced by music and helping behavior. As a result, it is conjecturable that the association between depressive mood, music, and altruism is not holistically understood.

The importance of empathy, helping, and ultimately, compassion is not subtle. The studies referenced here have clearly indicated the miniscule musical factors that affect feelings of empathy and helping behavior. Whether or not these factors influence compassion, therefore, is of profound interest.

The Present Study

It has been shown that music can influence mood, and that depressed mood can, in certain circumstances, increase helping behavior, enhance interpersonal perception, and augment feelings of compassion. However, a direct link between musically induced mood and compassion has not yet been established. This study used an experimental procedure to examine the following question: can depressive mood induced by music enhance feelings of compassion? As compassion literally means "to suffer with," it is feasible that music which evokes the experience of suffering in the listener in combination with the witnessing of suffering in others would heighten compassionate feelings. Under the guise of an experiment that is testing the effect of music on perception of visual stimuli, participants were randomly assigned to view images of suffering individuals while listening to either no music or a recording of Chopin's *Prelude, Op. 28, No. 4 in E minor* as a means of inducing depressive mood. This piece received the highest "sad" rating in a study on mood induction (Mayer, Allen, & Beauregard, 1995). The images depicted suffering of individuals involved in the Syrian refugee crisis. The negative mood induction and potential guilt involved in viewing the refugees was hypothesized to lead participants to feel motivated to help, thus further enhancing compassionate responses. The association between outward focus of attention in negative mood and helping is also relevant here as participants were asked to concentrate on the stimuli presented to them. Therefore, the negative state achieved by participants was of an outward focus, which has previously been

shown to increase helping behavior. A compassion scale, amount of time spent viewing images of suffering, and an opportunity to help a suffering individual was used to provide a holistic measure of compassion. By this measure, it was hypothesized that participants who listened to the depression-inducing music would exhibit higher levels of compassion as indicated by each measure. It was also predicted that, due to the previously described "tend-and-befriend" response, females in the *music* condition would report greater compassion than males.

Method

Participants

47 undergraduate students were recruited through an online system at Allegheny College. Two participants were excluded from analyses due to one's relationship with the experimenter and the other's data deleted due to experimenter error, for a final *N* of 45. The study attempted to recruit an equal number of male and female students. As a means of obtaining a higher sample, participants were incentivized through credit in introductory Psychology courses at the college, and were also entered into a raffle to receive a $25 gift card to a local business.

Materials

Mood Induction. A recording of *Prelude Op. 28, No. 4 in E minor* by Chopin was used to induce a depressive mood in the *music* condition. The induced mood served as the independent variable of the study. Participants in the *no music* condition did not listen to any music during the experiment. As a manipulation check to assess the efficacy of the music in producing the intended mood, participants completed the Positive and Negative Affect Schedule (PANAS) to designate the emotions that they were experiencing at the present moment (Watson, Clark, & Tellegen, 1988). To reduce the likelihood that the effects of the mood induction would dilute while completing the scale, only 10 items from the original scale were used. Items on the scale include: "distressed," "guilty," "interested," and "enthusiastic." In addition to the PANAS,

participants completed items that assessed physical pain, interest (analyzed in conjunction with the interest item on the PANAS), and familiarity with the piece of music (see Appendix).

Compassion. In both conditions, participants viewed a slideshow consisting of images taken from the Syrian refugee crisis. The images depicted a variety of races, ages, and genders represented in the refugee crisis, and the slideshow was pilot tested prior to the start of the study. A 7 point (1 = *not at all*, 7 = *extremely*), 9-item Likert scale developed by Cameron & Payne (2011) was used to assess compassion. Self-reported ratings on this scale acted as one of three operational definitions of compassion in this study. This scale, originally used in regards to starving children in Darfur, was modified to apply to the Syrian refugees portrayed in the slideshow. Because participants viewed the suffering of foreign individuals, it was speculated that the manipulation would also affect perceived psychological distance from the refugees. Thus, the scale also included an 8-item *distance* scale, developed by Cameron & Payne (2011). Sample items from the compassion scale that were used in the analysis include: "How sympathetic do you feel toward the Syrian refugees in the pictures?," "To what extent do you feel that it is appropriate to give money to aid the refugees?," and "How important is it you that the refugees do not suffer?" Since it has been suggested that compassion motivates approach tendencies, rendering it functionally distinct from distress (Eisenberg et al., 1989), items that gauged that participants further interest in the subject (e.g. to what extent would you like to learn more about the Syrian refugees?) were included. In addition, the amount of time that participant's devoted to viewing the images were measured and served as another primary outcome measure of the study. Following the purported conclusion of the study, participants were given an opportunity to help an experimenter with an apocryphal hand injury who exhibited difficulty writing on a document ("Participant Raffle Entry Form," located in Appendix) related to the experiment; whether or not

the participant offered to write for the experimenter served as the helping measure. This was intended to provide a measure of helping that is reflexive and interpersonal, similar to the type of compassion-influenced helping measure developed by Condon, Desborders, Miller, and DeSteno (2013). Items that ask participants to assess visual features of the stimuli were also included as distractor items. The pre-questionnaire, PANAS, distance scale, and compassion scale are located in the Appendix.

Procedure

The study took place on the 2nd floor of Carnegie Hall at Allegheny College. Recruited participants were told that study is examining the interactive effect of audio (music) and visual (images) stimuli on perception. They were informed that they would be assigned to view a series of images on a specific, randomized topic (the Syrian refugees) with or without music. After signing the informed consent (see Appendix), participants were randomly assigned to one of two conditions: *music* and *no music*. For participants in the *music* condition, a recording of Chopin's *Prelude in E minor* played in the background while viewing the images, while those in the *no music* condition simply viewed the images without any additional stimuli. Participants were required to view each individual image for a minimum of three seconds, but after this time had passed, were allowed to view each image for as long as they liked before choosing to proceed in the slideshow. The total amount of time that it took for each participant to view the slideshow was recorded. Following the conclusion of the slideshow, participants were given the PANAS and the compassion Likert scale, under the pretense that these were included to gather information of how audio/visual components influence subsequent conceptualization of the content of perceived stimuli. Completion time of both scales together was approximately 4-5 minutes. After completing the two scales, participants notified the experimenter, who then provided a form whose completion was purported to be required in order for the participant to be

entered into the raffle for the study. The experimenter, who appeared to be suffering from a hand injury (indicated by wearing a splint on his thumb), noticeably struggled while attempting to record information such as the time of day and participant ID number on the form. When the form was complete, participants were given a debriefing form (see Appendix) and excused from the study, after which the experimenter recorded whether or not the participant offered to help complete the prior form. After the conclusion of the study, participants were electronically sent a second debriefing form with more detailed information about the study (see Appendix).

Design & Analysis

This study used a one-factor, between subjects design. Compassion scores were defined by three primary outcome measures: total time spent viewing the slideshow, sum of self-reported responses on the compassion Likert scale, and whether the participant offered to help the experimenter (indicated by "yes" or "no"). A one-factor analysis of variance (ANOVA) employed on SPSS software was used to test for a significant difference in compassion scores on the self-reported and time measure between the *music* and *no music* condition. Analyses were not run for the helping measure due to floor effects.

Results

For means and standard deviations of compassion, distance, time, and interest, as well as for responses on PANAS items, refer to Tables 1 & 2. Unless reported, no significant differences in gender were found.

Effects of Music on Compassion. All compassion items were averaged to build a single composite compassion score. To test for the effect of music on compassion, independent samples t-tests were run for the average compassion scores. Contrary to the hypothesis, participants in the *no music* condition reported a higher level of compassion towards the refugees (M = 5.86, SD =

0.62) than those in the *music* condition (*M* = 5.55, *SD* = 0.84), though these results were non-significant, *t* (43) = 1.40, *p* = .168, *d* = 0.42.

Helping. Of 43 participants, three participants (7%) offered to help the experimenter, one of which was excluded for being a personal acquaintance of the experimenter. Of the two remaining participants who helped, one was in the *music* condition and the other in the *no music* condition. As a result of the lack of variability, no analysis was performed for helping.

Distance and Time. Participants' time score was the average time spent viewing each image, in milliseconds. Inconsistent with the hypothesis, participants in the *no music* condition spent a marginally longer time viewing the images (*M* = 10470.35 milliseconds) than those in the *music* condition (*M*= 8427.38 milliseconds), *t* (43) = 1.934, *p* = .06, *d* = 0.58. A composite score for psychological distance was also created by averaging all distance scores. No significant difference was found for perceived distance from the refugees between the *no music* (*M* = 4.57, *SD* = .79) and *music* conditions (*M* = 4.72, *SD* = .75), *t* (43) = .687, *p* = .50, *d* = 0.19. A composite score of interest in the refugee crisis also yielded non-significance between the *no music* (*M* = 16.67, *SD* = 3.85) and *music* (*M* = 16.29, *SD* = 2.57) conditions, *t* (43) = .388, *p* = .70, *d* = 0.12.

PANAS. For the PANAS measures, there was no significant difference between the two experimental conditions in distress, guilt, hostility, or shame, all *p*s >.21. There was also no significant difference in reports of physical pain between the *music* (*M* = 10.46, *SD* = 16.55) and *no music* (*M* = 12.38, *SD* = 19.7) conditions, *t* (43) = 0.35, *p* = 0.72, *d* = 0.10. Interestingly, participants in the *no music* condition reported feeling significantly more scared (*M* = 2.48, *SD* = 1.17) than those in *music* condition (*M* = 1.58, *SD* = 0.93) after viewing the images, *t* (43) = 2.86, *p* < .01, *d* = 0.87. Participants in the *no music* condition also reported feeling marginally

more upset (*M* = 3.52, *SD* = 1.10) than those in the *music* (*M* = 3.04, *SD* = 0.91) condition, *t* (43) = 1.63, *p* = .11, *d* = 0.48. Females reported higher levels of guilt (*M* = 2.74, *SD* = 1.15) than males (*M* = 1.92, *SD* = .86), *p* <.05. Males reported marginally higher amounts of physical pain (*M* = 19.00, SD = 23.00) than females (*M* = 8.03, *SD* = 14.86), *p* = .07. No interactions were found between gender and condition on these measures.

Familiarity. Participants in the *music* condition who indicated that they were familiar with the piece of music (*n* = 12) reported a higher level of psychological distance from the Syrian refugees (*M* = 5.00, *SD* = .60) than those who indicated they were unfamiliar with the piece (*n*=15; *M* = 4.38, *SD* = .74), *t* (25) = 2.35, *p* <.05, *d* = .92. No significant differences in psychological distance were found between those who heard no music and those who heard music and were familiar (*p* = .21) or unfamiliar (*p* = .335) with the piece.

Discussion

The purpose of this study was to test the effects of musically induced mood on self-report and behavioral outcomes of compassion. It was hypothesized that participants who viewed a series of images of Syrian refugees while listening to depressive-mood inducing music would report greater compassion towards the refugees, spend a longer amount of time viewing the images, and be more likely to help the experimenter after the conclusion of the experiment. The hypotheses were not supported by the data. In fact, the results of this study contradicted the hypothesized outcome in each primary dimension: participants who did not listen to music while viewing the images reported greater feelings of compassion, less psychological distance, spent more time viewing the images, and exhibited more interest in the Syrian refugee crisis. Though non-significant, with viewing-time approaching significance, the consistency of these results across measures, in addition to modest effect sizes, suggests that the presence of music

influenced participants' apperception of the refugees in the images. Specifically, it appears that, if anything, the presence of music resulted in lower levels of engagement towards the images and actually *inhibited* compassionate responses.

Emotion Regulation. Considering Cameron & Payne's (2011) finding that compassion can be inhibited as an attempt to regulate emotions that are potentially overwhelming, it is possible that participants tempered their emotional response to the stimuli presented in the experiment. Since participants in the *music* condition were presented with two evocative stimuli simultaneously, the compounding effect of the unsettling emotions associated with each may have resulted in a situation that participants felt was overwhelming, leading them to disengage. This suggests that an additional control condition in which participants completed the compassion measures without viewing images *or* listening to music would have been beneficial because it would have provided a baseline measure of participants' compassion towards the refugees in the absence of stimuli.

Reactance. The consistency between the emotions elicited by the refugees and by the music may have incited suspicion in participants and begetted psychological reactance. Reactance is theorized as a motivational state that arises when individuals feel that their behavioral or psychological freedom is being eliminated or has the potential to be eliminated, and as a result, attempt to restore an impression of freedom and/or control (Miron & Brehm, 2006). Although participants were told that the topic and music were assigned randomly, it is reasonable to postulate that the slideshow and the music aligned so well that participants doubted whether randomization actually occurred. One participant, for example, asked the experimenter if there were multiple topics and pieces of music (to which the experimenter spuriously replied "yes"). Thus, some participants may have believed that they were being induced into an unpleasant

emotional state and resisted this prompt by thinking and/or behaving in a way that was antithetical to what they believed was the desired effect.

Participants' inactivity in regards to the randomization process may have provoked suspicion and resulted in a diminished sense of control. In order to eliminate participants reduced sense of control and circumvent reactance effects, it may have been helpful to allow participants an active role in the randomization of the images and music. For example, participants may have been administered a dice game in which the outcome ostensibly determined which topic or music they were to be assigned to, rather than simply being told that the stimuli assignment was random and presented with a "randomizing topic" screen. This may have enhanced participant's perception of control over the outcome of the randomization and reinforced the conception that it was indeed authentic.

High Compassion Scores. Any inhibition of compassion in this study was, however, relative: average compassion scores were high in both conditions. This was likely due to the use of the Syrian Refugee Crisis as a subject (a burgeoning topic in the media), images of individuals (which are more likely to beget compassion than the presentation of mass suffering. See Cameron & Payne (2011)), and social desirability effects that were exacerbated by directly asking participants to rate the compassion they felt towards the refugees.

Attitudes towards the Refugee Crisis. It is possible, however, that individual attitudes towards the Syrian Refugee Crisis as a political issue influenced the nature of participants' emotional regulation and their reported compassion for the refugees. It is well established that individual attitudes can enable or inhibit empathy when the opportunity to express it presents itself (Zaki & Cikara, 2015) and even that emotion regulation can influence attitudes towards specific issues (Halperin, Porat, Tamir, & Gross, 2013), so it is reasonable to surmise that the salience of Syrian

refugees and attitudes towards the issue (or lack thereof) had an effect on compassion outcomes. Although ideological attitudes were not measured in this study, future studies should investigate if political outlooks towards the issue presented in the study can influence participants' compassionate responses to the individuals involved in that issue.

PANAS. The emotion regulation explanation is supported by higher means on PANAS items by participants in the *no music* condition, indicating that higher compassion worked in tandem with overall emotional activation during the experiment. This suggests that the compound effect of viewing the images and listening to the music simultaneously resulted in a blunted emotional response due to overwhelming emotional evocation. Future studies should thus investigate whether the emotional regulation described by Cameron and Payne (2011) can inhibit compassion towards small groups of individuals (those depicted in the images) when participants are presented with multiple forms of stimuli that are emotionally evocative.

The nuanced emotions that are activated in response to emotionally evocative stimuli and how they relate to compassion should be scrutinized more closely. This study broadly categorized the emotion elicited by the stimuli as "negative," but results on the PANAS suggest the involvement of a broad constellation of emotions. For example, it is perhaps perplexing that participants in the *no music* condition reported feeling significantly more scared, marginally more upset, but no more distressed than those in the *music* condition. This demonstrates that the stimuli had varying effects on different types of emotions, but the precise nature of these effects is difficult to identify because the stimuli were only selected to elicit a general negative state. Therefore, future research should take more care to determine which negative emotions influence compassion and to what degree.

The use of Chopin's *Prelude in E-minor* is also important in considering how emotions were evoked in the study. This piece was chosen for its high "sad" rating in a prior study (see Mayer, Allen, & Beauregard, 1995), but, as the results indicate, the emotions elicited by the experiment were nuanced. This may have been due to the level of emotional alignment between the two pieces of stimuli; although "Prelude in E-minor" has been previously rated as "sad," and expresses this emotion consistently throughout the piece, each of the twenty images likely evoked different emotions themselves and thus as a whole constructed a more complicated emotional system than the music. The experience of fear that was elicited by the images themselves, which was dulled in the *music* condition, indicates a need for exploration in regards to the interaction between emotions elicited by two different stimuli, how and what types of emotions are regulated (and in what contexts), and the ramifications this holds for compassion.

Distraction. Alternatively, since participants in the *no music* condition only focused on one stimulus, it may have simply been easier to attend to the images and respond accordingly. Because participants in the *music* condition were presented with images and music simultaneously, their ability to emotionally react to the content of the images themselves may have been hindered, diluting any effects that the induced mood may have had on compassion. This explanation is weakened, however, by the finding that participants in the *no music* condition spent more time viewing the images. Since participants were instructed to view the images long enough to garner a sufficient understanding of each, it would be expected that those who viewed the images with music would need more time to gather information. However, it is also possible that participants in the *music* condition felt overwhelmed by the compounding stimuli and as a result advanced through the images more quickly. Thus, it is difficult to determine if the disparity in viewing times between conditions is a result of participants in the *no music* condition

being more engaged in the images (due to having less stimuli to attend to) or participants in the *music* condition feeling overloaded. These conflicting explanations demonstrate a need for additional conditions that would isolate the independent effects of each stimulus. For example, future studies could investigate how viewing depictions of suffering *after* the mood induction has occurred (and thus eliminating distractions effects that may occur when stimuli are presented simultaneously) would influence compassion outcomes.

The role of distraction in the study, however, may be supported by participants' ratings of familiarity in regards to the piece of music in the study (Chopin's *Prelude in E-minor*). Specifically, participants who were familiar with the piece reported a higher level of psychological distance from the refugees, with a considerable effect size. According to the optimal complexity model, familiarity with a stimulus should reduce perceived complexity of that stimulus (North & Hargreaves, 1995). Intuitively, this would mean that participants who are familiar with the piece should perceive it as less complicated and would thus require less psychological resources to process the stimulus than participants who are unfamiliar with the piece. If this were the case, participants should have been able to focus more of their attention on the unfamiliar visual stimuli. However, the optimal complexity model also surmises that although familiarity reduces perceived complexity, it also tends to increase liking of the stimulus, so participants may have alternatively devoted more of their attention to the music because they enjoyed it more.

A key factor that may distinguish between liking and complexity as they pertain to familiarity in this study is the method by which participants were instructed to engage the images. Since participants were instructed to gather as much information from the images as possible, a commission that requires psychological resources, it is feasible that some of these

resources would be diverted by an additional, novel stimulus in participants who were unfamiliar with the music. However, this contradicts the results of the study that participants who were unfamiliar with the music (and thus would need to devote more psychological resources to the music) reported less psychological distance from the refugees in the images. This may be explained by the influence of familiarity on liking: the higher amount of psychological distance in familiar participants may have been a result of increased liking of the music, which deflected their emotional attention away from the images and towards the music and made it more difficult to identify with the individuals in the images.

The latter explanation is more consistent with the findings of the study, but it is still difficult to assess the exact nature of the familiarity outcome and why it only influenced psychological distance. Because the optimal complexity model hinges on the *degree* of familiarity to stimuli, follow-up studies should assess and analyze the extent to which participants were familiar with the music, the degree to which they liked the music, and how familiar/enjoyable music influences attention to other stimuli that are presented simultaneously. Moreover, future studies should attempt to replicate the influence of familiarity on psychological distance in order to test the possibility of a Type 1 error.

Helping. It is perhaps equivocal why the experiment garnered such a low level of helping from the participants. The helping paradigm was not completely ineffectual: there were three participants who offered to help the experimenter, which suggests that the setup of the helping paradigm was still somewhat conducive to helping. However, since the number of participants who helped was so low, it is difficult or futile to assess their motivations for doing so or whether the manipulation contributed to the effect. The helping paradigm in this study echoed work by Condon et al. (2013), in which participants were given the opportunity to give up their seat for a

confederate who is (ostensibly) on crutches. A comparison between this helping measure and that of the present study illuminates two elements that may have stymied helping in the latter: the relationship between the participant and individual eliciting help, as well as saliency of the need for help. In the study by Condon et al., the individual eliciting help was presented as being incidentally present in a waiting room and thus peripheral to the study itself. In the present study, on the other hand, the impetus for helping occurred within the context of the experiment and the individual in need was the experimenter. Because the experimenter was facilitating the study in the moment the opportunity for helping became present, participants may have felt it inappropriate or even pernicious to the procedure if they were to intervene. Moreover, the helping manipulation (a thumb injury that made it difficult to write) was relatively subtle and may have been viewed as innocuous by participants. That is, the experimenter was still *able* to write on the document and simply needed to exert more effort to do so, which may have reinforced participants' conception that intervention would be unnecessary.

Retrospectively, it may have been more effective to utilize a validated helping measure (such as that established by Condon et al. (2013)) in order to draw a more direct connection between the manipulation of the study and behavioral outcomes, though the lack of helping in this study does provide some insight into social mechanisms that influence it. Future research would benefit from exploring these systems, such as the social dynamic between the helper and the help beneficiary and the characteristics of the catalyst for help (e.g. crutches vs. thumb injury).

It is additionally possible that the effects of the experiment either diluted before the helping paradigm was administered or that the two seemed unrelated as a result of being

presented separately. Thus, a behavioral measure that was directly related to the Syrian refugees may have been more effective.

Gender. Although there was a significant difference between males and females in reports of physical pain, the meaning of this finding is somewhat dubious: the majority of participants denoted a rating of "0" for physical pain, with a few outliers who gave very high ratings. The significant difference between males and females is essentially driven by a single male participant who rated his physical pain as 64. Without this outlier, differences in physical pain were negligible.

The primary outcome measures did not support the hypothesis that females would exhibit higher levels of compassion than males, though they did display a higher amount of emotional activation than males with the measure of guilt reaching significance. This provides some support for the tend-and-befriend hypothesis: the presentation of Syrian refugees is likely to elicit guilt when the individual feels motivated to help but does not have any ability to do so, and females may have experienced more guilt as a result of greater emotional reactivity due to tend-and-befriend processes (see Taylor et al., 2000). In addition, a myriad of distress-related emotions (e.g., fear and sadness) tend to be more stereotypically associated with females (Hutson-Comeaux & Kelly, 2002), which may result in women being more likely to report experiencing these emotions when presented with emotionally evocative stimuli. However, these explanations suggest that females should have also reported significantly more compassion and distress-related emotions, which was not the case. Though there is a connection between guilt and prosocial motivation (see Carlson & Miller, 1987), how this may affect compassion is unclear.

Conclusion & Limitations. The primary limitation of this study was the difficulty of achieving the desired effect due to the stimuli used, as well as appraising how this difficulty influenced outcomes. The role of music in this study and its interaction with the visual stimuli is particularly complex (indeed, much more than anticipated). The study also suffered from a limited sample size due to being conducted at a small college where individuals tend to have similar demographics/backgrounds (e.g. white, middle class, etc.).

A more precise classification of emotions would have likely benefited this study immensely. The PANAS items were used as manipulation checks but, due to the unclear findings described earlier, it is difficult to establish a clear connection between the emotions elicited by each stimulus and responses on the PANAS. More importantly, these inconsistencies hinder a definitive assessment of the validity of the stimuli. In the future, it would be beneficial to disentangle the effects of each individual stimulus that was used (e.g., were the images and/or music adequately potent in eliciting the desired emotions?).

Although the hypothesized results were not supported by the data, many of the patterns delineated here are somewhat promising: though non-significant, there was a consistent effect on compassion that occurred in the opposite direction of what was hypothesized, and this effect can be partially explained by examining other measures of the study. These findings, though unexpected, provide some insight into perception and attention of visual and auditory stimuli as they pertain to compassion and should help galvanize future research. The societal benefits of understanding the forces that influence compassion are unequivocal, and any minor advancement in this field of study should be viewed as a significant step in the formation of a better world.

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Appendix

Pre-questionnaire

Age:

Gender: 1 Male 2 Female 3 Other

Class status: FR SO JR SR

Watson, D., Clark, L.A, & Tellegen, A. (1988). Positive and Negative Affect Schedule [database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t03592-000

You will now be presented with a number of statements that describe different feelings and emotions. Read each item and then mark the extent to which you agree with each statement.

1 = very slightly or not at all 2 = a little 3 = moderately 4 = quite a bit 5 = extremely

____ Interested

____ Distressed

____ Upset

____ Guilty

____ Scared

____ Hostile

____ Ashamed

Cameron, C.D., & Payne, B.K. (2011). Measures to assess collapse of compassion [Database record]. Retrieved from PsycTESTS. doi: 10.1037/t01681-000

This scale is modified from the original to apply to the Syrian refugees seen in the images of the experiment. Items marked with an asterisk are used exclusively to deter participants from identifying the true purpose of the study. Responses to these items will not be included in the analysis.

Instructions:

Both conditions:

You will be presented with one of several sets of images that each depict a unique topic, and will be assigned to view the images either with or without music. The subject matter of the images, as well as the musical piece that you will be assigned, is randomized for each participant.

Condition 1 (no music):

The topic to which you have been assigned is the current Syrian refugee crisis. The images that you see will depict refugees fleeing Syria as a result of violence from civil war. You have been assigned to view the images without music. Try to view each image attentively and long enough to gather as much visual/contextual information as you can. You will be allotted a minimum of 3 seconds to view each image. When you feel you have viewed the image long enough, press "continue" to proceed to the next image. Since you will later be asked questions about the images, try to view each one attentively and long enough to gather as much visual/contextual information as possible.

Condition 2 (music):

The topic to which you have been assigned is the current Syrian refugee crisis. The images that you see will depict refugees fleeing Syria as a result of violence from civil war. You have been assigned to view the images with music. Try to view each image attentively and long enough to gather as much visual/contextual information as you can. You will be allotted a minimum of 3 seconds to view each image. When you feel you have viewed the image long enough, press "continue" to proceed to the next image. Since you will later be asked questions about the images, try to view each one attentively and long enough to gather as much visual/contextual information as possible.

Compassion Scale (1 = *Not at all* to 7 = *Extremely*)

Content

This section will assess your thoughtful and emotional perception of the slide show's content.

1. How sympathetic do you feel towards the refugees in the pictures?
2. How warm do you feel toward the people you viewed in the images?
3. How compassionate do you feel toward the Syrian refugees?
4. How touched were you by the images?
5. How urgent do the needs of the Syrians seem?
6. To what extent do you feel that it is appropriate to give money to aid the refugees?
7. How much do you value the welfare of the refugees?
8. How important is it to you that the those in the images be happy?
9. How important is it to you that the Syrian refugees not suffer?

Distance Scale (1 = *Not at all* to 7 = *Extremely*)

1. How close do you feel to the Syrian refugees? (reverse-coded)
2. How distant do you feel from the Syrian refugees?
3. To what extent do you feel like you are physically far away from the Syrian refugees?
4. How much do you feel like the Syrian refugees are all the way across the world?
5. To what extent do you feel personally invested in the Syrian refugees? (reverse-coded)
6. To what extent do you feel a social connection to the Syrian refugees? (reverse-coded)
7. To what extent do you feel emotionally connected to the Syrian refugees? (reverse-coded)
8. How emotionally distant do you feel from the Syrian refugees?

Physical Pain

1. Currently, how much physical pain are you experiencing (0= none at all, 100= the worst pain you've ever experienced)? _____

Interest

1. To what degree would you like to learn more about the Syrian refugee crisis?
2. How much do you already know about the refugee crisis?
3. If you were to watch a documentary about the Syrian refugee crisis, what would be an ideal length in which you would remain interested for its entirety?
    a. <5 min
    b. 5-10
    c. 10-20
    d. 20-40
    e. 40-60
    f. >60

Visual

This section will assess your visual perception of the pictures that you viewed.

1. How would you rate the overall quality of the pictures?
2. To what degree was there a difference in brightness between the pictures?
3. To what degree was there a difference in brightness of colors?
4. How would you compare the overall quality of the pictures to that of a professional?
5. How capable were you in perceiving individual faces?

Familiarity

1. Do you recognize the music that you heard?
2. How familiar are you with the music that you heard?

Participant Raffle Entry Form

Participant ID number: _____ Experiment Time: _____

Date: _____

Assigned topic_____

Participant Signature_____

Experimenter Signature _____

Research Participation Consent Form

The Effect of Music on Perception of Visual Stimuli
Allegheny College Department of Psychology

Purpose of Research: The purpose of this study is to examine how listening to music can affect how one perceives certain visual characteristics in media (such as color, brightness, quality, content etc.).

Procedure: I understand that I will be asked to view a brief slideshow while listening to a piece of instrumental music, and subsequently complete a questionnaire regarding my perceptions of the pictures that I viewed as well as my current mood state.

Risks to the Individual: I understand that there will be no more risk other than what is normally experienced in everyday life. Similar to pictures seen in news stories, some of the images have the potential to be disturbing to sensitive audiences.

Compensation: I understand that I may receive extra credit at the discretion of my instructor, and that I can choose to be entered into a raffle to win a $25 gift card to the Pennsylvania Sandwich Company.

Confidentiality: I understand that my name will never be associated with the data I provide and will be completely confidential. I understand that the researcher is interested in patterns in the data as a whole as opposed to individual scores. Any reports made based on the data will focus solely on these general patterns.
Furthermore, I understand that all data will be stored under lock and key in the Psychology Department at Allegheny College. I understand that my consent form will be stored in a locked cabinet separately from my data. When the data I provide today are no longer needed, they will be destroyed.

Voluntary Nature of Participation: I understand that I do NOT have to participate in this experiment. Furthermore, upon beginning the experiment, I may choose to withdraw my participation at any time without penalty. I understand that I may skip any individual questions that I do not wish to answer, and I may choose not to participate in any part of the study without being questioned.

Contact Information: If I have any questions about this research project, I can contact Stephen Anderson at andersons@allegheny.edu or the research advisor, Dr. Lydia E. Jackson at ljackson2@allegheny.edu or at (814) 332 5955. If I have questions or concerns about the treatment of research participants, I can contact Dr. Jialu Streeter, Chair of the Allegheny Institutional Review Board (IRB) at jstreeter@allegheny.edu.
I understand that my signature below indicates that I am at least 18 years of age at the time of my participation in this study, and that I have a received a copy of this informed consent form. I have carefully read and understood the information on this form and all of my questions thus far have been answered. I hereby agree to participate in the study.

Participant's Signature _____ date _____

Participant's Name (print) _____ date _____

Researcher's Signature (Stephen Anderson) _____ date _____

Research Participation Debriefing Form I
The Effect of Music on Perception of Visual Stimuli
Allegheny College Department of Psychology

Purpose of Research: The purpose of this study was to investigate the effects of music on the perception of images. Some participants listened to music (vs. not) while looking at images from recent events. The hypothesis was that music would enhance the perception and processing of the images. It is understood that some of these images may have been emotionally distressing. The Counseling Center (information below) is available. If you are in immediate need of counseling, please let the experimenter know so he can walk you to Reis Hall.

Compensation: Some students may receive extra credit from their professors for their participation if the course allows it. Participants may also enter their name into a raffle for a $25 gift card from the Pennsylvania Sandwich Company.

Confidentiality: The data you provided for this research project will be confidential and your name will never be associated with your results. Furthermore, when your data is no longer needed, it will be shredded.

To Learn More: For further information about this topic, please consult the following sources:

Bouhuys, A.L., Bloom, G.M., Groothuis, T.G.G. (1995). Induction of depressed and elated mood by music influences the perception of facial emotional expressions in healthy subjects. *Journal of Affective Disorders, 33,* 215-226. doi:10.1016/0165-0327(94)00092-N

Hunter, P. G., Schellenberg, E. G., & Schimmack, U. (2010). Feelings and perceptions of happiness and sadness induced by music: Similarities, differences, and mixed emotions. *Psychology of Aesthetics, Creativity, and the Arts, 4(1),* 47-56. doi:10.1037/a0016873

Contact Information: If you have any questions about this research project, please consult the information below:

Experimenter: Stephen Anderson E-mail: andersons@allegheny.edu
Faculty Advisor: Dr. Lydia E. Jackson E-mail: ljackson2@allegheny.edu
IRB Committee Chair: Dr. Jialu Streeter E-mail: jstreeter@allegheny.edu
Counseling Center (Reis Hall Room 304) - (814) 332-4368

If you would like a copy of the results of this research study, please fill out and tear off the bottom portion of this debriefing statement and return it to the researcher.

I would like to receive a summary of the results of this study.
Yes No

If yes, what is your Box #? _____

Research Participation Debriefing Form, II

The Effect of Musically Induced Mood on Feelings of Compassion
Allegheny College Department of Psychology

Purpose of Research: Previous research has demonstrated that negative emotions play a role in compassion and perception of suffering in others. The purpose of this study is to investigate whether listening to mood-inducing music can affect feelings of compassion. My hypothesis is that participants who listened to depressive mood-inducing music, compared to participants who listened to no music would spend more time viewing the images, report more feelings of compassion, and be more likely to help the experimenter write on the document. It was necessary to keep the true purpose of the study hidden to avoid potential bias in participant responses, and several irrelevant items were included in the questionnaire to make the story more convincing.

Compensation: Some students may receive extra credit from their professors for their participation if the course allows it. Participants may also enter their name into a raffle for a $25 gift card from Pennsylvania Sandwich Company.

Confidentiality: The data you provided for this research project will be confidential and your name will never be associated with your results. Furthermore, when your data is no longer needed, it will be shredded.

To Learn More: For further information about this topic, please consult the following sources:

Bouhuys, A.L., Bloom, G.M., Groothuis, T.G.G. (1995). Induction of depressed and elated mood by music influences the perception of facial emotional expressions in healthy subjects. *Journal of Affective Disorders, 33,* 215-226. doi:10.1016/0165-0327(94)00092-N

Hunter, P.G., Schellenberg, E.G., Schimmack, U. (2010). Feelings and perceptions of happiness and sadness induced by music: Similarities, differences, and mixed emotions. *Psychology of Aesthetics, Creativity, and the Arts, 4,* 47-56. doi: 10.1037/a0016873

Stellar, J., Manzo, V., Kraus, M., Keltner, D. (2012). Class and compassion: Socioeconomic factors predict responses to suffering. *Emotion, 12,* 449-459. doi: 10.1037/a0026508

Contact Information: If you have any questions about this research project, please consult the information below:

Experimenter: Stephen Anderson E-mail: andersons@allegheny.edu
Faculty Advisor: Dr. Lydia E. Jackson E-mail: ljackson2@allegheny.edu
IRB Committee Chair: Dr. Jialu Streeter E-mail: jstreeter@allegheny.edu
Counseling Center (Reis Hall Room 304) - (814) 332-4368

If you would like a copy of the results of this research study, please fill out and tear off the bottom portion of this debriefing statement and return it to the researcher.

I would like to receive a summary of the results of this study.
Yes No
If yes, what is your Box #? _____

Table 1

Means and standard deviations for compassion, distance, time, and interest scores

	No Music (n=21)		Music (n=24)	
	M	SD	M	SD
Compassion	5.86	.62	5.55	.84
Distance	4.57	.79	4.72	.75
Time	10470.35*	3744.61	8427.38	3342.16
Interest	16.67	3.85	16.29	2.57

*p = .06

Note: The interest score above was created out of a composite score of the "interest" item on the PANAS and the three interest items in the post-questionnaire (see Appendix). The highest possible score participants could obtain on this measure was 21.

Table 2

Means and standard deviations for PANAS items and physical pain

	No Music (n=21)		Music (n=24)	
	M	SD	M	SD
Distress	2.86	1.06	3.04	.91
Guilt	2.67	1.11	2.46	1.25
Hostility	1.57	.75	1.42	1.06
Scared	2.48**	1.17	1.58	.93
Shame	2.48	1.12	2.08	.97
Upset	3.52	1.10	3.04	.91
Pain	12.38	19.70	10.46	16.55

** $p < .01$