

The Science and Psychology Behind Music and Emotion

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ABSTRACT

Music has been used for thousands of years as a means of emotional expression. The goals of this paper are to (a) review current literature on how music induces emotion (b) explore the mechanisms of how this happens both physiologically and psychologically and (c) to look at the role of desired effect and musical preference to move towards a general conclusion of what drives listeners' musical choices. This paper approaches this by looking at structural theories of music including those of Krumhansl (1997) that music has inherent qualities that instill specific responses in the listener. The paper then continues by addressing a Jungian perspective often employed in music therapy. Here, music is used to express what is otherwise inexpressible. The Behavioral Perspective section postulates that music can prime listeners by making them predisposed through associations to feel positive or negative emotions. This theory is carried over to an analysis of music and consumerism where emotional priming can serve as a bridge to an association with a product. The Physiological Effects section explores research on music's somatic connection indicating that pleasant music reduces stress and may decrease the body's post-stress responses. The Music and Performance section analyzes the Mozart effect and its potential relationship to the arousal and mood hypothesis, stating that the improved spatial IQ scores recorded in the Mozart effect may have more to do with the arousal generated by all classical music rather than Mozart's music itself. The paper concludes with an analysis of what drives listeners and the Arnett (1991a; 1991b; 1992) heavy metal studies, which show that music is the way adolescents deal with emotional upheaval and how music can be used as a means of achieving catharsis.

INTRODUCTION

Music has been used for thousands of years as a means of religious, cultural, social, and self-expression. Gold et al. (2007) noted that music can be used as a form of nonverbal communication and interaction. Music's communicative impact is displayed quite prominently in the research and methods of music therapy. Music therapy utilizes musical instruments and voice as tools to express emotions that were previously inexpressible.

Also, music often elicits emotion through emotional associations to specific chord progressions (Luck et al. 2007). This paper examines the mechanisms of how music affects emotion.

Kivy (1990) and Krumhansl (1997) note that within the study of music and

emotion lie two primary perspectives. The first of which suggests that music itself has inherent, unchangeable qualities that will incite in a listener a specific emotional response, as designed by the composer of a given piece. This position is known as the 'emotivist' position. Indeed, major and minor mode music are associated with specific emotional reactions in listeners (Krumhansl 1997).

The second perspective, known as the 'cognitivist' position, states that the emotion experienced by a listener is a product of emotions that the listener associates with, or recognize within, the music. However, unlike with the experiences of Heavy Metal listeners, to be discussed in later sections (Arnett 1991a),

Kivy (1990) argues that emotion felt while listening to music is a product of the expressive nature of the music and is not necessarily the same emotion as is normally experienced day-to-day. This perspective is given with the possible exception, of cases of psychopathology or association between the music and previously felt emotion (Kivy 1990; Krumhansl 1997).

Falling somewhere in the middle of the spectrum between the emotionist and cognitivist perspectives are the findings pertaining to Heavy Metal music from Arnett (1991a). To many who do not prefer Heavy Metal, this form of music would likely be seen as negative, angry and aversive, while to those that do prefer it, it is seen as cathartic (Arnett 1991a). Indeed, research has shown that those who suffer from negative affect will seek out negatively valenced media to achieve some sort of gratifying emotional response (Mares and Cantor 1992; Nabi et al. 2006), falling in line with the exception present within the cognitivist principle of Kivy (1990). According to Arnett (1991a), listeners use Heavy Metal music to bring to the surface emotions that they already are experiencing absent the musical stimuli.

The psychological effects section of this paper explores the Jungian perspective of music and emotion, as represented in the goals of music therapy. Research from this view of psychomusicology implies that music can be a tool to express specific emotions felt by a patient (McClary 2007; Luck et al. 2007). The behavioral perspective on music would seem to fall in line with this as positively associated music can be paired with a neutral object to create a positive association with that object, thereby displaying some sort of relational connection between music and emotion.

The main goals of this paper are as follows: (a) to review current thinking on whether music directly induces emotion, (b) to explore the mechanisms of how music impacts or induces emotion both physiologically and psychologically, and finally (c) to look at the role of desired effect

and musical preference to move towards a general conclusion of what drives listeners to select specific types of music.

DOES MUSIC INDUCE EMOTION?

Music's Direct Effect on Emotion

According to Rider (1997), the homeodynamic theory states that, those who experience poorer emotional health will express their ailments physically (Rider 1997). Shea et al. (1993) found that those who scored higher in two types of repression scored lower in overall T-cell count. Furthermore, Temoshok (1987) found that cancer patients tended to score higher on levels of repressive coping.

Additionally, those who experience high levels of repression can most effectively be restored to homeostasis through cathartic release (Rider 1997). Rider found that one of the most effective ways of achieving this type of catharsis (or "homeodynamic shifts" as Rider often referred to it) was through music (Rider 1997). Additional evidence exists indicating music as actually inducing and amplifying emotions. Traditional researchers studying music effects have found associations between minor modes and sad emotions and major modes and happy emotions (Kivy 1990; Krumhansl 1997). This evident connection between music and mood is partially the foundation behind music therapy which uses structured and free musical improvisation, singing and listening to music to address a client's given issues. The process of music therapy is described by McClary (2007):

The modality of music therapy attempts to utilize the nonverbal and often nonthreatening nature of music to provide a safe place to express the inexpressible....The act of processing a musical experience involves looking at the material that arose [through musical expression] and directing it through carefully structured questions and observations into conscious awareness. By....walking around the experience and

looking at it from all sides, the implication is that there is movement with the experience. Movement implies a process through which symptoms of psyche can come to the surface and be viewed from a therapeutic standpoint. (McClary 2007 p.155)

Music as a type of psychotherapy has many forms. One common approach is to simply expose listeners to musical stimuli to facilitate a desired response (Luck et al. 2007). Another, known as "Improvisation," was developed in the early 1960's as a psychological treatment method for handicapped children. Improvisation can be used alone or in combination with other therapeutic methods. In this method musical and non-verbal communication are used as methods for communicating, and amplifying emotion that a patient may have otherwise been unable to express, or may be all together unaware of (Luck et al. 2007).

Music therapy has been effectively used for promoting emotional expressiveness in children (Gold et al. 2007). Hendon (2008) found that across various studies, music has been shown to be an effective therapeutic technique across differing individuals with differing needs. In Hendon's same study, music therapy led to significantly more smiles in hospitalized children for every three minutes observed than play therapy. Since smiles are a good indicator of positive mood in children, Hendon inferred that children were happier in music therapy than in play therapy. This inference was reinforced by children's increased willingness to participate in music therapy over play therapy (Hendon 2008). Music therapy has also been found to encourage overall emotional welfare (Paul and Ramsey 2000).

Music therapy has also been shown to be effective at instilling positive mood and positive behavioral reactions in adolescents. A case study by Pasagiannis (2002) found an increasing trend of affiliative (pro-social) behaviors in a female participant and an increased ability for both of the researcher's subjects to engage with a therapist and others. The authors therefore implied that

music therapy is a positive and effective way of boosting retention rates in adolescent treatment and boosting positive emotional reactions and behaviors.

Hospitalized children often experience stress from their stay possibly because of separation from loved ones, isolation, discomfort from their illness and fear of the new and unknown environment (Longhi and Pickett 2008). Music therapy has been shown to be an effective technique for reducing resulting pediatric anxiety and stress (Longhi and Pickett, 2008). Longhi and Pickett (2008) found that after being exposed to live music, twenty-one pediatric patients at a London hospital showed blood oxygen saturation levels had significantly risen compared to tests performed prior to the music session. The rise in blood oxygen levels is a physiological indication of reduced anxiety. This finding held regardless of sex.

Furthermore, this study indicated that these results were present not only for premature newborns during circumcision and low birth weight pediatric patients, but also for pediatric patients regardless of age or condition. This finding revealed that live music, especially with emotional and soothing components, was beneficial in helping to alleviate stress for children in anxiety provoking situations. (Longhi and Pickett 2008)

Evidence for the impact of music on mood transcends music therapy alone. Le Roux et al. (2007) found that exposure to J.S. Bach's Magnificat reduced levels of cortisol in the blood of listeners with and without medical conditions. McCraty (1999) displayed a relationship between increased levels of anger and higher levels of cortisol. Since levels of cortisol are associated with physiological stress, one could surmise that exposure to the Magnificat reduced listeners' physiological stress levels. Because lower cortisol levels are also a good indication of reduced emotional stress, one could also conclude that exposure to the Magnificat also reduced listener's emotional and psychological stress levels as well.

This apparent connection is further bolstered by the overall reduction of depression in listeners with medical conditions (Le Roux et al. 2007). Le Roux et al. (2007) also displayed that an increase of hostility and anger has a direct, suppressive effect on the immune system, while musical intervention made a significant, positive difference, especially as it pertained to anger and hostility.

Furthermore, Livingston (1979) found that music itself can stimulate the relaxation response in individuals by both distracting the mind and allowing it to focus attention. According to Livingston (1979), music does this by allowing the mind to shift its focus to the relaxation of muscles and the facilitation of breathing.

Ferrer (2007) examined music therapy interventions in cancer patients exposed to live music during chemotherapy treatments. With a sample of 50 cancer patients ranging ages 21 to 78, Ferrer (2007) found that overall anxiety decreased by 57% for listeners, while those in the control group experienced an 11% increase in anxiety. Additionally, Ferrer (2007) measured patients' current levels of fear, which across the patients decreased 60% with worry decreasing overall as well. Finally, on average, both comfort and relaxation increased across the sample.

These studies all seem to point to one thing, that listening to music, especially when it comes to preferred styles, plays an important role in reducing anxiety for listeners. These studies, however, do not pertain to actual day-to-day listening preference and instead deal with clinical or hospitalized populations.

On the topic of music's direct effect on emotion, numerous scholars have expressed concern with regard to music's effect on the attitudes of listeners (Wester et al. 1997). What is commonly known as "gangsta rap" has proved to be of specific concern with lyrics that aggrandize physical abuse, torture and rape of women and actively portray antisocial behavior as a norm (Wester et al. 1997).

Bandura's (1977) social model of violent behavior states that viewing unpunished violence can lead to significant increases in the likelihood of the viewer engaging in violent behavior and violent emotional responses, especially in children. Following Bandura's model, Wester et al. (1997) theorized that, repetitive exposure to violent gangsta rap music would either prime listeners to preexisting cultural anti-female values in some groups, or possibly itself cause anti-female sentiment. To examine this possibility, Wester et al. (1997) isolated gangsta rap from its subculture and exposed 60 White and exclusively male undergraduates to the music.

Results of Wester et al. (1997) suggested that exposure to gangsta rap lyrics may have led participants to view their preexisting relationships with females as more hostile than non-listeners. On the other hand, listeners to gangsta rap were not significantly influenced in their overall attitudes towards women. In general, these results were, in fact in line with Wester et al's. (1997) hypothesis that gangsta rap has a priming effect on preexisting subcultural beliefs and values about women. Furthermore, Wester et al. (1997) hypothesized that based on the study's results, chronic exposure to gangsta rap would enhance or create lower views of women over time.

MECHANISMS OF HOW MUSIC INDUCES

EMOTION

Structural Qualities of Music

Krumhansl (1997) states that ratings of perceived emotional experience as induced by exposure to musical excerpts match the researcher's expected emotional response for those same excerpts. The music in Krumhansl (1997) therefore was theorized to have instilled a specific and unchangeable emotional response into the listener. Luck et al. (2007) suggest that while the feel of a specific song may in fact

fall in line with expected emotional responses, specific features of the piece may decrease or increase the perception of specific emotion as the piece progresses. Still, this study supports the findings of Krumhansl (1997) by implying that a specific emotional tone is held within a piece of music.

One confound to Krumhansl (1997), however, is that this lab study did not address the possibility that the emotional perception of a piece of music inside of and outside of a lab may be different. Furthermore, this study did not address how the perceived emotional quality of a given piece of music may not necessarily be in line with the emotional experience of the listener. If the latter is in fact the case, the possible inherent quality of the music may not be a catalyst for an emotional reaction that matches the music's emotional tone. In other words, the perceived emotional experience of listening to a piece of music may be different from what one would describe as the inherent emotional quality to that given piece, such as whether that piece is considered happy, sad, angry, etc.

The dimensional theories of emotion attempt to explain inherent emotional qualities of music by picking apart aspects of a piece of music. The dimensional theories of emotion state that: the emotional meaning of a piece of music "can be described within a multidimensional emotion space comprised of a small number of dimensions." These "dimensions" are known as "potency/strength," "valence/pleasantness," and "activity/arousal" (Luck et al. 2007). When looking at perceptions of music as rated within the dimensional model, Luck et al. (2007) found that ratings including "pleasantness," "activity" and "strength" related to "large scale temporal patterns of musical features."

Higher ratings of musical "activity" were predicted best by a greater pulse clarity and a higher level of note density. Higher "strength" ratings were best predicted by a higher average velocity, dissonance and note density and finally,

higher "pleasantness" ratings were best predicted by lower note density, lower pulse clarity and higher tonal clarity. These results therefore indicate that specific structural characteristics of a given piece of music can predict, elicit and induce emotional responses. These findings provide a very interesting look at music's impact on its listeners, but what of the listener's role in music? Why do some listeners prefer harsher more violent forms of music, while others slower and more "pleasant" forms? These questions are addressed in the following sections.

PSYCHOLOGICAL EFFECTS OF MUSIC

The Jungian Perspective

For a psychological perspective, one could look to the works of Carl Jung - a psychoanalytic theorist and former understudy of Freud- to understand the mechanisms of how music induces emotion (Dunne 2002). According to Jung, the goal of any therapy should be one of the realizations of the authentic self, or making one's issues conscious where they were once unconscious. By addressing these issues, one reveals the true self residing underneath the once unconscious issue. Music therapy can therefore be seen as sharing the same goals as the Jungian model of psychotherapy and musical preference, using music to express unconscious or inexpressible emotions (McClary 2007).

Improvisational music therapy would seem to follow along with this model, showing a view of a psychological mechanism of music's emotional effect that is consistent with psychodynamic theory. Free improvisation in music therapy is a form of psychotherapy where the client creates musical sounds in an environment devoid of any guidelines, rules or directions as indicated by the therapist (Luck et al. 2007).

While this form of music therapy displays the musical representation and

amplification of what the client is feeling, it is the job of the therapist to “define and extract the clinically relevant combinations of musical features that are ‘hiding’ within the improvisations.... [this is further complicated by the fact that]...these combinations of features change and evolve as an improvisation unfolds raising the question of how best to investigate their relationship to listeners’ perception of emotional content” (Luck et al. 2007). There are several ways to interpret this information, from continuous ratings of emotional perceptions of emotional content to examining relationships between these ratings and modifying the combinations of the features of the music in the improvisation (Luck et al., 2007).

The Behavioral Perspective on Music

Similar to how a score can cause an emotional priming effect on a listener, making them predisposed to feel specific types of emotions before or during a related event i.e. a movie (Simonton 2007), music can be used to positively prime a consumer by creating a positive association between the consumer and a product, or a consumer and a brand name (Fulberg 2003). The behavioral concept of classical conditioning suggests that a preferred song or piece, if paired with a neutral product will produce a positive, or negative association between the two stimuli (Zander 2006). Gorn (1982) noted that classical conditioning could be applied to consumer selection through his pen selection experiment. Gorn (1982) paired light blue and beige pens with music either preferred or disliked by subjects. At the end of his experiment, he found that when asked to pick a pen, 79% of subjects chose the one that had been paired with their preferred music.

Music’s dramatic potential to influence people is especially present in the case of familiar music. Familiar music has the potential to promote “peripheral processing” where: through a process of association of familiar with positive, and

unfamiliar with negative, unfamiliar music, objects and individuals could create a tendency to incite negative affect, such as frustration and anxiety (Garivaldis et al. 2007; Bornstein 1989). Further reinforcing this concept are Garivaldis et al. (2007) finding that familiar music does in fact induce favorable observations exercised by individuals within a job applicant selection task. This would imply that familiar music instilled in listeners positive feelings towards the individuals who were paired with it.

PHYSIOLOGICAL EFFECTS OF MUSIC

As mentioned in the first section, music has been shown to reduce stress and anxiety, and to reduce levels of cortisol in the blood. Further questions still stand: how are the emotional effects that listeners experience when exposed to music represented on a physiological level? These questions are addressed in the studies of Suda et al. (2008) and by others mentioned in this section.

Suda et al. (2008) represents a complex analysis of physiological responses to music. Their study recruited 10 participants between 25 and 35 years of age without any known psychiatric or neurological disorders. Participants were given an intelligence task to initially raise cortisol levels. Participants were then exposed to major mode music (primarily pleasant/happy) and minor mode music (primarily sad/unpleasant). After exposure to major mode music, cortisol levels dropped dramatically. This response implies, as discussed before, that pleasant music reduces stress and that music may decrease post-stress responses of the hypothalamus-adrenal-pituitary axis (Suda et al., 2008). This area of the brain is implicated in mood control and regulation, and stress based reactions (Holsboer et al. 1994).

Additionally, localized areas of the brain were shown to respond to music under stressful conditions. Hemoglobin changes in cerebral blood oxygenation,

similar to previously mentioned studies were detected as a “focal increase.” (Suda et al. 2008).

Furthermore, increased hemoglobin was detected in the dorsal front area in response to major mode music. This makes sense when one considers that dorsal front areas of the brain mostly correspond to the dorsolateral prefrontal cortex, a region of the brain associated with positive mood (Suda et al. 2008).

Suda et al. (2008) also noted changes in the lower temporal cortex specifically in decreased hemoglobin levels with exposure to minor mode music. Additionally, the upper temporal cortex of participants experienced noteworthy asymmetric changes in hemoglobin. This led the researchers to believe that pleasant and unpleasant processing of emotions in the temporal cortex may be, as previously found, related to stress reduction by music.

In further support of this general hypothesis they found that neural structures involved in emotional feelings by musical and sound stimuli were observed in the orbitofrontal gyrus, the amygdala, the insula, the stratum, the cerebellum, the hippocampus, and the parahippocampus (Suda et al. 2008). Finally, in the occipital cortex, higher hemoglobin changes were recorded in response to minor compared with major mode music. This finding suggested that attenuated processing areas in the lateral occipital complex were responsible for negative emotion through activation of the dorsolateral prefrontal cortex. The dorsolateral prefrontal cortex - or working memory areas- were therefore activated during exposure to unpleasant or sad music. This finding suggests a significant interaction of arousal responses to music from endocrine sites in the body (Suda et al. 2008).

In another work, (Thompson et al. 2001) stated that the effects of positive emotional reactions from music are linked with higher levels of dopamine. Dopamine projects from the ventral tegmental area to various areas throughout the brain, one of

which is known as the locus ceruleus. The locus ceruleus is the brain’s largest producer of norepinephrine which is the neurotransmitter most significantly associated with arousal. Therefore, enhanced positive mood resulting from musical exposure can stimulate brain areas such as the locus ceruleus, thereby increasing arousal and overall performance (Thompson et al. 2001). Music has also been shown to have a direct effect on arousal and mood by changes in heart rate, skin conductance, finger pulse amplitude, breathing rate, and other skin measures (Davis and Thaut 1989; Krumhansl 1997).

MUSIC AND CONSUMERISM

Influencing choice through emotional amplification

As has been indicated, music is highly effective at amplifying and communicating emotion (McClary 2007; Luck et al. 2007). In cinema, Musical pieces can be conceived of as a means of further amplifying a film scene’s emotional qualities such as happiness, sadness, withdrawal, anger or fear (Simonton 2007). Simonton (2007) describes music as an emotional communicator that helps to facilitate an intellectual understanding of a film’s story line. Simonton (2007) also suggests that the music within a film may in fact withdraw to the background of the cinematic experience, conveying a sort of unconscious priming effect to the listener for the emotional and cognitive aspects of the film. Robazza et al. (1994) found that individuals were able to interpret the emotional meaning of a piece of music regardless of age, sex, or prior musical training. These findings would seem to indicate that music’s effect on individuals is present to the same degree regardless of potentially confounding factors. This would therefore indicate a relatively uniform effectiveness of music in the background of retail/in-store shopping environments. While

retail may not hinder music's influence on an individual's experiences, music may in fact influence an individual's behavior in retail settings.

The experience of a product in today's retail markets is now a sensory experience, where retail in and of itself is a communication strategy (Fullberg 2003). Music provides an opportunity for a company to communicate with a consumer directly, to attempt to connect and foster a sense of brand loyalty (Fullberg 2003). A great deal of evidence exists to suggest that the presence of music in retail environments such as stores and other consumer service locations affects the specifics of transactions taking place in those retail settings (Morin et al. 2007).

Caldwell and Hibbert (2002) found that pleasant music, as opposed to music of a less pleasing nature, is associated with longer consumption times, fewer negative emotional responses to waiting (Hui, Dubé, and Chebat 1997), shorter time perceptions (Cameron et al. 2003; Kellaris and Kent 1992) and more positive attitudes towards the service provider (Dubé et al. 1995). Background music in retail environments has also been found to affect such consumer behaviors as the pace of in-store movement, perceived and actual time spent shopping, and willingness to interact with a sales official (Millman 1982; Yalch and Spangenberg 2000; Dubé, Chebat, and Morin 1995).

The concept of utilizing music to create a positive ambiance for the consumer is represented by the concept of "Brand Theaters" (Fullberg 2003). A "Brand Theater" is a space where the brand attempts to aggrandize the experience of a product. The role of music and sound in this theater, as Fullberg argues, is to be a primary communicator between the product and the consumer, setting the mood and emotion of a product through the music, similar to film and background music (Fullberg 2003).

Fullberg (2003) also addressed the 'wine-aisle experiment' by North et al. (1999) which used specific styles of French

music to increase the sales of French wine and German music to increase the sales of German wine, implying that the music played induced a preference or comfort level with one product over another (North et al. 1999).

Millman (1982) observed that the pace with which music was played in a chain of U.S. supermarkets encouraged customers to stay in the store and continue shopping 39% longer. Fullberg (2003) noted that the direct connection between the musical induction of an emotion-based reaction has never been fully investigated which contradicts the results of other previously mentioned studies that predate Fullberg (2003).

Dubé and Morin (2001) theorized that music in a retail setting does not influence store evaluation through the music's pleasant qualities directly, but influences store evaluation by changing the consumers' attitudes toward the service environment and specifically the service provider. This, in turn subsequently impacts the consumers' overall in-store evaluation. In their model, pleasant music improves the attitude of the service environment, which impacts in store evaluation in both direct and indirect ways. The first of which is the customers' view of the service provider and environment, and then follows the view of the store itself.

In a study of music's effect on attitude formation, Chebat et al. (2001) found that music that enhanced cognitive activity such as complex or fast paced music is associated with lower attitudes of subjects. These results imply that in order to create a positive emotional response to a product or in a retail setting, one may choose to select music that induces lower, rather than higher cognitive activity.

On the similar topic of music conveying the emotional message of film, Baumgartner et al. (2007) found that in an analysis of emotional valence, participants experienced emotional responses such as happiness, fear and sadness the strongest when music that represented those specific emotions was paired with pictures that the

music could be interpreted as representing. These reports were bolstered by the findings that these intense emotional responses were paired with neural activation in areas of the brain associated with emotion. Furthermore, Baumgartner et al. (2007) found that these emotional responses activated the brain's motor cortex because of an overall and unspecific increase in arousal and a high focus on external stimuli.

Similar to previously mentioned studies relating to the concept of using musical scores to underline the emotional message of a film, music can be used in advertising to reinforce a customer's belief about a product, such as using rock music to underscore messages about power or speed or classical music to underscore elegance or refinement (Zander 2006). More specifically, Zander (2006) found that impressions of a brand name could be maneuvered by means of playing specific musical pieces. Depending on which music was used the brand could convey either strength or softness. Zander also found that perception of music, unlike in previous studies was found to differ significantly between men and women, with women reacting more openly and positively overall. Music's emotion based impact on perception is not only limited to objects and brand names but to individuals as well. Chebat et al. (2000) found that calming music promotes customer compliance to requests from salespersons.

Music and Performance

Music has been shown repeatedly to enhance task performance and memory in several studies, the most notable of which is commonly referred to as the Mozart effect. Raucher et al. (1993) made note that the reading comprehension and spatial IQ scores of school aged children increased when they were exposed to Mozart. Furthermore, the same study made note that college students tended to perform better on standardized tests of special

abilities after listening to a short ten-minute excerpt of Mozart, as well. As a direct result of such findings, the concept that music can make a person more intelligent has risen to prominence as a popular interpretation and research finding (Thompson et al. 2001).

The 'arousal and mood hypothesis' was proposed by Thompson et al. (2001) and states that musical exposure affects cognitive abilities because music causes changes in listeners' levels of arousal and/or overall mood. Musical mode is traditionally associated with mood, such as with major and minor chords, and tempo with arousal (Husain et al. 2002). This provides a platform for understanding the Mozart effect whereby the music actually primes the mind in the unrelated domain of spatial-temporal learning and memory (Rauscher and Shaw, 1998; Rauscher et al. 1993).

This effect, however, may not be specific to Mozart and would therefore be applicable to similar types of music according to the arousal and mood hypothesis (Schellenberg et al. 2007). While some literature, however, contrasts these findings under similar conditions (McKelvie and Low 2002), the main question with these findings is what is the reason for this response in individuals, and does it stem from some sort of emotional component?

Schellenberg et al., (2007) found that IQ test's benefits favoring Mozart are in fact a byproduct of mood and arousal generated by the music. This finding therefore reinforces that similar types of music can yield similar benefits to listeners. These findings generalize across age groups, non-IQ cognitive tasks and cultural barriers. In contrast to the idea that similar types of music yield similar effects across different individuals, Cassidy and MacDonald (2007) theorized that this effect was dependent on the personality structure of the listener, specifically with regard to whether they were extroverted or introverted. This theory reflected the concept that the emotional experience of a given piece of music is dependent on the individual listener.

Russell's (1980) 'circumplex' model of emotions stated that emotions exist within a two dimensional space with one dimension comprising arousal and activation, and another mood and valence depicting arousal as a degree of physical activation and experienced emotional response (Schellenberg 2007). Introverts and extroverts reactions to musical preference may be based on their preference for overall arousal during concentration.

Campbell and Hawley (1982) found that extroverts were more likely to choose areas to work with high amounts of noise and activity while introverts tend to work in areas secluded from distraction. Because of these findings, Cassidy and MacDonald (2007) hypothesized that task performance during musical performance would be moderated by extroversion and introversion.

This hypothesis was supported showing that performance benefits in high arousal settings were most experienced by extroverts and in low arousal settings by introverts. It is therefore possible to surmise that extroverts were calmed and focused by high arousal music more than introverts, hence displaying discrepant emotional reactions between listeners. These findings reflect the overall concept that like with emotion and performance, responses differ based on the personality structure of the listener.

A further study on the topic of music and performance was performed by Anderson et al. (2003). The aforementioned study linked concepts of negative behavior and aggression to theories about the arousal potential of music and internal arousal itself. Wienberger (1995) made note of how music played during a learning exercise yielded higher procedural recall when it was played during an examination. When different music was played during the exam from the learning exercise, procedural recall was at its lowest. These results shed light on music's possible power to induce recall and music's powerful effect on the mind (Fullberg 2003).

ROLES OF PREFERENCE AND DESIRED EFFECTS: *What Drives Listeners?*

What drives listeners to prefer some types of music rather than others? Kurdek (1987) stated that listening to music was the way that adolescents, both male and female dealt with anxiety. Many new forms of music in the past 10-20 years have entered the main stream such as Hip-Hop and Heavy Metal. Particularly in the case of Heavy Metal, new darker forms of the music, known as Death Metal, Screamo, and Hardcore among others, have evolved from once fringe styles with underground followings into popular music often played on the radio. With themes such as self-mutilation, murder and suicide, one may wonder, what drives listeners to prefer this style of music? Are listeners angrier or do they experience more dysphoric mood than non-listeners? What does this music do for the listeners? Is it cathartic, or does it make them angry or sad?

Exposure studies have often found that repeated exposure to a stimulus originally rated as neutral or positive causes increased positive association with repetitive exposure (Arnett 1991a). Washburn et al. (1927) showed that repetitive exposure to classical music tended to cause increased responses of pleasantness and initially more pleasant affect among listeners. Altschuler (1948) found that depressed mood could be altered if a patient was initially exposed to music that matched their original mood state. Later, Altschuler successfully changed the tone of the music to alter the patients' emotional state naming the theory behind this process the "Iso-Moodic" principle Altschuler (1948). Similarly, the research of Brickman et al. (1972), suggested the ability to manipulate specific aspects of music to influence musical preference and emotional response.

Witvliet and Vrana (2007) hypothesized that similar responses would occur with music designed to invoke high and low arousal affective responses and positive and negative affective responses.

Using a sample of 67 undergraduate psychology students ranging in age from 18-35, participants were rated on self-report measures of music liking, pleasantness and arousal as well as physiological responses including facial electromyography and heart rate.

According to self-report data, participants reported preference for positively valenced music as compared to negative, and tended to like highly arousing music more than low arousal music. Initial liking responses polarized with participants disliking negative music more over time and liking positive music more over time. Research has shown that listening to preferred music reduces anxiety levels in listeners, the possible reason for the polarizing responses of listeners over time (Davis and Thaut 1989). Listeners to once fringe styles of music under the Heavy Metal umbrella were not interviewed until Arnett (1991b) conducted a study of free response interviews of actual adolescent Heavy Metal music listeners. This work is discussed later on in this section.

The mood management theory was proposed by Zillmann (1988a, 1988b, 2000, 2003). This theory states that listeners will select media, in this case music, that promises to optimize their mood state. According to this viewpoint, individuals would be more inclined to choose media that is of more positive content than their current mood state in an effort to distract them from their current negative mood (Carpenter et al., 2008).

According to Carpinter et al. (2008) arguably the most empirically supported finding with regard to mood management has been that those experiencing positive moods will seek positive media to maintain their current mood state (Biswas, Riffe and Zillman 1994). This is conversely true of those experiencing negative mood states who tend to uplift their mood through media conducive to positive thinking while at the same time avoiding media content with sad subject matter (Meadowcroft and Zillmann 1987).

Research has not always shown this to be the case, however, whereby that individuals with negative affect often seek out negatively valenced media (Mares and Cantor 1992). In many cases, this media seems to result in some form of gratifying emotional response. (Nabi et al. 2006)

Carpinter et al. (2008) sought to explore media usage such as the usage of media and its interaction with mood in depressed adolescents. The Carpinter et al. (2008) study consisted of 51 adolescent participants ranging in age from 7 to 17 years with and without depression. They found that adolescents with major depressive disorder tended to use media such as music more often than those without major depressive disorder. Moreover, those with lower positive mood at one time were more likely to be using media subsequently.

Overall Carpinter et al. (2008) reported that both adolescents suffering from depression and those without depression turned to media after feeling less positive emotionally. Furthermore, adolescents did not seem to use media with sad qualities based on their previously reported mood. Interestingly, more adolescents who were using any type of media were in neutral mood states compared to those not using media at all. Furthermore, Carpinter et al.'s 2008 findings indicated the higher the prior mood level of the subject, the more fun the emotional quality of the media used in subsequent sessions.

Growing in popularity in the 1980's, Heavy Metal music had entered the main stream by the early 1990's. From early on Heavy Metal music was not without its detractors; much of the American public viewed heavy metal as distasteful. Governmental bodies even sought to ban music with the often violent and negative themes found in Heavy Metal ranging from drug use to suicide (Weinstein 2000).

Heavy Metal music is characterized by pounding rhythmic beats, extremely loud volume, vocals screamed as much as sung, and heavily distorted guitar instrumentals

(Arnett 1991b). Heavy Metal and Hard Rock music distinguish themselves from other forms of rock music with their more sexual, hedonistic and depressed themes (Arnett 1992). Hard rock and Heavy Metal further distinguish themselves from one another with hard rock being more often played in major keys, and Heavy Metal being played mostly in minor keys, with a more depressed emphasis.

Arnett (1991a) was one of the few studies that approached listeners who preferred Heavy Metal music and directly questioned them about why they liked their music and what it did for them. The sample for Arnett (1991a) was 17 subjects recruited from a Georgia music store who were asked 28 open ended questions about Heavy Metal music and how it made them feel. Forty-three percent of subjects indicated that they listened to Heavy Metal especially when they were angry, indicating that it was not necessarily the music that caused their negative emotions, rather, those with preexisting negative affect sought the music out themselves. One listener indicated that the more angry or dysphoric his emotional state, the "harder" the metal he would listen to. Very few listeners indicated that they listened to the music while happy or while experiencing positive emotional states.

More interestingly two thirds of listeners who listened to Heavy Metal music while angry stated that the music had a "purgative" or cathartic effect that reduced their negative emotions, calmed them down, or provided a "vicarious release or aggression." These findings and statements are in line with the Jungian view of music in therapeutic contexts, as a channel to release negative emotion whether conscious or unconscious (McClary 2007).

Furthermore, these findings are in line with aforementioned music therapy studies displaying a reduction in anxiety for listeners under emotional stress (Longhi and Pickett 2008). Paradoxically, of the listeners interviewed, only two stated that the music actually produced more aggression. Therefore only those two respondents in Arnett's study reflected the

results of other music studies theorizing that it is actually the inherent structural qualities of the music itself that causes specific emotional reactions.

One reason for this discrepancy may be the emotional state of the adolescent listeners. A number of subjects interviewed described "smoldering conflict" between them and their parents, indicating the possibility of a tumultuous home life or psychological maladjustment of these listeners (Arnett 1991b). Indeed if some listeners listen to Heavy Metal specifically when they are angry and prefer Heavy Metal music in general, it is plausible to surmise that they in fact have higher levels of anger and utilize Heavy Metal music as a means of emotional release.

In an unstructured and open ended study of middle school and high school students, Wass et al. (1988) examined students who usually preferred songs, usually from Heavy Metal bands containing themes of suicide, homicide and satanism to students who preferred other types of rock music. Wass et al. (1988) determined that students who liked Heavy Metal music tended to disagree that their preferred music would lead to behaviors that correspond with those stated in the lyrical content. These findings are consistent with findings by Arnett (1991b). Together, these results suggest Heavy Metal music, provides an emotional release, and does not necessarily encourage or instigate aggressive behavior.

King (1988) examined adolescents hospitalized in a psychiatric unit and found that 59% of those hospitalized for substance abuse specifically named Heavy Metal as their favorite musical style. Additionally, Stack, Gundlach and Reeves (1994) found that the per capita subscriptions to Heavy Metal magazines were associated with the overall youth suicide rate in the United States. Lester and Whipple (1996) found that those who preferred Heavy Metal music were more likely to have considered suicide in the past, implying a history of psychological problems such as depression. Furthermore, Rubin et al. (2001) found that

Heavy Metal listeners displayed more negative attitudes towards women and held them in significantly lower regard than did listeners of other surveyed musical styles.

In a study of adolescents between the ages of 16 and 19, Arnett (1991b) found that, boys who listed a preference for Heavy Metal music reported significantly higher frequencies of reckless behavior in the preceding one year period. Furthermore, Arnett (1991a) found that 87% percent of adolescents who listened to Heavy Metal music had driven over 80 mph (in a state with a 65mph speed limit) at least once in the past year and 87% percent of adolescent boys who listened to Heavy Metal music had driven more than 20 mph over the speed limit (Arnett 1991a). Furthermore, physical expression of emotional discontent can be seen with 61% of surveyed Heavy Metal listeners listing a preference for Heavy Metal music having caused destruction or damage to public property in the past year (Arnett 1991a).

Arnett (1992) delved deeper into the case of Heavy Metal and emotional and behavioral responses in its listeners. In a study of 248 10th and 11th graders, Arnett addressed questions pertaining to musical preference and behavioral and relationship dysphoria. More specifically, Arnett addressed whether or not adolescents who preferred Heavy Metal music reported higher rates of, low self-esteem, reckless and sensation seeking behavior, and poor relationship quality at home, with the opposite sex and with peers.

Arnett (1992) found that adolescents who stated a preference for Heavy Metal or Hard Rock did indeed report higher rates of reckless behavior such as unsafe and casual sex, use of illicit drugs such as cocaine and marijuana, vandalism, shoplifting and other antisocial behaviors. Furthermore, listeners to Heavy Metal music reported higher levels of sensation seeking.

Again, results indicated that those who stated a preference for Heavy Metal music expressed having poor filial relationships, as indicated by complaints such as being perceived as “unimportant,”

or being “disliked by their parents.” Arnett (1992) hypothesized that it is possible that the need for sensation seeking, and the potentially anti-social behavior exhibited by listeners may be in direct response to a poor family situation. Adolescents therefore, as previously mentioned, may use the music for some sort of purgative release to calm their anger, frustration and discomfort stemming from an uncomfortable home life (Arnett 1992).

Female listeners, unlike male listeners of Heavy Metal music were found to have significantly lower self-esteem than those who preferred other styles of music (Arnett 1992). Arnett (1992) theorized that this may be a direct result of the misogynistic and objectifying nature of many Heavy Metal songs of the early 1990's. Whether the music is lending itself to this quality of low female self-esteem, girls with low self-esteem seek out Heavy Metal, or Heavy Metal itself reinforces preexisting low self-esteem is currently unclear (Arnett 1992).

The news for female listeners to Heavy Metal music is not all bad. Selfhout (2007) examined “externalizing behavior” (reckless and antisocial behavior) among 931 Dutch adolescents between the ages of 11 and 18 years of age. These adolescents were studied over a period of 2 years. Externalizing behaviors, involving such behaviors as illicit drug use, aggression and unsafe sexual practices was found to be significantly higher among males, suggesting that females may be less vulnerable to the externalizing tendencies of male Heavy Metal listeners.

As was previously mentioned, music does not appear to cause negative emotional responses, and as mentioned in the case of Heavy Metal, may actually serve a positive cathartic function (Arnett 1991a; Arnett, 1991b; and Arnett 1992). Again, these findings run counter, however, to other studies that find that inherent structural foundations of music contribute significantly to the emotional responses of the listener (Krumhansl 1997).

Based on current research, it is still unclear whether Heavy Metal listeners, with apparently different psychological profiles respond differently to exposure to music compared with those who listen to other styles. Furthermore, it may be difficult to tease out whether it is the overall structure of the music, or the listeners past experiences, that create their sometimes unique, sometimes similar emotional responses.

DISCUSSION

This paper reviewed the major studies and current scientific research as to music's impact on emotion. The main goals of this paper were: (a) to review current thinking on whether music directly induces emotion, (b) to explore the mechanisms of how music impacts or induces emotion both physiologically and psychologically, and finally (c) to look at the role of desired effect and musical preference to move towards a general conclusion of what drives listeners to select specific types of music.

Music cross culturally has been used as a means of religious and social self-expression. On the topic of music's direct effect on the listener, music can be seen to have a direct effect on the emotions of the listener (Krumhansl 1997). Espousing this position is the perspective of 'emotivists' who state that minor modes in musical pieces are most often associated with sad emotional responses and major modes with happy emotional responses (Kivy 1990). Furthermore, music's inherent quality to induce specific experiential reactions is indicated by the well cited study Raucher et al. (1993) noting the higher special IQ scores of listeners when exposed to music composed by Mozart.

On the topic of the mechanisms of how music impacts or induces emotion both physiologically and psychologically, concepts such as the Mozart effect would seem to validate the idea that inherent qualities of music affect the emotional response of the listener, and in the case of

the Mozart effect, even the intelligence of the listener. This concept would imply that these emotional responses and intellectual capacities are within the temporary control of the composer.

Since the days of silent film music has been used to augment the emotional impact of cinema. As previously mentioned in this paper, Simonton (2007) stated that musical pieces are specifically created as a means of further reinforcing a movie's already present emotional quality. The music is designed to amplify the film's qualities of happiness, anger, sadness or fear. Movie music may also create an unconscious priming effect on the listener allowing for increased understanding of the film (Simonton 2007; Zander 2006).

Furthermore, Baumgartner et al. (2007) found that visual media, when not paired with music of a complimentary emotional tone, did not have as much impact as the combined complimentary media together. One possibility for future research on this subject may be to examine whether this effect is also true of music and their music video counterparts. A study could be designed where individuals rated the emotional quality of listening to a song alone, and listening to the song paired with its music video.

It is plausible, however, to surmise that studies of music and its inherent emotional properties similar to those of Krumhansl (1997) only skim the surface of an evaluation of music and mood. Past research has shown that different individuals have different responses to different types of music, as noted in the case of Heavy Metal. (Arnett 1991a; Arnett 1991b; Arnett 1992).

Indeed, the Krumhansl (1997) lab study may have failed to recognize the potential difference between the controlled setting of an in-lab study and the real-world environments where people choose to listen to music. Furthermore, the perceived emotional quality of a given piece of music may not at all be in line with the actual emotional response evoked within the listener by the music. These qualities of

music and perceived emotional tone vs. music and felt emotion may therefore be two independent processes.

On the topic of musical preference and desired effect, it is likely that very few listeners to Heavy Metal music would doubt the angry emotional tone of their music of choice. However, their reason for listening, (e.g. to achieve catharsis, to calm them down from an angry or agitated emotional state) would run counter to the Krumhansl (1997) findings that suggest that listeners to a type of music similar to Heavy Metal would only feel more angry or agitated upon listening.

This is similar in concept to the Mozart effect. As previously mentioned, the popular perspective on Rauscher et al.'s (1993) findings is that listening to classical music, namely that of Mozart will increase one's intelligence (Thompson 2001). This may not in fact be the case as the added benefit of Mozart music may be a physiological corollary of relaxation that aids in arousal and therefore allows for added focus on intellectually challenging tasks. Therefore, it may be fair to say that the impact of music on individuals may not always be as it seems.

Looking across naturalistic and lab-based studies, it appears that music's effects on emotion are not solely based on its inherent attributes. That is, there seem to be between-person differences in the perceived emotional quality of a musical piece and the evoked experience by the listener. Future research can directly examine this idea by duplicating Krumhansl (1997) in lab and real world settings. This future study could ask participants to rate their perceived and felt emotions when listening to music that varies in positive and negative emotional characteristics and major and minor modal tones.

The Arnett studies of the early 1990's (e.g. Arnett 1991a, 1991b, 1992) made significant contributions to the study of musical preference and emotional and behavioral response. These studies indicated that those who listen to Heavy Metal music do not believe that the music

actually causes negative behavior, but rather it causes a purgative and cathartic effect for the listener (Arnett 1991b). A limitation of Arnett (1991b) was that its interviews of Heavy Metal listeners utilized open ended questions allowing listeners to state varying responses lasting from between 20 minutes to 2 hours depending on the willingness of the participant to share information. One possibility for future research would be to attempt a study in the style of Arnett (1991b) with structured, multiple-choice questions that would allow for quantitative or musical preference and effects.

Furthermore, Arnett's studies suggest that listeners who prefer Heavy Metal music suffer from poor family relationships, engage in more reckless behavior, and rate much higher on levels of sensation seeking. Additionally, in the case of female listeners, those who prefer Heavy Metal music may have lower self-esteem than listeners of other types of music, possibly a reflection of the misogynistic and objectifying nature of Heavy Metal songs (Arnett 1992).

One of the confounds of this study is that it did not explore the deeper emotional element of its listeners. While Arnett's studies did look to a negative home life as a possible cause for the dangerous risk taking behaviors and preference for Heavy Metal music, he did not explore whether listeners to this music are more likely to suffer from personality disorders, depression or anxiety. An interesting topic for future research may also be to examine those factors.

Another interesting possibility for future research is to examine what aspects of Heavy Metal music are cathartically beneficial to listeners, (e.g. the distorted musical attributes, the violent and angry subject matter the screamed lyrics or some combination?) Furthermore, if the combination of these specific aspects of Heavy Metal music are beneficial, might the individual components of this music such as screaming lyrics or distorted instrumentals serve different purposes, or does this intense music serve to drown out negative

emotions through some sort of overloaded sensory experience? Answers to these questions would provide important insights into music's effects.

Finally, as Heavy Metal music has increasingly entered mainstream, it has acquired increasingly darker and more violent themes and styles such as Emo, Death Metal, and Hardcore. It would be interesting to try to replicate Arnett's studies in light of current trends in Heavy Metal music. Performing a study such as this one may be even more interesting in light of a possible increase in Heavy Metal listeners due to the added popularity of these new forms of Heavy Metal.

In light of the violent and disturbing trends of musical content, it is important to understand this darker music's effects on emotion. Even in its most violent form, music may serve a positive purgative function based on the psychological profile of the individual listener. Further examination of this phenomenon will be important to better understand musical preference.

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REFERENCES

1. Altschuler, I. (1948) A psychiatrist's experience with music as a therapeutic agent. In Schullian (Ed.), *Music and Medicine*. New York: Books for Libraries Press.
2. Anderson, CA., et al. (2003) Exposure to violent media: The effects of songs with violent lyrics on aggressive thoughts and feelings. *Journal of Personality and Social Psychology* 84, 960-971.
3. Arnett, J. (1991a) Adolescents and heavy metal music: From the mouths of metalheads. *Youth and Society* 23, 76-98.
4. Arnett, J. (1991b) Heavy metal music and reckless behavior among adolescents. *Journal of Youth and Adolescence* 20, 573-592.
5. Arnett, J. (1992) The soundtrack of recklessness: Musical preferences and reckless behavior among adolescents. *Journal of Adolescent Research* 7, 313-331.
6. Ashby, G.F et al. (1999) 'A Neuropsychological Theory of Positive Affect and its influence on Cognition'. *Psychological Review* 106, 529-50.
7. Bandura, A. (1977) *Social Learning Theory*. Oxford, England: Prentice-Hall. 22.
8. Baumgartner, T. (2007) Modulation of corticospinal activity by strong emotions evoked

- by pictures and classical music: A transcranial magnetic stimulation study. *Neuroreport* 18, 261-265.
9. Biswas, R. et al. (1994) Mood influence on the appeal of bad news. *Journalism Quarterly* 71, 689-696.
 10. Bornstein, R. F. (1989) Exposure and affect: overview and meta analysis of research 1968-1987. *Psychological Bulletin* 106, 265-289.
 11. Brickman, P, et al. (1972) Drive and predisposition as factors in the attitudinal effects of mere exposure. *Journal of Experimental Social Psychology* 8, 31-44.
 12. Cameron, MA. (2003) The effects of music, wait-length evaluation, and mood on a low-cost wait experience. *Journal of Business Research* 56, 421-430.
 13. Campbell, JB, and CW. Hawley. (1982) Study habits and Eysenck's theory of extraversion-introversion. *Journal of Research in Personality* 16, 139-146.
 14. Caldwell, C., and S.A. Hibbert. (2002) The influence of music tempo and musical preference on restaurant patrons' behavior. *Psychology and Marketing* 19, 895-917.
 15. Carpinter, F.R., et al. (2008) 'Sad Kids, Sad Media? Applying the Mood Management Theory to Depressed Adolescents' Use of Media', *Media Psychology* 11, 143-166.
 16. Cassidy, G., and R.A.R. MacDonald. (2007) The Effect of Background Music and background noise on the task performance of introverts and extraverts. *Psychology of Music* 35, 517-537.
 17. Chebat, J. (2000) Does background music in a store enhance salespersons' persuasiveness?. *Perceptual and Motor Skills* 91, 405-424.
 18. Chebat, J. (2001) Environmental background music and in-store selling. *Journal of Business Research* 54, 115-123.
 19. Davis, W.B., and M.H. Thaut. (1989) The influence of preferred relaxing music on measures of state anxiety, relaxation and psychological responses. *Journal of Music Therapy* 26, 168-187.
 20. Dubé, L. et al. (1995) "The Effects of Background Music on Consumers' Desire to Affiliate in Buyer-Seller Interactions" *Psychology and Marketing* 12, 305-319
 21. Dubé, L. et al. 1995 The effects of background music on consumer's desire to affiliate in buyer-seller interactions. *Psychology and Marketing* 12, 305-319
 22. Dubé, L, and S. Morin. (2001) Background music pleasure and store evaluation: Intensity effects and psychological mechanisms. *Journal of Business Research* 54, 107-113.

23. Dunne, Clare (2002) Carl Jung: Wounded Healer of the Soul: An Illustrated Biography. 27-30
24. Ferrer, AJ. (2007) The effect of live music on decreasing anxiety in patients undergoing chemotherapy treatment. *Journal of Music Therapy* 44, 242-255.
25. Fulberg, P. (2003) Using sonic branding in the retail environment-- An easy and effective way to create consumer brand loyalty while enhancing the in-store experience. *Journal of Consumer Behaviour* 3, 193-198.
26. Gold, C. (2007) Effectiveness of music therapy for children and adolescents with psychopathology: A quasi-experimental study. *Psychotherapy Research* 17, 292-300.
27. Garivaldis, FJ. (2007) The effect of familiar music on the perception of other individuals. *Psychomusicology* 19, 13-31.
28. Gorn, GJ. (1982) The effects of music in advertising on choice behavior: A classical conditioning approach. *Journal of Marketing* 46, 94-101.
29. Hendon, C(1). (2008) Hospitalized children's mood differences during play and music therapy. *Child care, Health and Development* 34, 141-144.
30. Holsboer F, et al. (1994) Steroid effects on central neurons and implications for psychiatric and neurological disorders. *Ann NY Acad Sci* 746, 345-359.
31. Hui, MK, et al. (1997) The impact of music on consumers' reactions to waiting for services. *Journal of Retailing* 73, 87-104.
32. Husain, G. (2002) Effects of musical tempo and mode on arousal, mood, and spatial abilities. *Music Perception* 20, 151-171.
33. Kellaris, JJ., and R.J. Kent, (1992) The influence of music on consumers' temporal perceptions: Does time fly when you're having fun?. *Journal of Consumer Psychology* 1, 365-376.
34. King, P. (1988) Heavy metal music and drug abuse in adolescents. *Postgraduate Medicine* 83, 295-304.
35. Krumhansl, CL. (1997) An exploratory study of musical emotions and psychophysiology. *Canadian Journal of Experimental Psychology* 51, 336-353.
36. Kurdek, LA. (1987) Gender differences in the psychological symptomatology and coping strategies of young adolescents. *The Journal of Early Adolescence* 7, 395-410.
37. Kivy, P. (1990) Music alone: Philosophical reflections on the purely musical experience.

Ithaca: Cornell University Press.

Aesthetics, Creativity, and the Arts 1, 155-159.

38. le Roux, FH. (2007) The effect of Bach's Magnificat on emotions, immune, and endocrine parameters during physiotherapy treatment of patients with infectious lung conditions. *Journal of Music Therapy* 44, 156-168.
39. Lester D., and M. Whipple, (1996) Music preference, depression, suicidal preoccupation, and personality: comment on stack and Gundlach's papers. *Suicide and Life-Threatening Behavior* 26, 68-70.
40. Livingston, J.C. (1979) Music for the childbearing family, *J. Obstet. Gynecol. Neonatal Nurs* 8, 363-367.
41. Longhi, E., and N. Pickett, (2008) Music and well-being in long-term hospitalized children. *Psychology of Music* 36, 247-256.
42. Luck, G. (2007) Modeling the relationships between emotional responses to, and musical content of, music therapy improvisations. *Psychology of Music* 36, 26-30
43. Mares, M.L. and J. Cantor. (1992) Elderly viewers' responses to televised portrayals of old age: Empathy and mood management versus social comparison., *Communication Research*, 19 459-478.
44. McClary, R. (2007) Healing the psyche through music, myth, and ritual. *Psychology of*
45. McCraty, R. (1999) The impact of an emotional self-management skills course on psychosocial functioning and autonomic recovery to stress in middle school children. *Integrative Physiological and Behavioral Science* 34, 246-268.
46. McKelvie, P. and J. Low, (2002) 'Listening to Mozart Does Not Improve Children's Spatial Ability: Final Curtains for the Mozart Effect', *British Journal of Developmental Psychology* 20, 241-58.
47. Meadowcroft, J.M., and D. Zillmann. (1987) Women's comedy preferences during the menstrual cycle. *Communication Research* 14, 204-218.
48. Milliman, R. E. (1982) 'Using background music to affect behaviour of supermarket shoppers', *Journal of Marketing* 46, 86-91.
49. Morin, S, et al. (2007) The role of pleasant music in servicescapes: A test of the dual model of environmental perception. *Journal of Retailing* 83, 115-130.
50. Nabi, R.L. et al. (2006) Does misery love company? Exploring the therapeutic effects of TV viewing on regretted experiences. *Journal of Communication* 56, 689-706.

51. North, A.C, et al. (1999) The influence of in-store music on wine selections. *Journal of Applied psychology* 84, 271-276.
52. Pasagiannis, JP. (2002) Hip hop music treatment with at-risk adolescent populations. UMI Microfilm, 2008 1-13
53. Paul, S. and D. Ramsey. (2000) Music therapy in physical medicine and rehabilitation. *Australian Occupational Therapy Journal* 47, 111-118.
54. Rauscher, F. H., et al. (1993) Music and spatial task performance. *Nature* 365, 611.
55. Rauscher, F.H., and G.L. Shaw, (1998) Key components of the "Mozart Effect." *Perceptual and Motor Skills* 86 , 835-841.
56. Rider, M. (1997) Rhythmic Language of Health and Disease, *MMB Music*. St. Louis, MO. 7, 86, 89, 90, 93
57. Robazza, C. et al. (1994) Emotional reactions to music by gender, age, and expertise. *Perceptual and Motor skills* 79, 939-944.
58. Rubin A.M, et al S. (2001) Differences in aggression, attitudes toward women, and distrust as reflected in popular music preferences. *Media Psychology* 3, 25-42.
59. Russell, J.A. (1980) 'A Circumplex Model of Affect', *Journal of Personality and Social Psychology* 39, 1161-78.
60. Schellenberg, E.G. et al. (2007) Exposure to music and cognitive performance: Tests of children and adults. *Psychology of Music* 35, 5-19.
61. Shea, J.D.C., et al. (1993) Negative affect, absorption, and immunity. *Psychology and Behavior* 53, 449-457.
62. Simonton, DK. (2007) Film music: Are award-winning scores and songs heard in successful motion pictures?. *Psychology of Aesthetics, Creativity, and the Arts* 1, 53-60.
63. Stack, S., et al. (1994) The heavy metal subculture and suicide. *Suicide and Life-Threatening Behavior* 24, 15-23..
64. Suda, M., et al. (2008) Emotional responses to music: towards scientific perspectives on music therapy. *NeuroReport* 19, 75-78.
65. Temoshok, L. (1987). Personality, coping style, emotion, and cancer: Toward an integrative model. *Cancer Surveys* 6, 545-567.
66. Thompson, W.F. et al. (2001) Arousal, mood, and the Mozart effect. *Psychological Science* 12, 248-251.
67. Wass, H., et al. (1988) Adolescents' interest in and views of destructive themes in rock music. *Omega* 19, 177-186.
68. Washburn, M.F. et al. (1927) The effects of immediate repetition on the pleasantness or

- unpleasantness of music. In M. Schoen (ED.), *The Effects of music*. New York: Harcourt Brace. 199-210
- impressions of product endorsers and brands. *Psychology of Music* 34, 465-480.
69. Weinberger, N. M. (1995) 'Elevator Music': More Than it Seems, *The Music and Science Information Computer Archive*, University of California, Ca.
70. Weinstein, D. (2000) *Heavy metal: The Music and its Culture*. New York : Da Capo Press. 264-267
71. Wester, S.R., et al. (1997) The influence of sexually violent rap music on attitudes of men with little prior exposure. *Psychology of Women Quarterly* 21, 497-508.
72. Witvliet, CV and SR Vrana. (2007) Play it again Sam: Repeated exposure to emotionally evocative music polarises liking and smiling responses, and influences other affective reports, facial EMG, and heart rate. *Cognition and Emotion* 21, 3-25.
73. Yalch, RF. (2000) The effects of music in a retail setting on real and perceived shopping times. *Journal of Business Research* 49, 139-147.
74. Zander, MF. (2006) Musical influences in advertising: How music modifies first
75. Zillmann, D. (1988a) Mood management through communication choices. *American Behavioral Scientist* 31, 327-340.
76. Zillmann, D. (1988b) Mood management: Using entertainment to full advantage. In L. Donohew, H. E. Sypher, and E. T. Higgins (Eds.) *Communication, social, cognition, and affect*. Hillsdale, NJ: Lawrence Erlbaum Associates. 147-171
77. Zillmann, D. (2000) Mood management in the context of selective exposure theory. In M. E. Roloff (ED.), *Communication yearbook* 23). Thousand Oaks, CA: Sage. 103-123
78. Zillmann, D. (2003) Theory of affective dynamics. *Emotions and moods*, In J. Bryant, D. Roskos-Ewoldsen, and J. Cantor (Eds.), *Communication and emotion*. Mahwah, NJ: Lawrence Erlbaum Associates. 533-567