THE EFFECT OF COMPLEXITY ON PERCEPTION OF EMOTION AND EMOTIONAL INTENSITY IN MUSIC

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ABSTRACT

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The purpose of this study was to study the impact of complexity (simple versus complex) on the perception of emotion and emotional intensity in music. Based on published research defining musical elements characteristic of various basic emotions, the researcher composed musical clips to represent five basic emotions (happy, sad, tenderness, fear, and anger) in two different complexity levels (simple and complex). These clips included happy-simple, happy-complex, sad-simple, sad-complex, anger-simple, anger-complex, tenderness-simple, tenderness-complex, fear-simple, and fear-complex. Participants listened to each clip, presented in a random order, and identified the perceived emotion from the given list of five emotions and ranked their perception of the emotional intensity on a scale from 0 (not at all intense) to 10 (highest intensity).

Results indicate that participants accurately identified the emotions in 10 given music clips more often when the music was complex versus simple. However, participants reported similar perceived emotional intensity levels in both simple and complex music clips. Taken together, these findings suggest that complex music may provide stronger musical cues as required to accurately perceive emotions in music, although future research is necessary to examine this phenomenon and to address practical applications for using simple or complex music with music therapy clients to address emotion-based goals.

KEY WORDS: Music perception; Music emotions; Music Intensity; Simple Music; Complex Music

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CHAPTER I

Introduction

Music therapists' assessments of their clients' emotional functioning is an essential component a comprehensive music therapy treatment planning process. The Certification Board for Music Therapists (CBMT) Board Certification Domains (BCD) indicate that it is within music therapists' scopes of practice to "identify client functioning level, strengths, and areas of need within the following domains of cognitive, communicative, emotional, musical, physiological, and psychological" (BCD I-B-3-a through f). In addition to assessment, music therapists may design experiences to address their clients' affective states, emotions, and moods. Concerning these clinical experiences and requisite knowledge required to do so, the American Music Therapy Association (AMTA) indicates that competent, entry-level music therapists should be able to "apply basic knowledge of the psychological aspects of musical behavior and experience including, but not limited to, perception, cognition, affective response, learning, development, preference, and creativity," and "apply philosophical, psychological, physiological, and sociological basis of music as therapy" (AMTA professional competencies).

Research exists examining several music therapy techniques, including relaxation, lyric analysis, songwriting, and clinical improvisation, that involve the client's ability to perceive, describe, and/or experience certain emotions. Robb proved several benefits related with affect and emotion concerning relaxation techniques. through four participants' tendencies: The tendency to unite music listening and relaxation techniques,

more attention and reducing tension effect, awareness of relaxation, and adhering to the relaxation due to amusement (Robb, 2000).

Jones also argued the effects of songwriting and lyric analysis in his study. After the experiment, eleven emotions were assessed: anger, joy, surprise, fear, frustration, sadness, acceptance, shame, anxiety, and loneliness. The result showed that the feeling of acceptance and joy were increased, and the feeling of guilt and fear were reduced. Although the songwriting yielded the little higher score than the lyric analysis, both techniques were verified as advantageous techniques for eliciting the emotions (Jones, 2005).

Luck et al. used an improvisation in the study, ”Modeling the relationships between emotional responses to, and musical content of, music therapy improvisations,” to examine the correlation between musical qualities and awareness of emotion. After the improvisation, the clients evaluated the correlations among the three dimensional emotions, activity, pleasantness, and strength. Then, the nine categories associated with musical characteristics, such as timing, pitch, tonality, and pulse, were set. The nine categories are as follows: Note density, articulation, average pitch, SD of pitch, average note-on velocity values, average note-on velocity, SD of note- on velocity, tonal clarity, pulse clarity, and sensory dissonance. These nine features were compared with the clients’ emotions. The result showed that the correlation between activity and pleasantness was relatively negative, that of activity and strength was intensely positive, and that of pleasantness and strength was relatively negative. Moreover, high note density and high pulse clarity contributed to activity to be the best model, low note density and

high tonal clarity impact to pleasantness, and high mean velocity and low note density influenced to strength (Luck et al., 2008).

Erkkila et al. examined that the effect of music therapy on the dropping of depression symptoms, other medical problems, such as a alexithymia, functioning, and quality of life, decreasing a frontal asymmetry, and modifications in music and perception. The improvisation intervention focused on the expressive musical interaction. It began unstructured frames, and progressed to the reciprocal building of sense of thoughts, images, emotion, and expression. The results showed that the symptoms of depression was improved. Also, the results of anxiety, functioning, and quality of life were significant (Erkkila et al., 2008).

Naess and Ruud had a case study about, "Music therapy with an institutionalized woman diagnosed with paranoid schizophrenia." Through those music therapy sessions, the following four theoretical viewpoints were pursued: Relational music therapy, resource-oriented music therapy, performance-oriented music therapy, and community music therapy. At the last year of sessions, she was enhanced in the view of behavioral and communicative aspects. Also, she showed the improvement of the stable manner, social extemporaneity, and self-determining controlling in the sessions (Naess & Ruud, 2007).

Katagiri investigated the effect of background music and song texts on the emotional understanding of children with autism. In the study, four emotions, happiness, sadness, anger, and fear, related to interpret and express, were instructed in the corrected treatment-order. Results indicated that the accepting of the four emotions were improved in all settings, especially in the feeling of happiness. Also, participants showed the

improvement in interpreting and expressing the emotions, especially more enhanced interpreting ability (Katagiri, 2009). The research of Weiss et al. discussed whether emotion dysregulation is relevant to the relationship between PTSD, especially impulsive behavior. The results indicated that emotion dysregulation was considerably associated with impulsive behaviors. (Weiss, 2012).

Need for the Study

Music therapists specially manipulate or utilize various elements of music, such as melody, harmony, and rhythm, to elicit emotional responses in clients. In a given music therapy experience, music therapists and their clients may combine these elements in an infinite number of ways. When combined, these musical elements effect the music's complexity level, which may range from relatively simply to extremely complex. Varying the level of musical complexity may impact the client's emotional experiences, and doing so may be necessary to invoke certain desired emotional responses (e.g., such as relaxation, mood alteration, emotional identification, or catharsis). Moreover, varying musical complexity may provide the client with the opportunity to experience and process various emotions necessary to obtain clinical goals, and may also impact the intensity at which clients appraise and experience emotions.

Despite the potential of music to affect emotional experiences in music therapy, and the particular role that musical complexity may play on these experiences, limited research exists in this area. Previous research has explored the effect of music therapist's use of simple and complex music on cognition and behavioral responses in clients with dementia (Groene, 2001) and Autism spectrum disorder (Kalas, 2012). However, as far as be determined, no research exists exploring differences in simple and complex music in

terms of emotion perception. In particular, research exploring the impact of musical complexity on intensity of perceived emotions has both theoretical and practical implications.

Theoretical implications. This study's findings will contribute knowledge regarding if musical complexity affects perceptions of emotions and emotional intensity in a typical population. To date, no research exists in this area. Findings will provide information regarding this phenomenon in may later inform future research in this area with individuals with clinical disorders that affect emotional processing and/or experiences, such as depression, bipolar disorder, or Autism spectrum disorder. Furthermore, the researcher-composed music utilized in this study may help inform future conceptualizations of which types and combinations of musical elements contribute to "simple" and "complex" music.

Practical implications. This study will contribute knowledge that music therapists can utilize in their clinical practice to address clients' emotional goals. Specifically, music therapists may apply these findings to enhance their ability to utilize simple or complex client-centered live music, as may be required for relaxation, songwriting, lyric analysis, and/or improvisation experiences, to enhance their clients' emotional perceptions and experiences.

Purpose of the Study

The purpose of this study was to study the impact of complexity (simple versus complex) on the perception of emotion and emotional intensity in music.

CHAPTER II

Review of Literature

Defining, Classifying, and Describing Emotions

Defining the term "emotions" can be challenging, as both this term and the term "mood" are often used interchangeably to mean the same thing (Beedie, 2005). However, although the meanings of emotion and mood are commonly used in this mixed-up manner, there are discreet dissimilarities between the two constructs. To clarify the differences in emotions and moods, Beedie (2005) compared themes extracted from his context analyses of 1) non-academic participants' survey responses to the charge to describe believed differences between moods and emotions; and 2) of academic literature on the topic. Overall, he identified 14 ways in which emotions and moods differ, including anatomy, awareness of cause, cause, clarity, consequences, control, display, duration, experience, intensity, intentionality, physiology, stability, and timing. Overall, emotions tend to arise from a specific identifiable cause, be shorter-lasting and more physically obvious to others than moods, and be felt quite intensely with less possibility of individual control than moods (Beedie, 2005).

Because humans' emotions are innumerably varied, in the study of emotion, attempting to filter and classify emotions into larger emotion models may help us understand them better. Among many approaches to understanding emotions, Ekman, Frisen, and Ellsworth (1992) classified six emotions -- happiness, surprise, fear, sadness, anger and disgust combined with contempt -- as particularly influential emotions. By contrast, Plutchik (2002) suggested eight basic emotions that consist of emotions paired with an emotion with an opposed meaning: joy/sadness, anger/fear, trust/disgust, and

surprise/anticipation. Some of these basic emotions can be developed to complex emotions. For instance, interpersonal anger and disgust can proceed to contempt (Plutchik, 2002).

Music Emotions

Many people have their own emotional experiences related to music. For example, Koelsch asserted that music can induce feelings of joy, amusement, amazement, extremely pleasure, feeling of vitalization, soothing, spirituality, calmness, and triumph (2013). Music is the art of auditory sense, and the mental activity involved in music perception can cause listeners to perceive or experience certain emotions. Specifically, one can distinguish emotion perception from emotional induction; perception involves recognizing certain musical elements as corresponding to or portraying certain emotions without actually feeling the emotions, while induction involves emotions felt during or as a result of music listening (Gabrielsson, 2002).

Many music researchers have sought to uncover how music and its various elements can impact emotional responses. For example, central to Meyer's Expectation Theory (1956) is the idea that through the process of listening to music, one develops certain expectations about what will happen. Emotions are generated when our musical expectations are immediately fulfilled, fulfilled after delay, or not fulfilled. In Meyer's view, our emotional responses to music depend on the strength and amount of tension we experience when expectations are or are not fulfilled (Meyer, 1956).

Researchers have explored the impact of specific music elements on music emotions. The element of rhythm has an advantage to show a direct and visible impact related to emotion by assessing the person's physical and physiological symptoms such

as blood pressure and heart rate. Some studies, including Krumhansl (1997), indicated that fearful or happy music is contributed more than sad music to the heart rate (Lunqvist, 2009). McFarland et al. drew the conclusion that happy music is stronger than fearful or sad music to increase facial temperature, which reflected his theory, that music inducing valence positively results in increasing temperature, and vice versa (McFarland et al, 1985, 1989, and 1991).

On top of that, mode, tempo, and texture can affect emotion. The mode in the music means major and minor mode. Many students have learned that major key music represents pleasant feelings, while minor key music indicates sad feelings, during their school period. Although there are some misleading concepts about that theory, because some music fits into the principle but some does not, the thought that there is relationship between major/minor mode and emotion is considerably common and dominant. Webster and Weir (2005) affirm this theory, suggesting that "almost without exception, music in major modes has been associated with happy emotional responses, whereas music in minor modes has been associated with sad emotional responses" (p. 20).

Tempo, also, is one of the influential elements which is closely related to our daily activities or customary affairs that we can observe easily in our surroundings. For example, people are prone to listen to fast tempo music to increase their mood, expected escalating effect of heart rate. Conversely, they prefer slow tempo music to pacify or soothe their hyper temperature. Also, in a funeral, slow tempo and solemn music has been used. In Rigg's (1940) experiment, the students responded more with a positive word, happy than negative word, sad, when they listened to music with a fast tempo. Regarding the texture, Gabrielsson & Lindstrom indicate that through most related

studies. The music with a complex texture involved with melody and harmony can move people's emotions to the negative sides, and vice versa (Gabrelsson & Lindstrom, 2001).

Juslin and Laukka (2004) found that sufficient evidence exists regarding the expression of five basic emotions in music, and that listeners perceive these emotions accurately: happiness, sadness, anger, fear, and tenderness. Their summary of musical features includes comprehensive musical elements from the basic elements, such as mode, tempo, and pitch, to the detailed elements, like a vibrato rate and sound level. Among those, the eight musical elements contributed to evoking the most those emotions: Tempo, mode, Timbre, Harmony, Interval, Rhythm, Pitch, and Sound Level.

In conclusion, the emotion of happiness is constituted by the musical elements of fast tempo, major mode, bright timbre, simple and consonant harmony, high pitch interval, smooth and fluent rhythm, high pitch, and medium-high sound level. Sadness is evoked by the musical elements of slow tempo, minor mode, dull timbre, dissonance, low pitch interval, low pitch, and low sound level. Anger emotion is constituted by the musical elements of fast tempo, minor mode, sharp timbre, atonality or dissonance, high pitch interval, complex rhythm, high pitch, and high sound level. Fear emotion is evoked by the musical elements of fast tempo, minor mode, soft timbre, dissonance, high pitch interval, jerky rhythm, high pitch, and low sound level. Tenderness emotion is constituted by the musical elements of slow tempo, major mode, soft timbre, consonance, low pitch interval, low pitch, and medium-low sound level.

Then, does only the complex texture induce the negative emotion? Streich mentioned about the complexity with a quotation Finnas, "unusual harmonies and timbres, irregular tempi and rhythms, unexpected tone sequences and variations in

volume' raise the level of perceived complexity" (Streich, 2005, p.14). Finnas also stated that all different elements of music such as harmony, rhythm, and volume can be involved with the complexity of music. In addition, a multi-faceted approach is required when an estimation of complexity for individuals is conducted because each person's response to each element of music is different (Finnas, 1989).

Streich pointed out six musical elements which could possibly be acted as complex element: melody, harmony, rhythm, timbre, acoustics (special/dynamic) (Streich, 2005). Scheirer counted the low-level features for the prediction of human complexity rating: coherence of spectral assignment to auditory streams, variance of number of auditory streams, loudness of the louder moment, most-likely tempo, and variance of time between beats (Scheirer, 2000).

Finnas asserted that most studies offer the "Optimal complexity model" and the approval for that is found in most study results (Finnas, 1989). He illustrates the example of the optimum of the complexity referring to Heyduk, Walker, Hargreaves's researches. In case the music has both features of extremely simple and complex music, it does not evoke client's preference, yet the moderate level music elicits more of preference (Finnas, 1989). Also, Finnas investigated the factors that influence the individual's preference of complex music. The result showed that acquaintance and repeated listening can reduce the reluctance of the complex music. Ironically, in the case of listening repeatedly to simple and well-known music, rather the opposite result was produced (Finnas, 1989).

Several functional neuroimaging studies have proved an effect of listening to music on the limbic and para-limbic system, which is closely related to emotional

treating. With a quotation from the study of Blood et al. when using PET, Koelsch reported that brain responses associated with the musical stimuli, which depends on the degree of dissonance or pleasure level. In this study, the highly dissonant sound contributed to the first ranked unpleasant sound which affected the change of the stimuli (Koelsch, 2009).

Another brain imaging study, using fMRI, was a good example of proving that the complex elements of music could act as the change of stimuli, which gives the complicated feeling in the brain. Koelsch et al. (2006) inspected brain reaction to two directly opposed music types: pleasurable dance music and dissonant sound dance tune. As a result, the dissonant tune augmented blood-oxygen-level-dependent signals in the center of the limbic system including the amygdala, the hippocampus, the para-hippocampal gyrus, and the temporal poles (Koelsch et al., 2006). In the latest fMRI study, Ball et al. (2007) reported a response in the amygdala on the pleasant and unpleasant music for which consonant piano music and dissonant electric sound were used. Even though participants clearly perceived the differences between the two musics, there were no signal changes. That was because the selected music did not show the distinctive variances (Ball et al., 2007).

Defining Complexity in Music

Several researchers explored the impact of music with different levels of complexity on various non-musical behaviors. These researchers' conceptualizations of simple versus complex music provide a foundation for defining various types of musical elements that consistite "simple" and "complex". For example, Arkes, Rettig, and Scougale (1986) compared the effect of simple versus complex music on the concurrent

task complexity and music experience on preference. For the two experiments, both simple and complex music by Heyduk (1975) were used. Both pieces have the same meter, tempo, accent patterns, and dynamic level. However, the rhythm differentiated from other musical elements a lot and the harmony showed slight differences between the two music. For the rhythm, the simple music consists of blocked chord style in both hands by quarter notes and half notes, except 2 bars' syncopated rhythms in melody. The complex music is rhythmically more complex than the simple music. The complex rhythm was featured by the dotted rhythm and the syncopated rhythm through ties connecting upbeat note and downbeat note. In addition, some harmonies were modified by the change of major and minor modes.

Groene (2001) compared the effect of simple versus complex music on the presentation and accompaniment styles on attentional and responsive behaviors of participants diagnosed with dementia. The simple accompaniment style used melodies sung on the beat with little or no syncopation with blocked chord guitar strumming once per beat in duple or triple meter. Also, the primary triad chords (I, IV, V) added V7 of V, were used with the slight change of chord. In the complex accompaniment style, the melody was modified by the syncopated rhythm, and the several Guitar techniques, such as with intro pattern, syncopated chordal structure, playing a ragtime/stride style, adding bass runs between chords, playing improvisatory passages, and percussive shuffle-type strum pattern, were employed. In the aspect of harmony, more various chords than those of simple accompaniment were applied: V of ii, iii, iv, 9^{th} chord, suspended chord, substitutions-ii of m7th for IV, diminished and augmented chord, and two part harmonic improvisatory passages.

More recently, Kalas (2012) compared the effect of simple versus complex music on joint attention behaviors in children with Autism spectrum disorder. The researcher used original songs with identical lyrics, but altered the accompaniment to be either simple or complex. These different accompaniments were differentiated by melody, accompaniment, and harmony. Simple versus complex melodies included differences in syncopation, use of dotted rhythms, range, and amount of space between notes. Simple versus complex accompaniment included differences in rhythmic accompaniment style. Finally, simple versus complex harmonies included differences in chord characteristics.

Research Questions

In this study, the following research questions were addressed:

1. What differences, if any, exist in individuals' perceptions of basic emotions in music when the music is composed using simple versus complex musical elements?
2. What differences, if any, exist in individuals' perceptions of emotional intensity in music when the music is composed using simple versus complex musical elements?

CHAPTER III

Method

Participants

Individuals were eligible to participate in this study if they were over the age of 18 and currently enrolled in college. A college student sample was selected out of convenience. To recruit potential participants, the researcher asked college instructors for permission to announce the study to their classes, and spoke to peers via word-of-mouth or via social media.

Stimuli and Procedures

The participants were asked to access study materials via the survey platform Qualtrics. The survey materials included questions regarding participant demographic data, such as age, gender, race/ethnicity, and college major. Additionally, the survey included 10 listening components consisting of short (i.e., 20-50 second) clips of music composed to reflect five emotions (happy, sad, anger, tenderness, or fear) and two levels of complexity for each emotion (simple and complex). Overall, participants listened to the following music clips: happy-simple, happy-complex, sad-simple, sad-complex, anger-simple, anger-complex, tenderness-simple, tenderness-complex, fear-simple, fear-complex). The music clips were presented in a computer-randomized order.

Participants were directed to listen to a given music clip, and then to rank order the five emotions so that the emotion ranked as 1 reflected the emotion they most perceived in the music, and the emotion ranked as 5 reflected the emotion they least perceived in the music. Next, the participant used a slider to indicate the intensity at which they perceived the emotion ranked as 1 to be in the music (i.e., 0 = not at all

intense; 10 = highest intensity). The participant completed this procedure for each of the 10 clips.

CHAPTER IV

Results

This chapter presents the statistical analysis of the data. Descriptive results, includes participants' demographic data and their responses to presented musical clips. Following the demographic results, participants' identification of emotions for each of 10 musical clips and their emotional intensity rankings for each of the clips are described.

Participant Demographics

A total of 31 adults over the age of 18 and currently enrolled in college participated in this study. The mean age of participants was 20.67 years with participants ranging in age from 18 to 26 years. Participants were asked to self-identify gender: 24 identified as female and seven identified as male. All 31 participants were music majors. Regarding ethnicity, 7 participants identified as Hispanic or Latino, and 24 identified as Not Hispanic or Latino. For race, there were 29 White participants as well as three participants who identified as multi-racial.

Participants' Responses to Music

For this study, participants listened to 10 music clips composed to represent five different basic emotions – happiness, sadness, fear, tenderness, and anger – presented in both simple and complex forms. Therefore, the 10 clips represented the following: happiness-simple, happiness-complex, sadness-simple, sadness-complex, fear-simple, fear-complex, tenderness-simple, tenderness-complex, anger-simple, and anger-complex.

For each of the music clips, participants listened to the clip and then rank-ordered the list of emotions so that the emotion they believed most closely matched the emotion the composer was trying to portray was ranked #1, followed by the next most likely

emotion, and so on. Then, the participant moved a slider indicate how intensely they perceived the emotion they ranked #1 to be portrayed in the music, where 0 = not at all intense and 10 = very intense. Music clips and their assigned questions were presented in a random order.

Happiness. After listening to the happiness-simple clip, 29 participants (93.5%) correctly moved happiness into the #1 ranked spot. In addition to these participants, two participants moved happiness into the #2 spot. When participants did not correctly identify happiness, they most frequently misidentified the clip as being reflective of tenderness (*n* = 2, 0.06%). When people correctly ranked the happiness-simple clip, they indicated that they perceived the emotion to be an intensity of 6 on the 0-10 point scale.

After listening to the happiness-complex clip, 28 participants (90.3%) correctly moved happiness into the #1 ranked spot. In addition to these participants, three participants moved happiness into the #2 spot. When participants did not correctly identify happiness, they most frequently misidentified the clip as being reflective of tenderness (*n* = 3, 0.97%). When people correctly ranked the happiness-complex clip, they indicated that they perceived the emotion to be an intensity of 7 on the 0-10 point scale.

Sadness. After listening to the sadness-simple clip, 25 participants (80.6%) correctly moved sadness into the #1 ranked spot. In addition to these participants, six participants moved sadness into the #2 spot. When participants did not correctly identify sadness, they most frequently misidentified the clip as being reflective of anger (*n* = 6, 19.35%). When people correctly ranked the sadness-sample clip, they indicated that they perceived the emotion to be an intensity of 8 on the 0-10 point scale.

After listening to the sadness-complex clip, 25 participants (80.6%) correctly moved sadness into the #1 ranked spot. In addition to these participants, six participants moved sadness into the #2 spot. When participants did not correctly identify sadness, they most frequently misidentified the clip as being reflective of anger (n = 6, 19.35%). When people correctly ranked the sadness-complex clip, they indicated that they perceived the emotion to be an intensity of 8 on the 0-10 point scale.

Anger. After listening to the anger-simple clip, 24 participants (77.4%) correctly moved anger into the #1 ranked spot. In addition to these participants, 7 participants moved anger into the #2 spot. When participants did not correctly identify anger, they most frequently misidentified the clip as being reflective of sadness (n = 7, 22.58%). When people correctly ranked the anger-simple clip, they indicated that they perceived the emotion to be an intensity of 7 on the 0-10 point scale.

After listening to the anger-complex clip, 30 participants (96.7%) correctly moved anger into the #1 ranked spot. In addition to these participants, one participant moved anger into the #2 spot. This participant misidentified the clip as being reflective of fear (n = 1, 0.03%). When people correctly ranked the anger-complex clip, they indicated that they perceived the emotion to be an intensity of 6 on the 0-10 point scale.

Tenderness. After listening to the tenderness-simple clip, 24 participants (77.4%) correctly moved tenderness into the #1 ranked spot. In addition to these participants, 7 participants moved tenderness into the #2 spot. When participants did not correctly identify tenderness, they most frequently misidentified the clip as being reflective of happiness (n = 7, 22.58%). When people correctly ranked the tenderness-simple clip, they indicated that they perceived the emotion to be an intensity of 8 on the 0-10 point scale.

After listening to the tenderness-complex clip, 28 participants (90.3%) correctly moved tenderness into the #1 ranked spot. In addition to these participants, three participants moved tenderness into the #2 spot. When participants did not correctly identify tenderness, they most frequently misidentified the clip as being reflective of happiness (n = 3, 0.1%). When people correctly ranked the tenderness-complex clip, they indicated that they perceived the emotion to be an intensity of 8 on the 0-10 point scale.

Fear. After listening to the fear-simple clip, 24 participants (77.4%) correctly moved fear into the #1 ranked spot. In addition to these participants, 7 participants moved fear into the #2 spot. When participants did not correctly identify fear, they most frequently misidentified the clip as being reflective of sadness (n = 5, 16.1%). When people correctly ranked the fear-simple clip, they indicated that they perceived the emotion to be an intensity of 6 on the 0-10 point scale.

After listening to the fear-complex clip, 30 participants (96.8%) correctly moved fear into the #1 ranked spot. In addition to these participants, one participant moved fear into the #2 spot. When participants did not correctly identify fear, they most frequently misidentified the clip as being reflective of anger (n = 1, 0.03%). When people correctly ranked the fear-complex clip, they indicated that they perceived the emotion to be an intensity of 8 on the 0-10 point scale.

Comparison of Simple and Complex Music

Overall, participants correctly ranked emotions when listening to the simple music clips 81.3% of the time, while participants correctly ranked emotions when listening to the complex music clips 91%. Regarding intensity, the average ranking for

the simple music clips was 7 out of 10; for complex music, the average ranking was 7.4 out of 10.

CHAPTER V

Discussion

In this chapter, interpretation of the statistical analyses will be discussed in detail. Practical and theoretical implications, as well as study limitations and recommendations for future research will be identified.

Discussion of the Research Questions

Differences in perception of basic emotions in simple versus complex music. Overall, participants rated the complex music clips more accurately than they did the simple music clips. One reason for this result could be that the complex music clips contained additional musical cues, such as syncopation, dotted rhythms, or unexpected harmonies, that assisted participants in perception of each emotion. The simple music clips may have been too simple and lacking in musical information necessary for participants to differentiate between emotions with similar musical characteristics, such as happiness and tenderness or sadness and anger.

Differences in perception of emotional intensity in simple versus complex music. Overall intensity ratings were comparable for the simple and complex music clips, indicating that participants perceived a similar amount of emotional intensity among the different musical complexities. In order to create the music clips, the researcher primarily manipulated rhythm, and manipulation of additional musical elements may have altered perceptions of intensity. For example, strategic use of volume, range, or melodic contour may help emphasize and express emotions with greater intensity.

Limitations and Suggestions for Future Research

This study has several limitations. Firstly, the recruitment of participants over the age of 18 and who were college student brings some bias to the generalization. The findings may not generalize to other age or demographics groups. Moreover, the sample size also contributes to poor generalizability and lack of reliability regarding the study's applications to larger populations or samples. Future research will be needed to extend the sample size, sample age, and more general populations such as adolescents, adults, and geriatrics.

Secondly, in the survey, the ten musical clips were provided to the participants using electronic sounds that mimic a piano. The researcher developed this music using free online music notation software. The program offered the essential services from the score notation to the recording, but the piano sound recorded has somewhat of an electric sound, rather than the natural sound through the acoustic instruments. It is possible the electric sound may have interfered with participants' perceptions of the emotions differently than if the music were presented with an acoustic piano.

Cultural references for portray of emotions in music were not taken into account when composing the music used for this study. The musical clips were all based on broad western classical music perceptions of emotions and music elements associated with the emotions. It is possible that participants' native music may reflect different musical and emotional norms than those expressed in the music clips, leading to perceptions different from those with significant familiarity with western classical music. Future studies may consider composing music specifically to explore how culturally-specific musical and emotion knowledge impacts emotion perception in music.

Finally, the music used and the survey material were developed according to guidelines from previous research regarding five basic emotions and eight musical elements that can be manipulated to create simple or complex music. However, the researcher did not vet the music prior to the study to ensure the music was written according to published guidelines regarding simple versus complex musical elements. Had the music been vetted, the findings would provide support that participants' perceptions of emotions in the music were valid.

Implications

Theoretical. Findings indicated that participants were more accurate in determining emotions in music when the music was complex, suggesting that complex music provides more salient musical cues than does simple music in helping participants to decode emotional meaning in music. While the participants in this study were typically-developing, these findings provide an interesting starting point for future research with individuals with clinical disorders that affect emotional processing and/or experiences, such as depression, bipolar disorder, or Autism spectrum disorder. Additionally, given that the researcher primarily manipulated rhythmic elements to differentiate the simple and complex music clips for a given emotion, these findings suggest that rhythm alone is not salient enough to impact perceived intensity of emotion in music; rather, a combination of musical elements, such as melody, range, harmony, and dynamics, contribute to intensity perception.

Practical. If a music therapist determines that emotion perception is an important aspect of their work with a particular client or group of client, they may be able to use these findings to provide them with a starting point for developing interventions that

utilize simple and/or complex music. While individual assessment to consider clients' needs should always guide selection of musical materials and experiences, findings suggest that complex music, as defined in this study, may provide greater avenues for accurate emotion perception and greater levels of felt intensity.

Summary and Conclusions

The purpose of this study was to study the impact of complexity (simple versus complex) on the perception of emotion and emotional intensity in music. Participants accurately identified the emotions in 10 given music clips more often when the music was complex versus simple. However, participants reported similar perceived emotional intensity levels in both simple and complex music clips. Taken together, these findings suggest that complex music may provide stronger musical cues as required to accurately perceive emotions in music, although future research is necessary to examine this phenomenon and to address practical applications for using simple or complex music with music therapy clients to address emotion-based goals.

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Geriatric Group-Village Green Alzheimer's Care/Conroe 9/2019- Current
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Geriatric individual-Lexington Hospice 2/2017- 5/2017
Special needs group & individual sessions 8/2016- 12/2016
Adolescent individual autism- School Clinic 8/2016- 12/2016
Geriatric individual- Client's Home 2/2016- 5/2016
Geriatric group-Health Care Center 8/2015- 12/2015
The First Presbyterian Church Huntsville, TX *Choir Member* 3/2017-Current
The Woodland Korean Family Church Woodlands, TX
Phrasing Song Team Leader 11/2015- 12/2018
SHSU Dance Department Huntsville
The contemporary dance class pianist 8/2018-11/2018
Hill Crest Baptist Church Stillwater, OK
Keyboardist in International Service 1/2015-8/2015
Korean Baptist Church Stillwater, OK
Pianist 6/2013-8/2015
8/2007-12/2009
Korean First Presbyterian Church Oklahoma City, OK
Choir Conductor 1/2010-2/2012
Composition Recital Seoul, S. Korea
Chorus Music with An-San City Chorus 2/2003
New Music Association 5/2002
The Composers Association of Ewha 10/1998
Do-Bong Cultural Center Seoul, S. Korea
Children Chorus Conductor 3/1998-1/1999

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Publications
Book for public with CD 12/2002
"If you know classical music, you can see fusion."
Composition Score 1/1994
"Three Collection of the Piano for the Liturgy"
Thesis for the Master's 2/1991
"Analytical Research-Three Songs of the Schoenberg, op.48"

Academic Awards
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