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Does Change in Timbre Alter Stereotypy Movements Exhibited by Three Persons with Diagnoses of Mental Retardation and Autism Spectrum Disorder: Three Case Studies

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RETARDATION AND AUTISM SPECTRUM DISORDER:

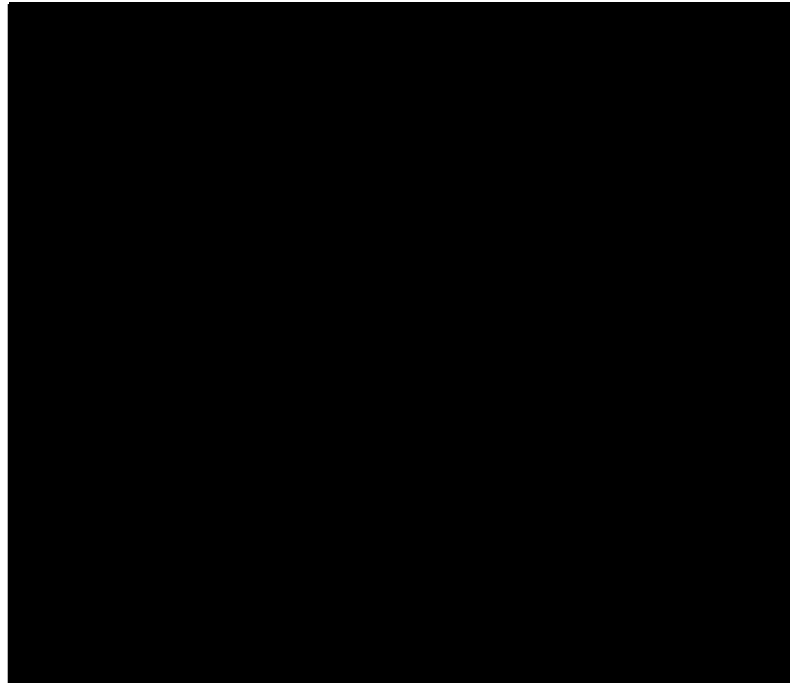
THREE CASE STUDIES

by

Kathy Wade Webb

A Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

Approved:



August 2009

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ABSTRACT

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The purpose of this study was to observe and collect data while monitoring the responses of three individuals to recorded presentations of four folk songs. The individuals, or participants, were all residents of a state-run facility in the southern region of the United States. The participants were females diagnosed with mental retardation and autism spectrum disorder, and they all exhibited one or more stereotypy behaviors in some form or another. The primary purpose of the study was to see if change in timbre of the songs would alter the stereotypy movements exhibited by these participants as the songs were presented to them. The four songs chosen were *Danny Boy*, *All Through the Night*, *To the Sky*, and *Amazing Grace*. In an effort to control as many variables as possible within reason, the pieces were chosen for their similarity of style and melodic contour and were all presented in keys of either F major or C major. The timbre presentations of each piece were (1) mezzo-soprano, melody only, a cappella; (2) bass-baritone, melody only, a cappella; (3) piano, melody only; (4) acoustic guitar, melody only; (5) tone chime, melody only. Assisting the researcher in collecting the data for the

study was the participants' psychologist. Assessment instruments for data collection were a journal completed by the researcher during the study and a behavior data sheet made for each participant with a separate sheet for the timbral presentation of each song. Also, there was a questionnaire for the psychologist to answer concerning each participant that covered the overall impression of the study for that participant.

Once the study was completed, the researcher and the psychologist met and discussed the assessment instruments and found that overall, change in timbre did alter the stereotypy movements of the participants in differing ways. It was agreed that of all the timbres presented, the two timbres which had the most positive effect, that of slowing or stopping the engagement of stereotypy, were the mezzo-soprano and the piano. The timbre that had the least positive effect, that of accelerating or causing the exhibition of stereotypy, was the bass-baritone. Possible reasons for these effects were discussed and reported along with implications of the research to the field of music education.

DEDICATION

This document and the work that went into it is dedicated to two of the most important people in my life, past and present. To my daughter, Isabel Kathleen Webb. I was told I could never expect you, but hope is free and not bound by any science or law. My hope for you, fanned from a faint flicker of acceptance to an avalanche of inexpressible wonder, came true despite all predicted obstacles. You are the greatest gift of my life, and you fill my heart and all corners of my soul with joy.

To my mother, Glenda Rae Pitts Wade. My first awareness of the world was of hearing music sung so beautifully from your lips as you held me on your lap and sang such lovely songs to me; and one of my fondest and most bittersweet memories of you despite the vehemence of wasting disease and gasping breath was of us singing the same songs together near your time's end on earth. You taught me that music does indeed have great, inexplicable power to heal, to uplift, to bring joy and love in times of grief and sorrow, to soothe, to console, and most of all to remember. I feel wherever you are that you know and are smiling at me with pride. I love you forever and beyond.

ACKNOWLEDGMENTS

This work would not have been possible without the help and support of a number of people. I extend my gratitude to the members of my committee, Dr. Jennifer Shank, Dr. Steven Moser, Dr. Chris Goertzen, Dr. Joseph Brumbeloe, Dr. Gregory Fuller. Thank you all for your guidance, time, and efforts on my behalf.

For assisting me in more ways than I can express here, I thank and acknowledge M. Renee Easley. It has been a pleasure to work with you; your knowledge and experience in the field of psychology proved invaluable to me during this process.

To the clients with whom and for whom I work each day. I've been told that I am your teacher. I must insist the opposite is true. You have taught me lessons about life I would never have gleaned from anyone else. I am, and will continue to be, humbled by the experience.

To my music teachers, Glenda Wade, Ellen Gunn, Wanda Saul, Dr. Milfred Valentine, Dr. Leon Henry, Dr. Constance Roberts, Dr. Teresa Sanchez, Dr. Larry Smith, and Dr. Vivian Wood. You all instilled in me a confidence in myself as a musician. For that most of all, I am grateful.

To Dr. Rudy Gatlin, who listened as I worried and fretted out loud, thank you for letting me bend your ears. To my brother, Bruce Wade, whose perseverance is my example and who puts into daily practice the core definition of a hero, my hero. And last, but nowhere near least, to my wonderful husband, Andrew Mark Webb. You came into my life when I wasn't looking and showed me what home really means. Love is Divine. I can never say enough how thankful I am for you.

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CHAPTER I

INTRODUCTION

Background and Statement of the Problem

Music is a vital part of all human life, of humanity itself. Music in some form or another is present in every culture on the planet. We as humans carry "music" within us throughout our earthly existence, we have a heartbeat that echoes out a regular or irregular rhythm, that is unique to each of us from birth. We move with and to our own internal meter, we speak in a timbre unique to each of us as an individual; we dance, we sing, we yell, we emote, we shiver, we run—all can be considered musical activities. Music is present everywhere inside and outside of us, every culture, every ethnicity, every group—each has a music that instills in it a sense of belonging, of community. To some, music may exist for recreative or religious means, a source of entertainment, or of ritual, of socialization, of economic gain. To others, music can be an intervention or a mode of self expression. Music in this way can be therapeutic and educational at the same time.

For individuals with developmental disabilities, music has been proven in studies to be beneficial in a multitude of ways through emotional and physical release, through entertainment, through socialization, and through communication. For individuals who have diagnoses of mental retardation and who live in long-term residential facilities, music can be much more. Music can be a link with the surrounding world and a way to live in the least restrictive environment possible. It is on such populations that the current study was focused.

The research presented here is a collective of three case studies focusing on three

individuals with diagnoses of mental retardation and autism spectrum disorder. They all exhibit one or more behaviors that indicate to the professionals that work with them that they find many aspects of the sensory world painful and confusing. These indications are usually in forms of aloofness or self-stimulatory behavior, two characteristics of autism. Defined by Sicile-Kira (2004, p.7) "autism" and "autistic" come from the Greek word *autos*, meaning "self." These words, according to Sicile-Kira, were first coined in 1911 by a psychiatrist, Eugen Bleuler, who used the terms to describe an individual who "withdraws totally from the outside world into himself." For the individual who has dual diagnoses of mental retardation or developmental disability and also autism spectrum disorder, the common routine of daily life and dealing sensory input often can be difficult to manage and to function within for him or her. Frequently, these individuals escape from a sensory world they cannot understand or cannot bear. Although they often do this through a variety of ways, of particular interest in the current case studies is escapism through stereotypical movements. All three participants in the proposed case studies exhibit a behavior or behaviors called stereotypies. Defined as "aimless, repetitive movements" (Sprague & Newell 1996, xvii), stereotypies severely interfere with communication and socialization on the part of the individuals who exhibit them and, on the whole, restrict their quality of life. Persons who reside in long-term residential facilities frequently develop such behavioral movements or they worsen over time if something is not done to intervene, divert, and maintain their attention away from such nonfunctional behavior.

According to O'Brien (1981), people with mental retardation in institutional settings perform repetitious motor behavior to such an excess that they are readily

distinguished from developmentally normal people. They may rock their bodies, clasp and unclasp their hands, wring their hands constantly, grind their teeth, make repetitive vocalizations; they may even exhibit behaviors that are self-injurious such as repetitive slapping or banging their heads or biting their arms. O'Brien also relates that usually these behaviors are performed in the same mechanical way each time they occur, thus the label "stereotypical movements." Treating these behaviors is an ongoing area of interest in research in the field. One way advocated by Foxx and Azrin in 1973 was to "interrupt the behavior when it occurs." Harris and Weiss (1998, p.91) relate that "it is important to help [a person with autism] gain control over these maladaptive or interfering behaviors by learning more adaptive ways of coping with demands and more appropriate ways of obtaining pleasure." Music is one such intervention, as Lundin wrote in 1967: music is a psychological language. Essentially, the thalamus region of the human brain is the "seat of emotions, sensations, and feelings" (Boxill 1985), and it is in this region, as Weigl (1959) wrote, that the "elements of sound—rhythm, pitch, and intensity—are mediated." Weigl goes on to note that these elements of music affect the functioning of the autonomic nervous system, while the involvement of the cortex does not take place; therefore, the feelings of people can be aroused even when they cannot be reached on an intellectual level (p. 676). This idea is the impetus behind the current research, thus the current study was centered on observing and collecting data on how the exposure to folk songs similar in key and melodic contour with variety in timbre presentation may affect the stereotypy behavior of persons with mental retardation and autism.

Creative imagination is the main criteria for developing a method strategy for this population, along with the desire to help and support the students through music.

Hoshizaki says that "the truly effective teacher will take the good and reject the bad in every method he can find and then add his own ideas while constantly looking for new things to do and new ways in which to do them"(p. 20). Hoshizaki calls such teachers of music *music specialists* in that they use music not to teach people to make music as an end product, the usual goal of the music teacher, but to find ways to teach *through* music. In this way the music specialist differs from the music therapist. If an individual described in the current study can learn other skills through music, then the role of the music educator can be realized within a population where music therapists most frequently take the primary role. Certainly, it is without question that music education should exist for all individuals without discrimination. It is the focus of the current study to examine a possible pathway to achieve such a goal with the population described herein.

Research Question

Does change in timbre alter stereotypy movements of persons diagnosed with mental retardation and autism? Three case studies.

Definition of Terms

1. *General intellectual functioning*: General intellectual functioning is defined as an intelligence quotient (IQ or IQ equivalent) obtained by assessment with one or more of the individually administered general intelligence tests (e.g., Wechsler Intelligence Scale for Children---Revised, Stanford Binet, Kaufman Assessment Battery for children).

Source: American Psychiatric Association, 3rd Edition-Revised

2. *Subaverage intellectual functioning*: defined as an IQ of 70 or below on an individually administered IQ test with a fallibility zone of 65-75 (American Psychiatric Association).

3. *Adaptive functioning*: refers to the person's effectiveness in areas such as social skills, communication, and daily living skills, and how well the person meets the standards of personal independence and social responsibility expected of his or her age by his or her cultural group. Adaptive behavior is more likely to improve with remedial efforts than is IQ, which tends to remain more stable (Ibid.).

4. *Mental retardation*: a disorder that features significantly subaverage general intellectual functioning, significant deficits or impairments in adaptive functioning, and on onset diagnosis before the age of 18. The diagnosis is made regardless of whether or not there is a coexisting physical or other mental disorder (Ibid.).

5. *Severe mental retardation*: IQ between 20 and 40 with display of poor motor development and little or no communicative speech (Ibid.).

6. *Profound mental retardation*: IQ below 20 or 25 with display of minimal capacity for sensorimotor functioning. Constant care and supervision is required (Ibid.).

7. *Autism*: a neurobiological disorder where the structures of the brain are atypical(Ibid.).

8. *Spectrum Disorder*: autism is usually referred to as a spectrum disorder meaning the symptoms can occur in any combination and with varying degrees of severity (Ibid.).
9. *Stereotypy*: aimless, abnormal, repetitive movements; purposeless movements exhibited to, among other things, self-stimulate, self-sedate, and escape. Such movement(s) shown by persons diagnosed with mental retardation and/or other mental disorders are considered to be nonfunctional and thus interfere with quality of life by restricting and inhibiting communication, socialization, attention, and awareness (Sprague & Newell, eds. 1996).
10. *Echolalia*: "parroting the speech of others" (Schreibman & Carr 1978); inappropriate speech repetitions in part of whole words and syllables. These vocalizations can vary in intensity, comprehensibility, and bout length, and whether they are echos of the vocalizations of others is arguable (Ahearn, Clark, MacDonald & Chung 2007).
11. *Timbre*: the way musical tones differ once they are equated for pitch, loudness, and duration (Krumhansl 1990).
12. *Antecedent stimuli*: events which precede a behavior at times setting the occasion for the occurrence of the behavior (Hanser 1999).
13. *Time Sampling*: a recording method in which the individual is observed at fixed intervals for a specified period of time and the occurrence or absence of a behavior during each interval is recorded (Foxx 1982).
14. *Formant*: spectral peaks, frequencies characteristic of particular sounds such as vowel sounds. These peaks can be independent of the pitch or can change position with the pitch of the sound (Cook 1999).

CHAPTER II

RELATED RESEARCH

Music Affecting Humans

E. Thayer Gaston in 1968 wrote that the function of music in the life of man is to enrich his life. In contemporary music education, in regard to working with and teaching individuals with mental retardation, Mark (1996) states that music experiences help children learn to socialize, to better communicate, and to become more aware of their environment. Melodic and rhythmic activities led and prompted by the music educator can help to draw out the child or person who has mental retardation and other developmental disabilities because music activities help give a feeling of oneness---as in included with the whole. Alvin and Warwick (1991, p. 1) express that music is a field of "multifarious experiences which affect man's mind, body, and emotions." They also present the idea that "music penetrates the subconscious and can reveal much of what is hidden there." Music, then, can also possibly help develop awareness of one's environment, a possibility of interest in the current study. Bull in 1973 wrote that music gives people with mental retardation a sense of dignity and self confidence. Alvin and Warwick advocate that music is an "eminently flexible, adaptable means which can reach an individual at any level of intelligence or education" (p. 1). The authors, as music therapists and educators, insist that "any sound is what the hearer makes of it, a sensation pleasant or unpleasant may evoke pleasant or unpleasant memories or associations through its pitch, tone color, intensity or duration"(p. 3). Certain musical stimuli are perhaps preferred by people with autism as a study by Blackstock in 1978 suggests. These ideas and research were what prompted and inspired the researcher of the current

research to conduct the current study.

“Music can be a teaching tool,” Hoshizaki (1983) states, “and teachers of persons with mental retardation should try to think creatively, and be satisfied with small gains” (p. 5). This can be the role of a music educator, a music therapist, or as, according to Hoshizaki, “a music specialist is a teacher who uses music in a manner calculated to help fulfill the needs of the students”(p. 20). Hoshizaki also advocates that there never be an established “method” of using music as an instructional tool for teaching persons with mental retardation; that is, except what he calls the “Creative Thinking Method” (p. 7). Creative imagination is the main criteria for developing a method strategy for this population, along with the desire to help and support the students through music. Hoshizaki says that “the truly effective teacher will take the good and reject the bad in every method he can find and then add his own ideas while constantly looking for new things to do and new ways in which to do them”(p. 20). As aforementioned, Hoshizaki calls such teachers of music *music specialists* in that they use music not to teach people to make music as an end product, the usual goal of the music teacher, and that also he or she also differs from the music therapist in that he or she is trying to find ways to teach through music, not use music as therapy.

Music and Special Learners

Alvin (1965) relates that music educators, therapists, and specialists can establish rapport with special education populations through rhythm, through timbre, and through melody and harmony. Hargreaves and North (1997) relate that “unstable introverts” can be drawn to mystical pieces from such composers as Debussy or genres such as New Age.

Heller (2002, p.197) writes that “music entertains us, changes our moods, soothes our souls, makes us smarter, even heals us. For the sensory defensive, music is an important way you calm yourself when you’re overwrought and rouse yourself when you’ve stayed in your shell too long.”

As Berger and Schneck in 2003 wrote,

Survival depends on the maintenance, within very narrow limits, of physiologic variables critical to life, leading to a condition known as *homeostasis*. Homeostasis is achieved by cascading networks of sophisticated feedback/feedforward control systems that operate in accordance with prescribed set points. In diagnosed populations (such as autistic), these set-points often deviate from those that optimize physiologic performance. Combined with misinterpretation of sensory information, these deviant set-points act to maintain the body in a perpetual survival mode that derives from the fear response. When this is the case, clinicians prescribe therapy in an attempt to re-set the reference control quantities to more desirable values through the process of *functional adaptation*. Recent research and clinical applications have verified that music therapy is one particularly effective clinical intervention that accomplishes this goal. The instinct to track music is innate; it parallels and reflects the human condition.

Berger and Schneck advocate that music can “drive a feedback-control system to adjust its reference signals through functionally adaptive mechanisms that redirect physiological patterns and psychological ‘attitudes’ ” (p. 692). Dr. Oliver Sacks, M.D. (2007), writes of autism and music intervention, “there seems to be a radical impairment of the powers of imagination, communication, and play; in a sense of one's own self and of others' selves in what is often called “theory of mind;” this seems to be based on a very complex and not yet wholly delineated neurological disorder and yet, briefly, all this can be transcended with the performance of music, allowing at least the appearance of a

normal emotional and imaginative identity” (p. 290). In addition, Thaut (2003) conducted a study where autistic children were exposed to visual and musical stimuli and he ultimately deduced that music's ultimate ability to sustain a person's attention makes it a prime tool to teach nonmusical tasks such as learning colors, learning numbers, learning days of the week, and months of the year. The main factors to consider when selecting music for therapy or instruction with these populations, according to a study done by Rubio in 2003, are to choose songs for their simplicity and their repetition. This finding is one of the reasons the current research is centered around the use of folk songs, for their simplicity of structure and their repetition of melodic line. Another study conducted by Heaton, Hermelin, and Pring in 2003 found that if "children with autism are repeatedly exposed to simple emotions conveyed through music while simultaneously experiencing an outward expression of those emotions, the [person] may be able to solidify his understanding of those affective states"(p. 1410). Thaut (1999) agrees that music is a useful teaching tool for persons with autism because many autistic children respond "more frequently and appropriately to music than to other auditory stimuli"(p. 432). In addition, as discussed in a study by Ahearn, Clark, MacDonald & Chung in 2007, one approach to developing treatment for automatically reinforced behavior has been to attempt to isolate the specific source of stimulation that maintains such responding. These authors note that it has long been thought that identifying a specific source of stimulation that maintains a behavior can be translated into establishing other means of accessing sensory stimulation that can then be used to reduce undesirable behavior. This finding is supported by a study conducted by Hanley, Iwata, Thompson, and Lindberg in 2000 when they found that “new sources of reinforcement derived from engaging in

alternative behavior may eventually compete with those derived from engaging in less desirable behavior" (p. 294). Thus, the current research was an attempt to discern whether music could supply an "accessible sensory stimulation" and perhaps a source of reinforcement that can be used to reduce undesirable behavior such as stereotypy. For example, Eason, White, and Newsom (1982) found that learning leisure activities, including music perhaps, prompted participants to display "leisure behavior" for longer periods instead of reverting back to stereotypy behavior.

The philosopher Immanuel Kant once defined music as "the art of the beautiful play of sensations" (trans by Meredith 1911), and Leibniz, in his discussion of aesthetics in 1956, wrote that "music charms us, although its beauty consists only in the agreement of numbers, and in the counting, which we do not perceive but which the soul nevertheless continues to carry out, of the beats or vibrations of sounding bodies which coincide at certain intervals" (as cited in Kivy, 2007). Kivy quotes these philosophers in regard to what he calls the non-conscious cognition taking place in the enjoyment of music. Thus, if we as a species take part in some level of unconscious musical listening, perhaps there are various possibilities in using music as a tool to reach the cognition taking place and then try to help organize it into the conscious mind, even an impaired conscious mind. Hoshizaki expresses similar thought that "even uninterested or inattentive people may find that music intrudes beyond the conscious level of hearing to evoke a visible physical response" (p. 83). Lippman (1977) relates that music has a "temporal character, it possesses significance, and it contains meaningful elements that recur in various contexts; these elements, brief melodic, rhythmic, polyphonic, or harmonic configurations, have a relatively constant significance" (p. 89). This statement

by Lippman relates to the proposed study in that through music there is the potential for "meaningful" responses on the part of listeners to such "significant" constancy. He also states that "vocal tone is an immediate expression of inner states of feeling much more than is hand clapping or even whistling"(p. 128). Lippman further discusses in particular the nature of hearing in relation to vision, that we "always seek the support of vision to come to grips with what we hear; yet taken in itself, hearing reveals many things about our world that vision cannot; what it lacks in multiplicity of detail and spatial definition it makes up in the telling us of the nature and state of physical material and of human personality, attitudes, feelings, and thought" (p.129). Thus with tone, the "mystery that hearing possesses with respect to outside objects is deepened to such a degree that it easily gives way to a new kind of perceptual activity amenable to the purposes of art precisely because of its lack of utility in adaptation" (129). This concept is of interest to the current researcher in that music, via tone timbre in music pieces both vocal and instrumental, does not demand that the listener rely on what he or she sees to respond, but rather to what he or she hears without outside influence.

Music Timbre

According to Berger and Schneck (2003, p. 688) "music, a sonorous image created by humans to express, parallel, and reflect human emotional and physiologic states, resonates with those states, echoing basic physiologic elements: *periodicity* (rhythm), *complex frequencies* (giving rise to pitch-melody, Fourier-induced sound quality or timbre, harmony), *energy* (dynamics, proportional to sound wave amplitude), and *structure* (form). Of these elements, music timbre, in regard to the present study, was

of interest as far as the nuances of difference in voices, from the bass-baritone to the mezzo-soprano in this case, and in instruments, in this case piano, guitar, and chimes, and how these nuances may or may not have impact on the study participants. In a study conducted by Dowling and Harwood (1986), the psychological attributes clustered under the heading timbre fall along more than one psychological dimension; sounds do not simply differ in their timbral presentation. There are several physical dimensions whose variation causes changes in timbre that interact with each other in complex ways distinguished by two types of physical correlate: the steady-state correlates of vowel-like timbre differences and the transient (rapidly changing) correlates of consonant-like timbre differences. Vowel timbre is largely independent of pitch, as evidenced by one's ability to sing a vowel sound on long duration without changing timbre, thus the steady-state label. A study by Slawson (1968) showed vowel quality is primarily determined by the absolute frequency of the formants. An illustration of this was provided by the aforementioned study conducted by Dowling and Harwood in 1986 when they presented the difference in spectral content when one stands in front of a piano and shouts "Hah" then "Hee" with the pedal depressed. There was a difference in the echo from the piano in response to the vowel. Slawson found absolute, not relative, formant frequency to be the most important determinant of timbre. Thus the vocal mechanism is a fine conduit for such formants via vowel sounds and one of the reasons the researcher of the current study decided the vocalists should sing the songs on "Ah." It is the same with string instruments and chimes, that the timbres produced are steady state formant placements and are more easily discriminated by the listening ear.

Timbre is also, as presented by Farnsworth in 1958, a setting for melody or a

“vertical impurity” or he termed it. Timbre and tone quality are often synonymous as are terms used to define them. Sound itself has many mysterious properties (Campbell 1997) and can “create physical forms and shapes that influence our health, consciousness, and behavior” (p. 33). The pieces chosen for the current study were chosen for their simple structure among other things and for, as explained by Serafine (1988), in a study of timbre synthesis in three- and four-year old children found that young children have extremely accurate perception and memory for simple timbres as single entities whereas they have trouble when timbres are layered together and presented along with other elements in a musical piece. Serafine also presents that Western folk music supplies repetition and predictable melodic alternation that make it accessible to the cognitive processes of young children.

Timbre was also of interest in the current study for its relation to tension and resolution in music. According to McLaughlin (1970), pitch, duration, volume, timbre all relate to tension and resolution, but melody strings together different tone colors inside the pitches and formation of vowel sounds so that these different tone colors appear as tensions. In the present study, the researcher controlled for harmony and for rhythm outside the melodic structure of the songs so each pitch is in itself a color and each folk song was presented in five timbres. It may very well be that in these tensions were found a way to arrest the participants’ attention away from their stereotypic behavior.

McLaughlin, in his book *Music and Communication* (1970), discusses the synaesthetic association between music and the other sense modes, an association which has long been recognized and discussed. “Timbre especially has close color affinities” and thus could possibly catch the attention of people in populations such as the participants in the

current study by appealing to or linking with their other senses. As Bush (1995) writes, “Music shapes sensory behaviors and responses” (p. 71). Ferguson in 1960 wrote that “when a motor impulse is inhibited, another than the immediate or natural motor-response occurs” (p. 60). He also related that timbre should be considered one of the four design elements of any musical piece and that “color in music is an intrinsic part of its substance” (p. 82). Timbre can in itself represent an emotion or establish a mood; the sounds of both musical instruments and vowels are differentiated largely by their timbre (Brown 1953). Vowels have timbres of their own, while consonants are mainly noises rather than timbres, useful for communication (Brown, 1953). Dowling and Harwood wrote in 1986, “timbre can help delineate musical structure and thereby improve musical communication” (p. 79). Ultimately, it is important to remember that adults with mental retardation are not delayed in regard to *feelings* that musical sounds can evoke, and timbre, such as the amount of high-frequency energy in the spectrum seems, according to Juslin and Sloboda (2001), to be especially important for emotional valence. Gabrielsson and Lindstrom (2001) found that “tones with many harmonics (as in high frequency energy) may suggest potency, anger, disgust, fear, activity, or surprise, and tones with few, low harmonics [as in the present study] may be associated with pleasantness, boredom, happiness, or sadness” (p. 241). It is interesting to note however that the relationship between color and music is a strangely entwined one. The current study was designed to present each melody in a major key at the same volume and control for timbre. The current researcher was trying however to discern a reaction to the overall timbre presentation rather than try to explore the multifaceted timbres within pitches. For while timbre is related to pitch, pitch is not the focal point of the current study. It was the

interest of the current researcher to observe reactions to larger changes in timbre presentations and to determine if there are any responses from the participants that could be defined as musical. According to Berger and Schneck (2003), "in music therapy interventions, timbre can cause a complete reversal of physiologic responses. In combination with rhythm and melody, timbre will animate or quell systemic responses. A patient can have adverse reactions—fear reactions—to some timbres, and soothing reactions to others" (p. 700).

Music as Therapy

According to Alvin (1965), music may be the only way a handicapped individual can communicate, integrate, and identify him or herself. Music may also be the only non-threatening representation of an otherwise threatening world. Alvin also advocates that music activities should be creative experiences, discovering to the fullest any ability the individual possesses. In addition, Alvin believes that if a person is sensitive to the "emotional impact of music" then that person may find in music "an expression of feelings he has experienced and moods he knows"(p. 3). Then the individual may respond to music in a world as he or she knows it, to find love, security, and movement which is, as Alvin puts it, "life." Surely if a person is capable of responding to music, is "musically sensitive", then music can be of value to his or her education. As Bush (1995, p.71) states, "Our physical organism is in itself a biological symphony of sound. Our internal pulsations, the rhythmic beating and pumping of our heart keep us physically alive. Instinctively, our inner biological environment of sound resonates with outer sounds in our environment. When we listen to a piece of music, the rhythms, beat, and

pulse of the music influence or entrain with the rhythms, beating, and pulsations of the physical body.” The proposed research is focused on observation of such behavioral responses and potential for attentiveness, arousal, and learning in the current study in an effort to divert the often destructive, negative behaviors of stereotypy. As Matson and LoVullo (2008) present in their study of self-injurious behaviors, including stereotypy behavior, the population who exhibits these behaviors the most is the severe and profoundly intellectually disabled population. In addition, results of a study done by Gebhardt and von Georgi in 2007 suggest that “people with mental disorders clearly tend to use music more for reduction of negative emotional activation” (p. 432). This result is desirable in that music can possibly be used for “influencing the psychic state as best as possible” (p. 433). Certainly such influence was the goal of the present study and the results of the present study were aligned with the idea that music can impact the psyche above and beyond intellectual ability.

Harbert (1974, p.39) imparts that "listening to music serves two purposes. It helps [an individual] to develop powers of concentration, and it serves to soothe restlessness." Professor Harbert also states that "singing is activating and furnishes [one] with emotional release, while rhythmic experiences, felt through bodily responses of the playing of musical instruments, free [one] of tensions.....above all else, music furnishes [persons with mental retardation] some measure of happiness." The professor advises that a successful music activity program for persons with mental retardation should include both stimulating selections and relaxing selections, and should be presented based on the demeanor of the individual on each specific day of the activity. Hoshizaki (1983) agrees in that he advocates that mentally retarded children who do not concentrate on anything

else will concentrate on music. That the basic elements of human expression, tempo, pitch, dynamic, timbre, rhythm, are also the basic elements of music makes music an obvious choice of instructional tool to educate persons with multiple disabilities.

Hoshizaki also discusses the importance of the teacher being sure to evaluate the demeanor of the student who has mental retardation, and, in the case of the current study, autism, so as not to overstimulate when calmness is needed and vice versa. In addition, Dr. Oliver Sacks (2007, p.237) discusses that with some autistic people and with severely retarded people who may be unable to perform fairly simple sequences involving four or five movements or procedures can often do these tasks perfectly well if they are set to music. "Music has the power to embed sequences and to do this when other forms of organization including verbal forms fail." A study conducted in 2008 by Glazebrook, Elliott, and Szatmari found that persons with autism can benefit from advance information that is "direct and visual", that "spoken instructions combined with concrete visual images may give persons with autism the best opportunity to use information available to them and visual cues are an effective and widely used tool for helping individuals with autism learn and perform a number of tasks"(p.119). This related study was not conducted with participants dually diagnosed with mental retardation in addition to autism, but the premise for the present study is similar in that, to carry out musical tasks, it might be most conducive to success if the current researcher uses visual cues during the instruction and imitation phases of teaching the task. It was also important to the present study that observations of the participants' attention were very intense due to the fact that persons with autism and mental retardation may use other ways than what might be expected to express their "communicative attentions." A study

conducted in 2008 by Liebal, Colombi, Rogers, Warneken, and Tomasello found these and similar results. Thus, it was highly important that extensive anecdotal records were kept for each session in which factors such as body language, facial expressions, eye movements, and so on were closely monitored and discussed with the psychologist after each day of sessions. Lundin (1985, p.309) suggests beginning a session with "music that is highly rhythmical and then continuing with music that normally arouses some affective reaction in keeping with the present mood---that is, sad music for the depressed," and so on, then suddenly shifting to music that presents the opposite mood; this approach may have positive results." The current study attempted to expound on this idea of trying to use music to teach, whether the lesson to be learned is a musical task, to make eye contact and communicate, or to bring about an awareness of environment and to maintain attention. It is important to note that there were two types of response engagements (as thusly labeled in a 1997 study by McEntee and Saunders) monitored by the current researcher and the assisting psychologist: *functional engagement* which may have included body movements and/or holding or manipulating objects as they were intended to be manipulated, and *stereotypic engagement* which is the repetitive, seemingly purposeless movements and/or vocalizations. It was established in a study conducted in 1972 by Koegel and Covert that children with disabilities including mental retardation could be "induced to engage in productive learning activities when their stereotypies were suppressed" (p. 286).

It is important to note that the current study did not attempt to establish a basis of music responses for all individuals with dual diagnoses of mental retardation and autism disorder, but rather to record the experiences established in a formally timed, organized atmosphere of the three study participants currently in institutional care.

CHAPTER III

RESEARCH METHODS

Participants

The participants for this study were selected from a group of females sharing a dormitory at a long-term residential and training facility maintained by a state located in the southeast region of the United States for persons diagnosed with mild to profound mental retardation in addition to other mental health and medical issues. The three participants for the current study were females two of whom have diagnoses of severe mental retardation (IQ range of 20-34) with a mental age of five years or less and an adaptive level of moderate to severe functioning (mostly or somewhat dependent on caregivers in areas of daily living); the third participant has a diagnosis of profound mental retardation (IQ 0-19), mental age of less than three years old, and a profound adaptive functioning level (totally dependent on caregivers for all areas of daily living). All three participants also have diagnoses of autism spectrum disorder and all three participants exhibited two or more stereotypy behaviors. These behaviors were documented in the participants' medical and psychiatric records as behaviors which interfere with their awareness of reality, with being able to carry out tasks fully, and which reflect their attempts to escape from unwanted environments and social situations.

Participant One: Participant One was a 22-year-old female diagnosed with severe mental retardation, IQ equivalent of 21/academic age of 3 years, 3 months, and autism spectrum disorder. She was considered nonverbal according to test results evaluated and reported by the residential unit's speech pathologist; however, she would make short utterances and repeat some sounds when prompted. She would not make eye contact with

those who attempt to gain her attention. However, in reviewing the literature related to the current study, the researcher of the present study found a study conducted by Gernsbacher, Stevenson, Khandakar, and Goldsmith (2008) in which they discuss how people with autism (in addition to other intellectual disabilities) will pay attention covertly. The researcher of the current study observed such reactions from this participant and thus the music activities for this participant were planned around taking this information into consideration. This participant would carry out tasks with various levels of prompting, but she exhibited the repetitive, stereotypy movements of rocking back and forth, and, when agitated, pulling at her hair repeatedly and/or biting herself. These behaviors appeared to interfere with her successfully completing a task, as she seemed unable or unwilling to refrain from the stereotypies long enough to finish a task, even with prompting. According to the behavioral data collection sheet utilized by the facility, she exhibited the aforementioned stereotypy movements throughout the day, during activity time, training times, and leisure times. Participant 1 had proven herself, over the course of the year prior to the onset of the current study of the current researcher's observation and record-keeping of our interactions, to be compliant with most requests made of her. She did not appear to become agitated easily, but she did not participate in the music activities offered by the recreation therapist. Instead, she would exhibit the same stereotypy behavior as if no music was being played in the room.

Participant Two: The second participant in the study was a 23-year-old female who has a diagnosis of severe mental retardation, IQ equivalent of 20 with a cognitive functioning age of three years old, and autism spectrum disorder. She functions on an adaptive level of age five and under. She is verbal, but speaks in two to three-word

phrases which are frequently very repetitive and are considered by her psychologist to be a type of stereotypy behavior as well. She also exhibits stereotypy behaviors of giggling incessantly, babbling, and pacing. She will make brief eye contact with others and she shuffles her feet in small steps, a characteristic of autism. Participant 2 could become agitated and physically aggressive very suddenly and had to be moved to a quiet location to calm down. It was the hope of the researcher to find music that would assist with decreasing her stereotypy behaviors which often precede her escalating agitation and frustration with not being able to carry out preferred activities and thus benefit her in being able to focus her attention on completing tasks without event. This participant would often comply with requests made of her, but she had to be prompted frequently to carry out tasks and to maintain attention.

Participant Three: The third participant in this study was a 22-year-old female who had resided at the present facility for approximately two years. She is non-verbal except for a repetitive vocalizations and some words that she will repeat. She is diagnosed with profound mental retardation (IQ less than 20) and is assigned by her psychological team to an adaptive functional age of two years old. She is completely dependent on her caregivers in all areas of living. Participant 3 exhibits stereotypy behaviors in the forms of hand wringing, hand clasping and unclasping, repetitive vocalization, and body rocking. She will not make eye contact with others and has to be physically assisted to carry out tasks completely. She complies with requests made of her as long as she was prompted continually and consistently. She frequently refuses to hold anything in her hands during activities and she will often get up and sit down repeatedly which is another form of stereotypic movement.

According to the medical files of all three participants, they all have adequate hearing for conversational levels, adequate vision, and they do not have any documented physical limitations that would be exacerbated by or would hinder their participation in the study. They were all ambulatory with full use of their extremities and were familiar with this researcher and appear comfortable with her.

Setting

The researcher of the present study worked at the residential facility being used for five years prior to the study both as a case manager, known as a QMRP (Qualified Mental Retardation Professional), and a teacher. The researcher had contact and worked with the participants of this study for over seventeen months prior to the carrying out the study. During this time frame, this researcher noted and documented the participants' behaviors and attention levels during tasks and activities throughout each day. The participants were all very easily distracted by noise and by actions of others around them, they were distracted as well by objects in rooms and by sounds of mechanisms such as wheelchairs and lifts. Therefore, in order to establish an environment as distraction-free as possible, the present study was carried out in a private room containing only three chairs and a table. This room was within the dormitory in which the participants reside, and it was well away from the general activities of the bedroom and the dayroom areas; it was also away from the dining area and kitchen, ideal since aromas before meals can often trigger negative behaviors in clients at the facility when they have to wait for the dining room staff to prepare for meals. The room for the proposed study was approximately 12 X 12. It was the intent of the study to use the room, in its spartan, utilitarian decor, as a device in itself to attempt to gain and hold the attention of the participants by giving them little else to focus on. The chairs were for the participant, the attending psychologist, and the researcher and the chairs had tennis balls on the foot of each chair so that when the chairs were moved, no sound was made; this was to take away the possibility of a participant using the leg of a chair and the sounds it makes when moved across a floor as an escape method via stereotypy movement during the sessions

for the current study. The table was for the researcher and the psychologist to use and had a partition situated below eye level placed on it for purposes explained in the “Procedure” section of this document. All materials and the CD player used in the study sessions were on the table behind the partition until they were needed.

Assessment Instruments

The researcher utilized notes and established files documenting observations of behaviors, schedules, activities, diagnoses, environments, backgrounds, and training programs of the three participants in the current study for a period of one year, June 2007 to June 2008. The researcher was able to make these observations from the unique vantage point of the participants’ case manager or QMRP, Qualified Mental Retardation Professional. The QMRP position the researcher holds at the facility described in the current study is a position of a team leader, with the team being composed of a registered nurse, a psychologist, a social worker, a speech pathologist, a registered dietitian, a recreation therapist, a residential living specialist, and a vocational training instructor. The QMRP works in all the aforementioned areas with the trained staff in these areas to see that the client in his/her assigned case load receives the best care and training possible in all areas so that the client may live in his or her least restrictive environment. The QMRP is also the voice of the team and acts as liaison with the clients’ psychiatrist, medical doctor, and administrative officials at the facility. The current researcher/QMRP, therefore, has access to all relevant information pertaining to the participants in the proposed study. This access allowed the researcher to investigate the participants’ backgrounds, training programs, testing results and evaluations, medical histories,

psychiatric histories, and medication histories. The researcher's investigations in combination with personal observations as a trained teacher with a decade and a half teaching experience in the public classroom and at the facility described in the current study, helped the researcher to develop a plan of intervention for the participants via the researcher's specialized field of study: music. The intent of this intervention plan was to benefit the participants in a variety of ways including communication development, social skill development, and attention and focus to task, all through music activities and learning. To this end, the researcher designed a questionnaire (Appendix A) that was explained to the participants' psychologist, who has a Master's degree in counseling and psychology and twelve years experience in the field of mental health working particularly in the areas of autism, schizophrenia, and severe/profound mental retardation. The psychologist assisted the researcher in carrying out the study by answering the questionnaire after each session based on her observations of the participant's reactions and behaviors during the session. The questionnaire included participant information at the top, the music selection/activity of the session, session date and time and questions about the music selection/activity, specific to each session, for the psychologist to answer. In addition to the questionnaire, the psychologist completed for each session a behavior data collection sheet designed by the researcher along with a team of psychologists at the facility in the current study (Appendix B). The data sheet listed the participant's target stereotypy behaviors as well as an occurrence scale used for interpretive purposes along with time sampling of the participant's stereotypy. The two assessment instruments were completed during and after each session for each participant in the time frame established for the current study by a professional in the field of psychology so to assist the researcher

in obtaining reliable information about the participants' responses or lack thereof to the study variables.

Also, included with the aforementioned anecdotal records and observations kept by the researcher for over a year prior to the study, and the two assessment instruments completed by the participants' psychologist, an observation journal documenting each music session for each participant was kept by the researcher of each session (Appendix C). The journal noted any specific *musical* or *music-like* (such as body rocking in time to the music instead of randomly) responses to the session's music selection and/or activity. The researcher watched facial expressions, finger, hand, and foot movements, attention and listening, and recorded such observations. Also, the researcher monitored the participants closely for vocalizations. The researcher used descriptive words to evaluate the participant's demeanor during each session from the standpoint of a musician and an educator.

The combination of three assessment tools were used in the study, all devised to monitor and track responses, lack of responses, target behaviors, and attention factors. After the completion of the study, the researcher conferred with the psychologist and compiled a comprehensive picture of the overall effect of the sessions on each participant and the findings were reported and discussed without presuming generalities to a larger population.

Materials

As aforementioned, the room itself was utilized as a material factor, three chairs, a six-foot folding table with a nose-level partition made of particle board (to shield the mechanics of writing, the writing utensils themselves, the CD player and the running of it---all potential distractions to a person with autism and who is easily distracted. An RCA CD/cassette player model number RCD158A, and recorded song selections (as follows in next paragraph) were also used as materials.

The music used in the study included four folk songs: “Amazing Grace” (*Folk Songs for Solo Singers* edited by Althouse, 1993, pp. 3-7) in the key of F Major, “To the Sky” (*Folk Songs for Solo Singers* edited by Althouse, 1993, pp. 28-31) in F Major, “Danny Boy” (*Folk Songs for Solo Singers* edited by Althouse, 1993, pp. 23-27) in C Major, and “All Through the Night” (*Folk Songs and Art Songs Book II*, Armitage, 1938, p. 90) in C Major (music examples in Appendix D). In an attempt to control for factors such as key and melody, the researcher chose folk songs in major keys with similar melodic contour and that could be presented in similar tempo and dynamic level.

“Amazing Grace” is a variant of the tune “New Britain,” composer unknown, which has evolved to an American Christian hymn with words by John Newton; “To the Sky” is a southern folk song in this instance adapted from *Prospect* by Carl Stommen, “Danny Boy” is an old Irish air with lyrics attributed to Frederick Edward Weatherly, and “All Through the Night” is a Welsh folk song with poetry contributed to Sir Harold Boulton and composed by David Owen. In the effort to control timbre presentation, the researcher and an assistant recorded each song onto CD in live presentation via the following: female a cappella on the syllable “Ah”; male a cappella on the syllable “Ah”; piano--

melody only; acoustic guitar-- melody only; tone chimes--melody only. The female voice was mezzo-soprano in timbre and range, and the male voice was bass-baritone in timbre and range. The piano was a 5'8 K. Kawai baby grand, and the guitar was a Luna acoustic six-string model number HEN OAS CDR. The tone chimes used were Suzuki Tone Chimes model HB-25.

The primary purpose of the researcher's choice of pieces for the music listening during the present study was to observe and anecdotally record reactions of the participants to the pieces, specifically in the change of timbre. The overall purpose of the study was to arrest the participants' attention away from the nonfunctional behavior of engaging in stereotypy and to engage them in responsive music listening and/or other social contact, awareness, and communication. The researcher was not attempting to impress upon nor prompt the participants toward any specific response to the music, but rather the attempt was being made to draw the participants out of their inward focus to possibly show an awareness of and perhaps a response to the music and to decrease the frequency of their stereotypy behavior. An example of this awareness that the researcher was looking for could be something as simple as turning the head toward the sound source to something as elevated as picking up an instrument and picking out the tune. As Thaut mentions in his study in 2003, "music may provide a unique way to access the mind of a [person] who otherwise seems unreachable" (p. 432). He also found in his study that music may provide an effective medium for obtaining and directing the attention of people with autism. This statement and the idea it represents was crucial to the present research.

Procedure

The participants had five days of exposure to the listening selections with a 25 minute session conducted each weekday during the study period. The time of day was important to scheduling the sessions so that they did little to interfere or interrupt the normal routine and pattern of the participants' daily schedule. Session times were: 3:30pm with Participant 1, 3:55pm with Participant 2, and 4:20pm with Participant 3. At the residential facility used in the study, each client has his/her own individualized 24-hour schedule to include personal care times, training program times, meal times, and recreation/leisure times. The 3:30pm to 4:40pm time frame was agreed upon by the participant's habilitation team as least intrusive and disruptive of their daily routines, an aspect vital for anyone working with a person who has autism spectrum disorder to consider. The direct care staffperson working with each participant each day of session was reminded early in the day of the session time and place due to the fact that staff change frequently and quite often no one staff person works with the same client two or more days consecutively. The sessions took place in the room described earlier. The psychologist who assisted in the study was seated at one of the chairs behind the table with the partition in front of her so that while she could see the participant, the participant saw her upper facial area only. The researcher also used a chair behind the partition at the table for the listening portions of the sessions. The other chair in which the participants were encouraged to sit during some of the sessions were directly across and facing the partitioned table on the partition side.

Session Plan

At session time, the participant was asked to enter the room and be seated; the psychologist was already in the room and seated behind the partitioned table with questionnaire and behavior data sheet ready for observation recording and data collection. The request made to the participant by the researcher to be seated was the only verbalization made by the researcher or psychologist during the session. Whether or not the participant complied with the request to be seated, the researcher went behind the table and began the music presentation. The first folk song, "All Through the Night" was presented in the aforementioned venues to the participant. Throughout the playing of the recorded selections, both the researcher, from a music educator standpoint, and the psychologist, from a psychological standpoint monitored, observed, and recorded the participant's behavior(s), demeanor, and facial and body language. The researcher watched any stereotypy movement closely to attempt to discern any rhythmic or melodic alliances between the stereotypy movements and the elements of the piece. The researcher also watched and listened for verbalizations made by the client, if any. The researcher had to rely on personal observations and experience working with the participants as well as extensive training as a music educator to discern the aforementioned functional music response, if any was present, on the part of the participant since any videographic recording of the sessions was against facility policy and was thus a limitation of the current study. The same holds true for the observations and notes made by the attending psychologist.

For the second session in the study, the researcher presented the folk song, "Amazing Grace." As in the first session, the researcher and the psychologist monitored

the participant for responses and behaviors. Sessions Three using “Danny Boy” and Four using “To the Sky” followed the same plan as outlined for the first two sessions. The plan for Session Five was to present the selections at random to the participants to determine if varying the order of the presentations had any effect opposite to what was observed when they first heard the pieces in earlier sessions. The use of four folk songs as the exploration vehicle was deliberate due to the fact that the researcher desired songs with simple structures and melodies that would not overwhelm the participants nor continue to inundate their ears with genres of music they had been exposed to prior to the study. It was the hope of the researcher that the use of voices, instruments, and melodic percussion would provide a palette of tone color to the listening ears of the study participants, and in doing so would perhaps gain and hold their attention for even a brief span of time.

The purpose of the music sessions was to arrest the attention of the participant without overwhelming or threatening her into agitation and adverse behavior. This researcher's primary goal was to avoid escapism-type behavior through stereotypy movement, which is nonfunctional, and turn such behavior toward a more purposeful, functional behavior that could be perceived as musical in the established environment of the music session. The researcher's duty was to observe, document and report what happened during the session and maybe cast light on the issue which could possibly assist in conducting further research of a more quantitative nature in this area. Thus, the plan of the study was not simply therapeutic under the guise of the music therapy, but was ultimately to promote music *learning* through exhibiting musical behavior in response to music stimuli, surely one of the goals of music education in any population. The goal was to try and explore responses from three participants, who have shown themselves to

be unaware of their environment and how to communicate within it, to presentation of a set of folk songs with similar melodic contour, key, and dynamic level so as to determine if change in tone color or timbre would in any way arrest the attention of the participant away from stereotypic behavior and instead draw that attention toward music listening or at the very least draw attention away from nonfunctional behavior toward attention to sound and its sources.

After each session, the researcher documented in the session journal for that participant the activity, the participant's demeanor and response, the length of response, the type of response, the point during the music selection where the response was elicited, and the researcher's overall impressions of the session. After Session Five was complete, the researcher met with the psychologist and gathered the data collected over the course of the study. The researcher interviewed the psychologist and asked questions generated from the questionnaire responses and the data on the behavior sheet. After a period of reviewing all the observation notes and information gathered and organized, the researcher composed a comprehensive overview of plausible explanations of the results of the study, and provided a discussion of the study's implications for further research.

CHAPTER IV

RESULTS

After the conclusion of the study, the researcher and psychologist met and compiled the data collected on each participant. Due to the qualitative nature of the study, the results are presented in anecdotal record style for each participant during each piece.

Participant One: As an overview of the study in regard to Participant One, it may be said that she reacted to the listening selections in a way not expected based on previous data collected. She stopped all stereotypy behavior, there was no rocking, no self-injurious behavior, and no pulling at her hair. She remained completely still during the entire session each day. The researcher was surprised at this response because this client most often rocks her body while awake during all daily activities. The researcher and psychologist agreed that Participant One looked tired during the sessions so the sleep record, a document used by the facility to collect data, was checked just to make sure that fatigue was not a factor in her response to the study. It showed that the participant slept a full eight hours each night prior to the days of the sessions. For this participant to show no stereotypy whatsoever for a period of twenty minutes each day of the study was highly unusual. The psychologist, on the behavior chart for the study, wrote that the participant seemed to be very attentive to the music and appeared to be attempting to locate the sound source throughout the session each day. The researcher noted in the study journal that during each piece the participant remained calm and still, with eyes open and head turned toward the sound source. The only notable response to the music itself other than appearing to listen to the sounds was during the mezzo-soprano a cappella version of

“Danny Boy” when the singer hit the E natural, a high note in the piece. At the point of the high pitch, the participant stretched out her neck and lifted her head toward the ceiling. The study sessions with this participant were quite surprising to both the researcher and the psychologist given this participant's history of continuous body rocking during most, if not all, of her daily activities. Therefore, the study sessions with Participant One in terms of reaction to the timbres presented to her can be descriptively broken down as follows:

“All Through the Night,” presented by an a cappella mezzo-soprano female voice on the syllable “Ah.” Participant One sat up very straight at the onset of the selection and appeared to both the researcher and the psychologist to be in an attitude of listening. She exhibited no stereotypy during the duration of the selection. “All Through the Night” presented by an a cappella bass-baritone male voice sung on syllable “Ah.” The participant turned her head toward the sound source and remained very still throughout the selection. This behavior surprised both the researcher and the psychologist as it was very unusual for this participant to refrain from exhibiting stereotypy for such a consecutive amount of time. She did not, however, exhibit any other sort of behavior other than keeping her head turned toward the sound and her eyes focused in an attitude of listening. She did not clap, hum, or vocalize in any way. She did not move from her chair or tap her feet or exhibit any other type of behavior that could be deemed a response in any way.

“All Through the Night” presented melody-only on the piano. Again Participant One remained still and in an attitude of listening as she did in the prior selection. She sat up straight in her chair, kept her hands still and by her side, and kept her head toward the

sound source and her eyes focused and directed toward the sound as well. This behavior remained constant throughout each session.

“All Through the Night” presented melody-only on the guitar. Participant One remained in the same position as before. She did not rock, flap her hands, fidget, nor did she exhibit any demeanor that might have reflected her unwillingness to remain in the room. She did appear to be very calm, maybe drowsy; however, the psychologist again checked her sleep data in her file, and there was no appearance of lack of sleep nor had her routine been changed prior to the sessions such as being involved a lengthy outing off campus or medical appointment. Participant One remained seemingly attentive to all the pieces presented to her during each session with the complete absence of stereotypy.

“All Through the Night” presented melody-only via tone chimes. Participant One appeared somewhat more alert to this timbre of the chimes than she did to the preceding timbral selections. She smiled several times over the course of the period of sessions whenever she heard this song played on the chimes. The psychologist agreed on her data collection sheet that Participant One seemed more intrigued by the chime timbre than by the other timbres in each session, that her alertness was more evident than any prior. Participant One remained, however surprisingly to the researcher and psychologist, stereotypy-free during over the course of the entire study. Such a reaction was deemed worthy of bringing before her habilitation team since it was such an aberration from her usual demeanor even during music activities at the facility.

“Amazing Grace” was presented to Participant One first by the timbre of a mezzo-soprano singing the melody on “Ah” a cappella. She remained attentive to the selection as she did to the presentation of the song in the first session. She turned her head toward

the sound at the onset of the first setting possibly due to a new experience in hearing a possibly familiar tune in the mezzo timbre.

“Amazing Grace” was presented next in a bass-baritone timbre, a cappella melody only on the syllable “Ah.” Participant One turned her eyes briefly toward the ceiling then resumed an attitude of attentive listening. She remained calm and still and did not close her eyes or yawn, or show anything to indicate boredom or sleepiness. No stereotypy was exhibited.

“Amazing Grace,” presented on the piano using melody only, was the focus of the next selection. Participant One again turned her head toward the sound source and exhibited none of her usual stereotypy movements. Again, the researcher and psychologist both were surprised at the lack of repetitive movement.

“Amazing Grace,” presented via melody-only on guitar, was the next selection. Participant One appeared very calm, showing no anxiety or sleepiness. She again showed an attitude of attentive listening. She did not exhibit any of her usual stereotypy behavior.

“Amazing Grace” was also presented via the timbre of tone chimes in a melody-setting. Participant One’s alertness was seemingly again heightened as it was during the song played on the chimes prior to this selection. At no time did she nod off, sigh, yawn, or otherwise indicate boredom to possibly explain her calmness and stillness. At this point, the psychologist checked her medication routine to determine if any medications induced side effects such as deep calm, decreased motor activity, or other possibilities that could be causing her to remain still and attentive other than the music itself.

“Danny Boy” was presented via the timbre of a mezzo-soprano singing a cappella on the syllable “Ah.” Participant One turned her head toward the sound source and sat up

straighter in her chair at the onset of the selection. She remained seemingly attentive throughout the selection. At the point where the mezzo sang an E natural, the highest pitch in the melody, Participant One reacted by stretching her neck up and her head back with her eyes on the ceiling. As soon as the melody turned downward again, she resumed a natural position with her head straight and her eyes turned toward the sound.

“Danny Boy” was presented next in an a cappella bass-baritone timbre, melody only, on the syllable “Ah.” Participant One cocked her head toward the sound source but turned her eyes away from it. She remained calm and still and did not close her eyes or yawn, or show anything to indicate boredom or sleepiness.

“Danny Boy,” presented on the piano using melody only, was the timbral focus of the next selection. Participant again turned her head toward the sound source and exhibited none of her usual stereotypy movements. Again, the researcher and psychologist both were surprised at the lack of repetitive movement. She remained very calm and still throughout the presentation.

“Danny Boy” was presented with the timbral focus on guitar, melody only. There were no stereotypy movements exhibited throughout the piece. Participant One again craned her neck toward the ceiling when the guitarist struck the high pitch of the piece, an E natural above the octave C. She seemed attentive and listening without showing any other, more outward showing of response to the music presented.

“Danny Boy” was presented next in the tone chime timbre, melody only. Participant One showed the same brief moment of heightened alertness at the onset of the piece, but after approximately two bars, she settled into the calm demeanor indicative of all of her responses to the pieces presented in the study.

“To the Sky” was presented in the timbre of a mezzo-soprano singing a cappella on the syllable “Ah.” Participant One, in an action exclusive over the whole study, briefly rocked back and forth at the onset of this piece. The stereotypy lasted less than two bars and she settled into a calm attentiveness thereafter. Again, her head was turned toward the sound source and she sat straight in her chair with her feet crossed at the ankles and hands by her sides. She appeared to be listening to the music, on this the researcher and psychologist agreed.

“To the Sky,” bass-baritone a cappella on the syllable “Ah.” This presentation received the same reaction as the one before the selection. Participant One remained calm and attentive during the piece and exhibited no stereotypic behavior during the entire selection. She turned toward the sound source and kept her eyes open and attentive.

“To the Sky,” piano timbre, melody only: Participant One looked toward the sound source the entire time, but showed no other reaction or stereotypy movement. Nor did she indicate sleepiness or boredom by any of her actions during the selection. Her eyes remained open and focused toward the sound in a seeming demeanor of listening.

“To the Sky,” guitar timbre: Participant One kept the same demeanor of listening as before with no stereotypy movements. She appeared relaxed and calm, not sleepy, but attentive. She kept her head turned toward the sound source for the duration of the piece.

“To the Sky,” tone chime timbre: It was noted at this point that Participant One always seemed to become slightly more alert, based on the combined observations of the researcher and the psychologist, at the onset of the chime timbre in any selection presented where the chimes were the instrument used. Participant One did not at any time exhibit repetitive movement; she remained calm and in an attitude of listening.

When Participant One was exposed to the music selections out of order in Session Five, she still showed no stereotypy movement and no expression other than a smile when she heard the tone chimes on “Danny Boy.” Her response remained constant.

Participant Two: Participant Two exhibited more of a variety of responses than did Participant One to the music selections. Participant Two, who exhibits vocal stereotypy, attempted to match pitches whenever the selections featuring a mezzo-soprano a cappella were presented. She especially responded to higher pitches in each piece. Whenever the bass-baritone pieces were presented, she would emit a growling noise which appeared to come from deep in her throat. She would also effectively match every third to fourth pitch in each piece. Participant Two remained attentive throughout most of each session, especially during the piano selections. She did not pace or exhibit much self-injurious behavior during the study, but she did babble between pieces. As aforementioned, her attention seemed most intent during the piano pieces and she would attempt to formulate words to match the piano leading both the researcher and psychologist to infer that she had been exposed to piano music prior to coming to live at the facility. Her attention was also acute during the guitar version of “All Through the Night” and she appeared to know some of the words of “Amazing Grace,” but only sang those words when the piano was presented. She also tried to make “Ah” sounds along with the mezzo and the bass-baritone both. Her reaction to the chimes at first was attentive, but within four bars of each piece she began to babble. It was noted by the psychologist that the dynamic level of the chimes was slightly lower than any of the other selections or instrumental presentations. Overall, Participant Two did not exhibit her usual level and frequency of stereotypy behavior during the study sessions. She appeared

to enjoy some of the music and was attuned and attentive to it and to the researcher at first. She did become more agitated after about ten minutes into the session. This response was the same for all of the study. Also, Participant Two got agitated more frequently during certain sessions and thus those sessions had to be cut short. A descriptive breakdown of this participant's reactions to each timbre is as follows: "All Through the Night"—mezzo-soprano timbre: Participant Two vocalized and appeared at times to be trying to match pitches. She showed no other stereotypy movements. She responded particularly exuberantly to the highest pitches in the piece by straightening in her chair and raising her chin toward the ceiling while emitting a barrage of vocalizations. Most of these seemed to be "ahs" or "oohs." She appeared to both the researcher and the psychologist to be excited, not agitated, by this timbre presentation.

"All Through the Night"---bass-baritone timbre: Participant Two began laughing and growling deeply in her throat. She also puckered her lips and vocalized "ah" as well. She appeared to be trying to match an odd pitch seemingly every third or fourth note in the piece.

"All Through the Night"----piano timbre: Participant Two seemed to recognize the timbre of the piano by relaxing and smiling and humming several pitches in tune. She was very attentive to the sound and exhibited no babbling or agitated behavior during the sessions.

"All Through the Night"----guitar timbre: Participant Two got very excitable at the onset of this selection. She began bobbing her head up and down, not a usual stereotypy for her, and attempted to match every third or fourth pitch in the piece. She smiled often during the selection and remained attentive throughout the song. "All

Through the Night”----tone chimes timbre: This participant turned her head toward the sound very sharply and stopped her previous reactions to earlier selections. She appeared to be arrested by the timbre of the chimes. She did not try to match pitches this time, rather, she remained still and in an attitude of listening.

“Amazing Grace”---all timbres: Participant Two was obviously familiar with this piece. She sang the words along with each selection. Thus the researcher inferred that her familiarity with melody outweighed any possible reaction to the change in timbre.

Regardless of the timbral medium, this participant sang the lyrics established to the tune as a Christian hymn. At times the words were not distinguishable, but she did not exhibit babbling or any other of her usual stereotypy behaviors. Even the timbre of the chimes, a timbre that seemingly fascinated her in the earlier selection did not deter her familiarity with the piece and her efforts to sing along with each timbral setting.

“Danny Boy”----mezzo-soprano timbre: Participant Two stuck her tongue out of her mouth and seemed to be trying to manipulate her mouth, lips, and tongue during this selection. This movement would come and go between instances of humming. The attending psychologist decided that these movements of her oral mechanism were a form of her babbling stereotypy behavior and thus the frequency of her stereotypy was high during this selection. Higher pitches in the piece in relation to the tonal center caused an acceleration of mouth movements.

“Danny Boy”----bass-baritone timbre: Participant Two again growled in her throat in response perhaps to the deepness of this male vocal timbre. She did not exhibit the rapid mouthing movements of the selection prior; she growled as if to match the lower, deeper pitches whereas during the presentation of the mezzo timbre, she hummed

and stretched her neck as if sensitive to the highness and lowness of the sounds.

“Danny Boy”---piano timbre: Again, this participant exhibited a familiarity to the timbre of the piano instrument. The psychologist said that perhaps the piano prompts a memory for her. She also tried to form some words or voice syllables throughout the piece. She did not exhibit any pacing or highly agitated behavior as is normal for her during activities.

“Danny Boy”----guitar timbre: Participant Two stuck her tongue out of her mouth and puckered her lips, but made no other attempts to babble or exhibit any other stereotypy movement.

“Danny Boy”----tone chime timbre: During this selection, Participant Two cocked her head toward the sound and appeared to listen attentively throughout the piece. At no time did she exhibit any of her usual stereotypy movements. Nor did she make movements with her mouth, lips or tongue.

“To the Sky”----mezzo-soprano timbre: This piece caused some babbling from Participant Two at first. Then she actually bit into her lip during the first session. Otherwise, she puckered her lips repetitively during the piece and began shaking her foot as if agitated. The psychologist and researcher agreed that she was losing her attention span at this point as her agitation became heightened. After the presentation of the mezzo timbre in this session, this participant became highly agitated. The psychologist wrote on the questionnaire that this reaction was due to the length of each study session. Thus, the participant was allowed to leave the room and the session ended at this point.

In Session Five, the researcher presented the timbral selections randomly to Participant Two. She exhibited babbling and some agitation during the first three pieces,

“Danny Boy” tone chimes, “To the Sky” mezzo, and “All Through the Night” guitar. She then got up from the chair and exhibited self-injurious behavior by way of striking at her head so the session ended.

Participant Three: Participant Three also showed a variety of reactions to the music selections. She also, however, exhibited the most amount of stereotypy out of all the participants in the study. The researcher and psychologist agreed that her attention was most arrested and her stereotypy behavior most absent whenever pitches higher than A5 sounded in each piece sung by the mezzo-soprano. Her vocalizations were constant except on the aforementioned higher pitches when she would stop all stereotypy and cock her head toward the sound source as if listening. It was the guitar selections that arrested her stereotypies the most as far as for the duration of a piece, and it was the bass-baritone selections that seemed to cause her behaviors to intensify into hand wringing, hand clasping and unclasping, vocalizations, laughing, and rocking back and forth. It was noted by the researcher and the psychologist both that when the highest pitch in each piece, other than those sung by the mezzo, sounded, Participant Three would raise her own vocalizations in an attempt perhaps to copy the pitch she heard. The chimes were received with much hand clapping and finger-flapping and vocalizations more so than any other instrumental presentation in the study. It was also interesting to the researcher that Participant Three remained very still during the first twelve bars of the mezzo singing “Danny Boy.” She then started rocking back and forth until the refrain when the melody climbed into a higher register at which time she got very still, turned toward the sound source, and remained thusly until the end of the selection. A descriptive breakdown of the participant’s reactions to each timbre are as follows:

“All Through the Night”—mezzo-soprano timbre: Participant Three got quiet and attentive to the sound. She stopped stereotypy movements except for some wringing of her hands.

“All Through the Night”---bass-baritone timbre: Participant Three began laughing and wringing her hands more quickly. At the highest pitch in the piece, she clapped and grinned with seeming excitement. There was less hand wringing stereotypy during the refrain.

“All Through the Night”----piano timbre: This participant’s vocal stereotypies, hand wringing, and finger flapping all got faster and more exuberant during this timbre presentation. She seemed to combine laughs with high vocalizations on nonsense syllables. All the while she kept her head and eyes toward the sound source.

“All Through the Night”----guitar timbre: Participant Three started rocking during this timbre presentation as well as exhibiting finger flapping and hand wringing. Her vocal stereotypies remained constant throughout the piece.

“All Through the Night”----tone chime timbre: Participant Three began to vocalize loudly and shake and wring her hands in agitation. The psychologist indicated it would be best to stop the selection and move to another one.

“Amazing Grace”----mezzo-soprano timbre: Participant’s stereotypies of vocalizations and hand wringing were constant during the selection. The main response noted by the researcher and psychologist was that she stopped all stereotypy on the highest pitch of the selection and cocked her head toward the sound source. Afterward, she would seemingly raise her vocalizations in an apparent attempt to mimic the pitches she heard.

“Amazing Grace”----bass-baritone timbre: During this timbral presentation, Participant Three heightened her level of hand wringing and rocking back and forth. She also started hitting herself in the chest area. Thus, the researcher stopped the music. The same reaction occurred in subsequent sessions to this selection and the researcher had to stop the piece each time.

“Amazing Grace”----piano timbre: There were some hand movements during this selection, but overall a less amount than during other timbral selections. The participant exhibited vocalizations during the entire piece, but no body rocking at all. The higher tones seemed to bring about the most evident response by way of her raising the tones of her vocalizations.

“Amazing Grace”----guitar timbre: The participant stilled all movements at the onset of this selection except for turning her head toward the sound source. After approximately 16 bars of the music, she began to rock back and forth and her hand movements returned.

“Amazing Grace”----tone chime timbre: Again as before, this timbre caused heightened movements of body rocking and hand wringing. When Participant Three’s vocalizations got shrill and loud, the psychologist again indicated to change the selection.

“Danny Boy”----mezzo-soprano timbre: Participant Three got very still at the onset of this selection for about 12 bars of the piece. After, she started rocking back and forth until the refrain came and the tone climbed in pitch and intensity at which time she got very still for the song duration. Her head was turned toward the sound source for the duration of the selection.

“Danny Boy”----bass-baritone timbre: The participant’s hand wringing increased

as did her body rocking and her vocalizations went without pause. When the singer sang the highest pitch of the piece, octave E above middle C, her pitched vocals rose as well in both tone and in dynamic level.

“Danny Boy”-----piano timbre: The participant got very still at the beginning of the piece then went into a seeming pattern of still and listening then an eruption of vocal stereotypy and hand movements. This pattern held the duration of the piece. Participant Three did, however, appear to be engaged and attentive to the sounds of the song.

“Danny Boy”----guitar timbre: Participant Three got very still at onset of piece then vocalized with less frequency than any selection prior to this one. As piece progressed to refrain, she got very still with her head turned toward the sound source. Her only movement at this point was a seemingly caressing-type of movement over the material of her shirt tail. No other stereotypy was exhibited during the piece.

“Danny Boy”----tone chime timbre: Participant Three began to vocalize and rock her body as soon as the timbre of the chimes sounded in the room. She got increasingly agitated with her movements so the researcher stopped the selection. After the piece was stopped, this participant got up and started bumping against the walls and her vocal stereotypies got much more shrill and intense than they had been earlier each session. The psychologist again noted that the length each session most likely played a part in losing the attention of Participant Three the same as it had with Participant Two.

The researcher was not able to conduct the Session Four with Participant Three due to the participant not being able to attend the sessions. Session Five with the pieces presented randomly met with the same attentive behavior and presence of her usual stereotypy movements. Her vocalizations were always present, but her body rocking was

less evident and she did not flick her fingers as much especially during the piano and guitar pieces. High pitches got her attention and briefly arrested any repetitive movement.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Although the current study is a case study with three participants, several trends emerged, including: pitches in the higher registers may lessen the intensity or presence of stereotypy behaviors on the part of the participants in the current study. The selections featuring the mezzo-soprano offered the participants a timbre with which they were perhaps more familiar in that the participants are most accustomed to female voices at the facility since females are their primary caretakers. Conversely, the pieces featuring the bass-baritone caused the participants to more readily exhibit stereotypy behavior than did other mediums being that the participants were conceivably less familiar to the timbre of the male voice. Also, the piano appeared to be a more familiar and thus perhaps non-threatening or even less interesting instrumental timbre presentation while the guitar and the chimes were more unusual timbres to their ears and experience and thus caused an increase of behavior at least on the part of Participant 3 and an increase of attention on the part of Participant 2. These responses led the researcher to conclude that it is not necessarily that timbre as a sonic quality is what matters in arresting attention from undesirable behavior, but rather familiarity to given timbres that is critical. In addition, the researcher, based on observations of the participants in the seventeen months prior to conducting the study, concluded that the experimental situation of exposing the participants to the more simple structure of melody in various timbral presentations controlling for changing rhythms, harmonies, and dynamics arrested undesirable behavior more so than facility music activities in their dormitory which often revolve around listening to current hits in genres such as pop, rhythm and blues, and rap. These activities

also often take place with all clients present which can be very distracting and a sensory overload to someone with autism spectrum disorder. It was also the conclusion of the researcher that the room itself, the setting where the sessions took place, was a vital aspect of the results of the study. Removing the clients from as many distractions as possible and controlling the physical environment itself was a factor in their decreased stereotypy behavior that could not be denied. Thus, any future music program designed for participants such as those described in the current study would have to take into account the room in which the music activity takes place. The room would need to be free of pictures, objects outside of materials for the music activity, unnecessary furniture, and as soundproof as possible. Such an environment would lend itself to a more positive music experience and allow for the participant to be able to focus solely on the music.

As far as the participants' attempts to match pitch or to respond vocally to the selections, this response could be due to prior experience with the pieces, due to repetition in the pieces, and/or due to their familiarity with the voice or the instrument such as the piano versions. As Dowling and Cuddy in 1993 found, "repeatedly returning to a particular pitch or pattern creates a closural effect. This is especially true of returning to the central pitch of a tonality, a form of tonal closure that involves the memory of other occurrences of that pitch. This memory does not appear to be consciously learned" (found in *Music and Memory* 2000, p. 65). Perhaps in addition to the timbre of the mezzo and the piano in particular are the repetitions and simple structure of the folk songs themselves. Repetition in this way could possibly be relaxing and comforting even when timbre is alien and disquieting to the listening ear and cognitive process of someone with sensory dysfunction and mental retardation, a potential topic for future research.

Female vocal form is perhaps natural to the ears of the participants in this study even when that natural form is presented formally. The participants are not exposed as readily to male voices even during their music activities because the staff who care for them in all areas on a daily basis are primarily female. Also, as far as the researcher has been able to determine, the piano has been and is more utilized at the facility than is the guitar, so one might infer that the guitar offered a threatening sensory experience to Participant Three yet intrigued Participant Two enough to still her stereotypy altogether. As Campbell wrote in 1997, “when any part of the brain is damaged, the natural rhythms of brain and body are disturbed, and the neurons may fire at the wrong time, or not at all.” Often external music, movement, or images help bring the “neurological music” back in tune. Music mysteriously reaches the depths of our brain and body that call many unconscious systems into expression” (p. 193). This statement is supported by Dutoit (1971), “music permits liberty of expression beyond normal outlets, and we respond to it with all our sensibility and inner feeling” (p. 33).

Overall, the present study presents the premise that change in timbre does alter stereotypy movements exhibited by the three participants in the present study. Also, it is presented that timbre with relatively low counts of formants such as the tone chimes and the guitar was received by two of the participants as non-threatening and of interest unlike the relatively high formant timbre of the bass-baritone. The piano timbre, even though it is familiar to the participants, also contains low formant waves and can be assumed to be nonthreatening to this particular set of participants as well. Essentially, it was observed that the participants responded to the music intervention, especially Participant 1. Also, the timbres having the most positive effect were the mezzo-soprano and the piano. It

must be mentioned that Participant 2 responded positively to the guitar as well. Of all the timbre presentations, the ones with the least positive effect were the bass-baritone and the chimes for possible reasons mentioned earlier. Ultimately, music is a form of human behavior and it can benefit people with disabilities such as those in the current study by helping them to change their behavior or by helping them to acquire a new and better behavior.

The present study could be expanded in the future by conducting a quantitative analysis of data gleaned from study variables by using a larger sample of the population. Another way to expand the current study is to examine the relation of other elements of music in tandem with timbre and reactions the combinations bring about in the population. Also, the study could be expanded by adding a greater variety of timbres from the instrument family, familiar instruments to Western art music as well as instruments from other cultures in the world. Timbre is an extremely complex element of music that has the potential for limitless angles of study and research with the current, as well as other, populations.

Limitations of the current study include first and foremost the number of participants. The case study design of the current research cannot allow a comprehensive and conclusive picture of the general population. Also, another limitation of the current research is not being able to videotape reactions of the participants to the study materials; an avenue that would help eliminate any nuances of response on the part of the participants that possibly escaped the observers' eyes and ears. The bulk of research in the specific area around which the current study is focused, that of timbre in relation to reactions of institutionalized persons diagnosed with mental retardation and autism

spectrum disorder, is not to be found. Primarily, research in music education and music therapy with such populations centers around elements of rhythm, pitch, intensity, dynamics, and tempi, not timbre. This aspect is another limitation of the current research, the lack of supportive research in the area.

The present study is of value to the fields of music education and music therapy in that the study did show that change in timbre can arrest the attention of people who exhibit stereotypy movement, however briefly. Music education in public and private schools exists ideally for all populations and music educators and therapists are often challenged in the schools as to how to design a music program for students with wide ranges of intellectual and behavioral needs. The current research may be used as a stepping stone for the music educator seeking to serve as many of the needs of his or her students as possible, no matter what the cognitive functioning ability. In the modern classroom of the present, mainstreaming students with developmental disabilities into as much of the regular classroom as possible is a strong trend of today's education philosophy, and studies such as the current one can perhaps offer information and tools for the music educator to use in such situations. The present study can also be useful to the music educator who teaches in the self-contained classrooms at school systems who have such programs for students who reside at home and who have diagnoses of severe and profound developmental delay. These programs require that the teachers provide as many services found in the mainstream as possible, including music instruction. It is also important to note that the stereotypy behaviors described in the present study are not necessarily exclusively exhibited by clients who live in facilities described herein, but are at times shown by students of many functioning levels and abilities in most levels of

education; therefore, the present research could provide information to music educators who find themselves required to design programs for students with many different needs both cognitively and behaviorally. More research in this area can allow for members of such populations to be taught more functional behavior and can allow for therapeutic intervention to help persons become better able to socialize and communicate with others.

Certainly, such intervention can improve the quality of life for persons suffering from and dealing with multiple disabilities that place them outside the norm of human behavior.

Appendix A
Session Questionnaire

Participant: ____ **Session:** ____

Music Selection:

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

- 1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)**

- 2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?**

- 3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?**

- 4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?**

- 5. Please give your overall impression(s) of today's session.**

Participant: 1 **Session:** 1

Music Selection: “All Through the Night”

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant’s demeanor during the pieces played in today’s session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Client was calm and seemed to be interested in the music. She exhibited no escapism behaviors at all.

2. Do you think the participant’s reaction to today’s music activity was beneficial to the participant? Why or why not?

Today’s music activity was beneficial to her because she exhibited no adverse behaviors during the activity. She seemed happy to be here.

3. What aspect(s), if any, of today’s activity should be deleted from any future music training program for this participant?

None, everything seemed beneficial for her.

4. What aspect(s), if any, of today’s activity should be included in any future music training program for this participant?

More music activities designed just for her and for her benefit.

5. Please give your overall impression(s) of today’s session.

Good session today; client was engaged and interested and did not show undesirable behavior.

Participant: 1 Session: 2

Music Selection: "Amazing Grace"

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

She was calm and seemed to be interested in the music. She did not exhibit her usual stereotypy behaviors today nor did she indicate the desire to leave the room.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

Yes, today's session appeared to be beneficial to the client because she appeared to be happy.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

None. All aspects of today's session appeared to be okay for this client.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

More music activities such as this one; music therapy program designed for her specifically.

5. Please give your overall impression(s) of today's session.

Good session today' client was engaged and interested and refrained from exhibiting undesirable and nonfunctional behavior.

Participant: 1 Session: 3

Music Selection: "Danny Boy"

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Client sat still and appeared alert and aware of the environment. She remained calm throughout the session, no body rocking or other stereotypic behaviors were exhibited.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

Today's music activity was beneficial to the client because she paid attention and remained calm and serene.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

None.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

More music activities designed for her based on her likes and dislikes and taking into account her diagnoses.

5. Please give your overall impression(s) of today's session.

Good session today. This client usually rocks her body throughout her daily activities, but today was completely calm and still during the music.

Participant: 1 Session: 4

Music Selection: "To the Sky"

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

She was calm and seemed to be interested in the music. She sat still and appeared alert and aware of her environment. She was quiet with no stereotypy behavior exhibited.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

Today's music was beneficial to her because she seemed more content and attentive.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

None

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

More music activities like the one today would be good for this client.

5. Please give your overall impression(s) of today's session.

Good music activity today; client was engaged and showed no adverse behaviors.

Participant: 1 **Session:** 5

Music Selection: Random

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

She was calm and seemed to be interested in the music. She sat still and appeared alert and aware of the environment. She seemed curious about the music and the CD player at times, but she appeared happy to be present.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

Today's music activity was beneficial to her because she exhibited no adverse behaviors during the activity and she was willing to remain engaged in the activity with no evidence of escapism behavior.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

Everything seemed to be beneficial for her. Future music activities should be like this.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

More music activities designed for her and organized to her likes and dislikes and allowing for her diagnoses. Perhaps a one on one music therapy program for her.

5. Please give your overall impression(s) of today's session.

Good session today; client was engaged and interested and did not show undesirable behavior. There were no changes in her demeanor such as with the sessions prior.

Participant: 2 Session: 1

Music Selection: “All Through the Night”

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant’s demeanor during the pieces played in today’s session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Sitting with legs crossed and arms folded over stomach; no agitation. Curious with wide eyes and some evidence of echolalia.

2. Do you think the participant’s reaction to today’s music activity was beneficial to the participant? Why or why not?

Today’s music activity was beneficial to her; she seems to like music. There were no severe adverse behaviors during the session.

3. What aspect(s), if any, of today’s activity should be deleted from any future music training program for this participant?

None, everything seemed to be beneficial for this client.

4. What aspect(s), if any, of today’s activity should be included in any future music training program for this participant?

This participant seems to like music very much; she smiled often during the session. Music she enjoys should be part of any future music program for her.

5. Please give your overall impression(s) of today’s session.

Good session today; client was engaged and interested and did not show much stereotypy behavior except for some echolalia (which was perhaps some attempt to sing or hum with the music). She appeared to want to participate with the music by singing.

Participant: 2 Session: 2

Music Selection: “Amazing Grace”

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant’s demeanor during the pieces played in today’s session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Client was obviously familiar with this song. She smiled and laughed and sang along, even articulating the words. She seems very happy with this music.

2. Do you think the participant’s reaction to today’s music activity was beneficial to the participant? Why or why not?

Yes, very beneficial. Presenting familiar songs to her seems to make her happy and engages her attention.

3. What aspect(s), if any, of today’s activity should be deleted from any future music training program for this participant?

None

4. What aspect(s), if any, of today’s activity should be included in any future music training program for this participant?

The familiarity of the song seems to be very appropriate for this client. She is totally engaged and attentive to the activity and music.

5. Please give your overall impression(s) of today’s session.

Excellent session. No adverse behaviors exhibited at all.

Participant: 2 Session: 3

Music Selection:

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Sitting with legs crossed and arms folded over stomach; a small amount of restless movement in the form of foot rocking and clasping hands. More mouth movements in this session than sessions prior, perhaps she likes to sing.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

Today's music activity seemed to be beneficial to this client; she appeared to like the music and was trying to sing along.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

Shorter sessions might work better with this client; she begins to get restless after about ten minutes.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

This client seems to like music. Music she knows and likes should be part of any future music program designed for her.

5. Please give your overall impression(s) of today's session.

Good session; client did not show any of her target stereotypy behaviors today.

Participant: 2 Session: 4

Music Selection: "To the Sky"

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

She was agitated and restless today.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

She did not respond well today perhaps due to a medical visit she had prior to the music session.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

Sessions could be shorter in length; it seems that she pays attention and refrains from showing adverse behavior for about ten minutes at a time.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

This participant seems to like music and should be exposed to music like these folk songs and children's songs (simple songs) on a daily basis. They seem to engage her and calm her down.

5. Please give your overall impression(s) of today's session.

Session had to be aborted after the first song. She began to get very agitated and started exhibiting self-injurious behavior. Outlying factors probably the cause.

Participant: 2 Session: 5

Music Selection: Random

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Client remained attentive for about three pieces of music then began to get exceedingly agitated.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

Client seems to benefit from music activities. They should be part of her daily active treatment and therapy.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

The male voice did not seem to appeal to her.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

She seemed to like the song "Amazing Grace" the best and she liked the piano timbre; it seemed familiar to her.

5. Please give your overall impression(s) of today's session.

Overall, music helps this client maintain functional behavior. Short music activities utilizing simple, familiar songs such as hymns would be very beneficial to her.

Participant: 3 Session: 1

Music Selection: "All Through the Night"

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Attentive and reasonably calm. Showing stereotypy behavior in the forms of repetitive vocalizations, finger flicking, and hand clasping. She seems to be responding to the music however.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

She appeared to enjoy the music, so today's music activity was beneficial to her.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

Instead of music listening only, perhaps add activities in which she can participate.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

This client likes music, so she should have some sort of music activity daily.

5. Please give your overall impression(s) of today's session.

Good session today; client was responsive even though she did engage in stereotypy, it appeared that some of the stereotypy was in actual response to the music.

Participant: 3 Session: 2

Music Selection: "Amazing Grace"

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Attentive, sometimes excitable with vocalizations and stereotypy. Some smiling and laughing.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

Yes, it was beneficial because it gained and kept her attention. During the activity, she showed less nonfunctional stereotypy than is usual for her.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

Nothing. Everything could be used in a future music activity.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

Everything could be used in a future training program in music for this client.

5. Please give your overall impression(s) of today's session.

Good session today; client was responsive in a positive way and attentive to the music.

Participant: 3 Session: 3

Music Selection: "Danny Boy"

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Very calm at first when the lady was singing. Kept head turned toward the CD player. Later, she started wringing her hands again and smiling often.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

She appeared to enjoy the music, she remained attentive; therefore, it was beneficial for her.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

Instead of passive participation by way of music listening, maybe she could actively participate in music activities in the future.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

Some sort of music program daily would be great for this client, especially if it could be one on one.

5. Please give your overall impression(s) of today's session.

Good session today; client was responsive. Some of her stereotypy movements were less evident than is usual for her.

Participant: 3 Session: 4

Music Selection: “To the Sky”

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant’s demeanor during the pieces played in today’s session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Note: Client was not able to attend the session today due to medical reasons.

2. Do you think the participant’s reaction to today’s music activity was beneficial to the participant? Why or why not?

3. What aspect(s), if any, of today’s activity should be deleted from any future music training program for this participant?

4. What aspect(s), if any, of today’s activity should be included in any future music training program for this participant?

5. Please give your overall impression(s) of today’s session.

Participant: 3 Session: 5

Music Selection: Random

Instructions for Observer: Based on your training and knowledge of the behaviors of this participant, please answer the following questions.

1. In descriptive words, please write your evaluation of the participant's demeanor during the pieces played in today's session? (i.e. calm, agitated, distracted, frantic, attentive, etc.)

Attentive and smiling; less body rocking and hand wringing than usual.

2. Do you think the participant's reaction to today's music activity was beneficial to the participant? Why or why not?

Yes, it was beneficial because she appeared to enjoy the music and was engaged and aware of her environment.

3. What aspect(s), if any, of today's activity should be deleted from any future music training program for this participant?

Nothing.

4. What aspect(s), if any, of today's activity should be included in any future music training program for this participant?

She could play instruments, dance, and sing along with music in future sessions.

5. Please give your overall impression(s) of today's session.

Music like this would be good for this client on a daily basis. She showed stereotypy, but it was less intense than usual and sometimes absent altogether.

Appendix B
Behavior Data Collection Sheets

Participant/Session

Length of Session: 20 minutes

Time Sampling: Every five minutes

Music Selection: _____

Stereotypy Behaviors:

Timbre	Behavior(s)	Level	Time

Level Key:

M = Mild—occurrence of zero to five times during piece

O = Moderate—occurrence of between five and ten times during piece

S = Severe—occurrence of over ten times during piece or repetitious throughout piece

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes:

Participant One/Session One**Length of Session: 20 minutes****Time Sampling: Every five minutes****Music Selection: “All Through the Night”****Stereotypy Behaviors: (A)Body rocking (B) pulling at hair and self-injurious behavior**

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	calm, perhaps sleepy?	M	3:30pm
Bass-baritone	calm and relaxed, no stereotypy movement	M	3:35pm
Piano	alert, calm	M	3:40pm
Guitar	no adverse behaviors present	M	3:45pm
Tone Chimes	calm and relaxed	M	3:50pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Client appears to be drowsy so the sleep record was checked. No anomalies were found on record, so medical chart was checked for changes to routine medications and medical procedures the week prior to session. No changes or procedures found that could explain response to session and music. Client is not displaying target behaviors today during the music activity.

Participant One/Session TwoLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: "Amazing Grace"Stereotypy Behaviors: (A)Body rocking (B) pulling at hair and self-injurious behavior

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	relaxed as if about to sleep	M	3:30pm
Bass-baritone	calm and relaxed, no stereotypy movement	M	3:35pm
Piano	calm, looking at CD player	M	3:40pm
Guitar	no adverse behaviors present, chin on chest	M	3:45pm
Tone Chimes	calm and relaxed	M	3:50pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Surprisingly, client does not present with any usual repetitive movements during this session today. She seems calm and relaxed and even attentive (unusual for this client).

Participant One/Session ThreeLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: "Danny Boy"Stereotypy Behaviors: (A)Body rocking (B) pulling at hair and self-injurious behavior

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	very calm	M	3:30pm
Bass-baritone	calm and relaxed, no stereotypy movement	M	3:35pm
Piano	calm but alert	M	3:40pm
Guitar	no adverse behaviors present	M	3:45pm
Tone Chimes	calm and relaxed, appears more alert	M	3:50pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: No adverse behaviors noted. Client is calm and aware of environment as evidenced by gaze toward and head tilted to CD player.

Participant One/Session Four**Length of Session: 20 minutes****Time Sampling: Every five minutes****Music Selection: “To the Sky”****Stereotypy Behaviors: (A)Body rocking (B) pulling at hair and self-injurious behavior**

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	calm, shifting around slightly in chair	M	3:30pm
Bass-baritone	calm and relaxed, dips chin to chest	M	3:35pm
Piano	alert, looks toward CD player	M	3:40pm
Guitar	no adverse behaviors present	M	3:45pm
Tone Chimes	calm and alert, smiles	M	3:50pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Client again presents calm demeanor with no evidence of target behaviors.

Participant One/Session Five**Length of Session: 20 minutes****Time Sampling: Every five minutes****Music Selection: Random presentation of pieces****Stereotypy Behaviors: (A)Body rocking (B) pulling at hair and self-injurious behavior**

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	very calm, seems alert	M	3:30pm
Bass-baritone	calm and relaxed, no stereotypy movement	M	3:35pm
Piano	calm, smiling	M	3:40pm
Guitar	no adverse behaviors present	M	3:45pm
Tone Chimes	appears startled at first, then calm	M	3:50pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Serene demeanor during the sessions this week, unusual behavior for this client. Medical chart and sleep data checked again with no anomalies. Client is responding to the music in a positive and beneficial manner.

Participant Two/Session One**Length of Session: 20 minutes****Time Sampling: Every five minutes****Music Selection: "All Through the Night"****Stereotypy Behaviors: (A) Babbling and echolalia, (B) Pacing and/or body rocking**

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	mouth movements, some babbling	M	3:55pm
Bass-baritone	babbling, echolalia, smiling	O	4:00pm
Piano	still and humming	M	4:05pm
Guitar	some humming	M	4:10pm
Tone Chimes	calm and attentive	M	4:15pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Client seems to be enjoying the music and is trying to hum and sing along.

Participant Two/Session TwoLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: “Amazing Grace”Stereotypy Behaviors: (A) Babbling and echolalia (B) Pacing and/or body rocking

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	Some smiling, vocalizations	M	3:55pm
Bass-baritone	laughing	M	4:00pm
Piano	head movements, singing words	M	4:05pm
Guitar	mouth movements, some babbling	M	4:10pm
Tone Chimes	rocking back and forth, smiling	M	4:15pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Client is exhibiting stereotypy movements but still seems to be interested in the music. Sings the words to the song so it must be familiar to her.

Participant Two/Session ThreeLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: “Danny Boy”Stereotypy Behaviors: (A) Babbling and echolalia (B) Pacing and/or body rocking

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	humming, puckers lips	M	3:55pm
Bass-baritone	mouth movements	O	4:00pm
Piano	mouth movements	O	4:05pm
Guitar	body rocking, mouth movements	O	4:10pm
Tone Chimes	calm, mouth movements	M	4:15pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Seems as though piano prompts a memory. Client knows some of the words to the song and hums with the pitches.

Participant Two/Session FourLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: “To the Sky”Stereotypy Behaviors: (A) Babbling and echolalia (B) Pacing and/or body rocking

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	agitated, restless, rocking her body	S	3:55pm
Bass-baritone	rocking, some SIB	S	4:00pm
Piano	still exhibiting same	S	4:05pm
Guitar			
Tone Chimes			

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Session had to end due to client's agitated behavior.

Participant Two/Session Five

Length of Session: 20 minutes

Time Sampling: Every five minutes

Music Selection: Random presentation of pieces

Stereotypy Behaviors: (A) Babbling and echolalia (B) Pacing and/or body rocking

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	babbling, restless	O	N/A
Bass/baritone	mouth and body movements	S	N/A

Level Key:

M = Mild—occurrence of zero to five times during piece

O = Moderate—occurrence of between five and ten times during piece

S = Severe—occurrence of over ten times during piece or repetitious throughout piece

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Client showed escalating agitated behavior so the session ended.

Participant Three/Session OneLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: "All Through the Night"Stereotypy Behaviors: (A) Finger flicking/hand wringing or slapping, (B) Pacing and/or body rocking (C) Repetitive vocalization

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	vocalizations, hand wringing	O	4:20pm
Bass-baritone	vocalizations, hand wringing	O	4:25pm
Piano	vocalizations, hand wringing	O	4:30pm
Guitar	finger flicking, some rocking	M	4:35pm
Tone Chimes	hand wringing, some vocalization	M	4:40pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Client seems interested in the music and her stereotypy movements might possibly be an indicator of that interest. She is attentive and aware of her environment as evidenced by turning her head toward the sound.

Participant Three/Session Two**Length of Session: 20 minutes****Time Sampling: Every five minutes****Music Selection: “Amazing Grace”****Stereotypy Behaviors: (A) Finger flicking/hand wringing or slapping, (B) Pacing and/or body rocking (C) Repetitive vocalization**

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	Some smiling, vocalizations	M	4:20pm
Bass-baritone	hand wringing and finger flicking	O	4:25pm
Piano	hand wringing and finger flicking	M	4:30pm
Guitar	hand wringing, patting chest	O	4:35pm
Tone Chimes	rocking back and forth, smiling	O	4:40pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece****Note:** Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.**Notes:** Client is exhibiting stereotypy movements but still seems to be interested in the music.

Participant Three/Session ThreeLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: "Danny Boy"Stereotypy Behaviors: (A) Finger flicking/hand wringing or slapping, (B) Pacing and/or body rocking (C) Repetitive vocalization

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	no stereotypy, very still	M	4:20pm
Bass-baritone	hand wringing and body rocking	O	4:25pm
Piano	still, then rocking and hand wringing	M	4:30pm
Guitar	got very still, calm, some vocalizing	M	4:35pm
Tone Chimes	rocking and finger flicking, patting chest	O	4:40pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: No adverse behaviors noted. Client is calm and aware of environment as evidenced by gaze toward and head tilted to CD player.

Participant Three/Session FourLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: “To the Sky”Stereotypy Behaviors: (A) Finger flicking/hand wringing or slapping, (B) Pacing and/or body rocking (C) Repetitive vocalization

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	still and calm, then some hand wringing	M	4:20pm
Bass-baritone	rocking, vocalizing, finger flicking	S	4:25pm
Piano	still exhibiting same	S	4:30pm
Guitar	less stereotypy, some rocking	M	4:35pm
Tone Chimes	wringing hands and vocalizations	O	4:40pm

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: Client does not seem to like the song sung by the male voice. She seems attentive to the music though. She got agitated in the middle of the session, but calmed down enough to avoid aborting the session.

Participant Three/Session FiveLength of Session: 20 minutesTime Sampling: Every five minutesMusic Selection: Random presentation of piecesStereotypy Behaviors: (A) Finger flicking/hand wringing or slapping, (B) Pacing and/or body rocking (C) Repetitive vocalization

Timbre	Behavior(s)	Level	Time
Mezzo-soprano	calm and vocalizing	M	N/A
Piano	some body rocking and vocalizing	M	N/A
Guitar	calm, seems to like the guitar	M	N/A

Level Key:**M = Mild—occurrence of zero to five times during piece****O = Moderate—occurrence of between five and ten times during piece****S = Severe—occurrence of over ten times during piece or repetitious throughout piece**

Note: Please include any other types of behaviors, facial expressions or body movements that are evidenced by the participant during the session in the space provided below on this sheet.

Notes: A fair amount of stereotypy typical for this client is present. She likes music however and channeling her movements into musical responses would be beneficial for her.

Appendix C

Journal of Anecdotal Records

(Compiled by the researcher during each session with each participant).

Session One/Participant One:**Piece: “All Through the Night”****Timbre: mezzo-soprano**

Participant One at first seemed very tired or sleepy, exhibiting none of her usual body rocking or pulling hair behavior. This response is much unlike her response to the pilot study presentations when she would rock during the majority of each session. Thus the researcher checked her sleep data (available through the attending psychologist) and found no abnormalities in her sleep pattern. The same was done for her medications with the same results. Her behavior today is attentive and calm, highly unusual in the researcher’s experience with this participant. She appears to be in an attitude of listening to the music as evidenced by her turning her head toward the sound and tilting it in a way as to appear to be listening. She is sitting very still and she remains calm throughout the piece. She exhibits no expression on her face, no smiles or grimaces (usual for this participant when she is either enjoying herself or wishing to be elsewhere). No stereotypy in evidence.

Piece: “All Through the Night”**Timbre: bass-baritone**

Participant One had started to shift around in her seat while waiting for the next presentation of the piece to start. At the onset of the male voice, she got very still and turned her head toward the sound source as if surprised. She remained thus throughout the piece, exhibiting no body movement and no facial expression other than two of what might be described as grimaces, scrunching up the cheeks and stretching out the lips. Again her demeanor is one of listening and calmness, a surprise to the researcher.

Piece: “All Through the Night”**Timbre: piano, melody only**

Participant One remained very still in her chair with her palms resting on her thighs. She again turned her head toward the sound source when the piece began and stayed thus until the piece ended. She did not exhibit any stereotypical movement at all, and showed no change in facial expression. This was highly surprising to the researcher in that this participant most often rocks her body in any type of social situation or leisure activity. She also rocks constantly when she is alone in her room. During this piece, however, she remained very still and calm throughout.

Piece: “All Through the Night”**Timbre: acoustic guitar, melody only**

Participant One remained in an attitude of attentive listening during this presentation of the piece. She tilted her head toward the sound source and exhibited no body movement or other stereotypy for the duration of the piece. She smiled once during the piece and then reverted back to a calm, yet solemn expression. She kept her hands on her thighs and she did not move her feet at all during the piece. Nor did she fidget in her chair, flap her hands or fingers, or exhibit in any way her unwillingness to remain in the room (something for which the researcher was watching very closely). She appeared to be drowsy and thus the researcher double checked her sleep and medication data since sedation is used widely at the facility in the best interests of the clients when they have medical procedures and appointments. No such activity was found to be the case with Participant One and her sleep data was normal.

Piece: “All Through the Night”**Timbre: tone chimes, melody only**

At the onset of sound in this presentation, Participant One smiled and turned her head and sat up slightly straighter in her chair. She appeared to be intrigued by the sound of the chimes and she smiled several other times during the piece. She kept this posture throughout the piece, and she looked up to the ceiling by stretching her chin forward and upward several times when the pitches rose up the scale. She would relax her chin by lowering it back toward her chest when the pitches descended in the scale. Her reaction overall to the piece merited the researcher as her QMRP to deem it necessary to discuss her behavior and lack of stereotypy with her habilitation team in the hopes of using these findings to assist her further in disengaging in such nonfunctional behavior as stereotypy.

General Observation Notes on Observation of Participant One in Session One:

Both the researcher and the psychologist assisting in the study were very surprised at the reaction and responses of Participant One to the music presented in the first sessions for both weeks. Participant One did not engage in her usual stereotypy behavior at all today. For this participant, such response is worthy of further exploration, thus the decision of the researcher to bring Participant One’s behavior today before her habilitation team at the facility. The researcher and the participant’s psychologist both found today’s behavior to be exciting.

Session Two/Participant One

Piece: “Amazing Grace”

Timbre: Mezzo-soprano

Participant One turned her head toward the sound source at the onset of the piece, but otherwise made no movement with her body. She did not appear surprised or startled in any way upon hearing the female timbre presentation, perhaps due to some familiarity with the tune of this song set to a well-known hymn. She remained in an attitude of listening the duration of the piece. She showed no facial expression and remained very calm and still throughout the piece. This reaction was again very surprising to the researcher.

Piece: “Amazing Grace”

Timbre: Bass-baritone

Participant One turned her eyes briefly toward the ceiling then resumed an attitude of attentive listening. She remained calm and still and did not close her eyes or yawn, or show anything to indicate boredom or sleepiness. She did not exhibit any of the facial grimaces she made when presented with this timbre in the prior session. Perhaps this was due to becoming familiar with the timbre of the male voice. Again, Participant One did not in any way exhibit any of her usual stereotypy behavior.

Piece: “Amazing Grace”

Timbre: piano, melody only

Participant One appeared very calm and still during the presentation of this piece. She did not show any anxiety or agitation and she exhibited no stereotypy behavior at all. This demeanor was very surprising to the researcher and to the psychologist due to the fact that this participant most often engages in frequent body rocking and pulling at her hair during all activities of the day at the facility. During the session today, however, she was very still and calm with her head tilted toward the sound and her eyes focused and open.

Piece: “Amazing Grace”

Timbre: acoustic guitar, melody only

Participant One showed attentive listening behavior during this timbral presentation. She did not exhibit any stereotypy behavior nor any sign of agitation or wanting to leave the room. She remained still and calm and in an attitude of listening as observed by the researcher as indicated by Participant One’s actions of tilting her head to the side and turning toward the sound source. She appeared upon several occasions to breathe deeply as if content and at peace.

Piece: “Amazing Grace”**Timbre: tone chimes, melody only**

Participant One again showed evidence of heightened interest in this timbre by sitting up straighter in her chair and smiling. Her calmness caused the attending psychologist to check Participant One’s medication and medical appointment schedule to see if there was possibly any underlying cause for this participant’s unusual demeanor and in order to attempt to rule out other possibilities for her lack of stereotypy other than the music presentation. Participant One’s data and medical records showed no changes and no administration of sedation for medical appointments, nor any other type of factors that might explain her behavior today outside of the music presentation. This aspect of the study was very exciting and the researcher plans to report Participant One’s behavior to her habilitation team for further exploration and discussion.

General Notes on Observation of Participant One in Session Two

Overall, the continued response of Participant One to the study variables and music presentation is very interesting and exciting. The researcher was simply amazed at the lack of body rocking in particular because, based on prior knowledge of this participant and observation of her for seventeen months prior to the study in all of her daily activities, Participant One exhibits body rocking stereotypy movement at least 95% of the time while awake; the only activity other than sleeping and bathing that does not result in body rocking is when she eats. Body rocking is her most frequent stereotypy behavior in all other daily activities and leisure times. This stereotypy and others exhibited by her were completely absent during this study session. The researcher is very anticipatory of how this participant will react to the rest of the pieces in the study.

Session Three/Participant One**Piece: “Danny Boy”****Timbre: Mezzo-soprano**

Participant One turned her head toward the sound source and sat up straighter in her chair at the onset of the selection. She remained seemingly attentive throughout the selection. At the point where the mezzo sang an E natural, the highest pitch in the melody, Participant One reacted by stretching her neck up and her head back with her eyes on the ceiling. As soon as the melody turned downward again, she resumed a natural position with her head straight and her eyes turned toward the sound. She remained still and calm with no exhibition of stereotypy movement or aberrant behavior.

Piece: “Danny Boy”**Timbre: Bass-baritone**

Participant One remained attentive, not moving between selections of the piece in the session. She turned her head toward the sound source at the onset of this timbral

presentation and remained still and in an attitude of listening. She kept her eyes open and remained alert, not showing any indication of sleepiness nor any sign of agitation. Her calmness and lack of movement or fidgety behavior was very surprising to the researcher and the attending psychologist.

Piece: “Danny Boy”

Timbre: Piano, melody only

Participant One again remained very still and calm, exhibiting none of her usual stereotypy movements nor any sign of escapism behavior. She breathed deeply and kept her head toward the sound source in an attitude of listening and attentiveness. Not once did she indicate any restlessness or agitative behavior during the duration of this piece.

Piece: “Danny Boy”

Timbre: Guitar, melody only

Participant One exhibited no stereotypy movements during this timbral presentation of the folk song. She again remained still in her chair and attentive to the sound. She did not close her eyes, grimace, fidget, or yawn to show any indication of restlessness or drowsiness. She did crane her neck toward the ceiling when the guitarist struck the highest pitch of the piece, an E natural above the octave C. She did not respond in any other way to the piece, nor did she exhibit the stereotypy movements typical for her.

Piece: “Danny Boy”

Timbre: Tone chimes, melody only

As in the prior sessions, Participant One showed heightened alertness at the onset of the sound of the tone chimes. She sat up a little straighter in her chair and her breathing seemed to quicken. This lasted approximately two bars into the piece and then she resumed a demeanor exhibited in prior sessions of serene listening.

General Notes on Observation of Participant One in Session Three

Client remained attentive and calm, even content throughout the session. She seemed sleepy but never dozed or closed her eyes. Lack of stereotypy behavior was surprising. She did look around the room a few times and she smiled a few times, but overall she seemed to be in an attitude of listening.

Session Four/Participant One

Piece: “To the Sky”

Timbre: Mezzo-soprano

Participant One, in an action exclusive thus far in the study, briefly engaged in body rocking back and forth in her chair at the onset of this selection. This movement lasted

less than two bars and then she settled into a calm demeanor of attentiveness for the rest of the piece. She did not exhibit any facial expressions other than eye movements from the sound source to the ceiling and back. Participant One kept her hands by her sides and her feet very still with ankles crossed. Her lack of stereotypy behavior was very surprising to the researcher and attending psychologist.

Piece: “To The Sky”

Timbre: Bass-baritone

Participant One remained calm and seemingly attentive to the piece presented. She did not exhibit any stereotypy movements nor any agitated behavior. She did not close her eyes or indicate boredom either. The only musical responses she exhibited were turning her head toward the sound source and tilting it.

Piece: “To the Sky”

Timbre: piano, melody only

Participant One appeared to be attentive and in an attitude of listening to the music. All stereotypy behavior was absent throughout the piece. Again, this demeanor from this participant was very surprising to the researcher and the psychologist. Participant One did not indicate any response other than turning her head toward the sound source and keeping it thus until the end of the selection.

Piece: “To the Sky”

Timbre: guitar, melody only

Participant One’s demeanor remained constant, the same as during the other pieces presented in this session. She was surprisingly calm and serene throughout the session. No hand movements, body movements, foot movements were noticeable. She stayed very still during the session.

Piece: “To the Sky”

Timbre: tone chimes, melody only

At the onset of the piece presented in the tone chime timbre, Participant One dropped her chin toward her chest and looked around the room before locking her gaze on the sound source. She then tilted her head and appeared to listen attentively to the piece to its end.

General Notes on Observation of Participant One during Session Four

There was little to no change in participant’s behavior during this session from sessions prior. She was calm, attentive, and relaxed. At times she would drop her chin down toward her chest, but she exhibited no restless movements at all.

Session Five/Participant One:

The purpose of this session was to see if mixing up the pieces and the timbral presentations of those pieces would have any effect on the participant different from what was observed in prior sessions. Other than a startled expression when “Danny Boy” presented on the tone chimes at the initiation of the session, Participant One exhibited the same demeanor as she did in Sessions One through Four. She relaxed back into her chair, kept her hands either at her side or on her thighs and kept her head tilted toward the sound source. This demeanor surprised the observers again to the point that her positive behavior and lack of stereotypy will be reported to her habilitation team at the facility. The researcher and psychologist agreed that music timbre most definitely arrests stereotypy movement on the part of Participant One.

Session One/Participant Two

Piece: “All Through the Night”

Timbre: Mezzo-soprano

Participant Two presented in a calm demeanor and sat with legs crossed and arms over middle in a hunched over posture. At the onset of the music, she made eye contact with the researcher and began to pucker her lips. She also hummed several times as if attempting to match pitches with the singer. She exhibited no other body movements nor the rapid babbling usual for her.

Piece: “All Through the Night”

Timbre: Bass-baritone

Participant Two began to laugh and make what appeared to be growling noises deep in her throat, guttural sounds. She also puckered her lips and tried to hum pitch several times. Otherwise, she maintained eye contact with both the researcher and the psychologist. She continued to laugh sporadically throughout the selection.

Piece: “All Through the Night”

Timbre: Piano

Participant sat up straighter in her chair and seemed very attentive to the sounds. She hummed throughout the selection and matched the pitch, perhaps accidentally, a number of times. No other stereotypy was present. She maintained eye contact with the researcher and the psychologist, eyes darting back and forth, for the entire piece. The timbre of the piano appears familiar to her.

Piece: “All Through the Night”

Timbre: Guitar

Participant maintained the same demeanor as the selection prior to this one. The only addition was she bobbed her head up and down a few times. She again vocalized with puckered lips as if trying to match pitches. She showed no restlessness or adverse behaviors during the piece.

Piece: "All Through the Night"**Timbre: Tone Chimes**

The onset of this selection got her attention evidenced by her startled expression and abrupt head turning toward the CD player. She did not hum or vocalize during the piece, but maintained an attitude of listening attentiveness throughout. No other stereotypy movements were observed.

General Notes on Observation of Participant Two during Session One

Overall, music seems to be enjoyable to this participant. She smiled often, even laughing a few times, during the music. She presents a demeanor that leads the researcher to believe she hears pitches and can match some accurately if accidentally. Babbling is one of the main stereotypies shown by this participant; the music session today appeared to focus that instinct on more functional musical responses upon which both the researcher and the psychologist agreed.

Session Two/Participant Two**Piece: "Amazing Grace"****Timbre: All**

Participant Two was obviously familiar with this piece. She sang the words along with each selection. Thus the researcher inferred that her familiarity with melody outweighed any possible reaction to the change in timbre. Regardless of the timbral medium, this participant sang the lyrics established to the tune as a Christian hymn. At times the words were not distinguishable, but she did not exhibit babbling or any other of her usual stereotypy behaviors. Even the timbre of the chimes, a timbre that seemingly fascinated her in the earlier selection did not deter her familiarity with the piece and her efforts to sing along with each timbral setting.

Session Three/Participant Two**Piece: "Danny Boy"****Timbre: Mezzo-soprano**

Participant Two stuck her tongue out of her mouth and seemed to be trying to manipulate her mouth, lips, and tongue during this selection. This movement would come and go between instances of humming. The attending psychologist decided that these movements of her oral mechanism were a form of her babbling stereotypy behavior and thus the frequency of her stereotypy was high during this selection. Higher pitches in the piece in relation to the tonal center caused an acceleration of mouth movements.

Piece: "Danny Boy"**Timbre: Bass-baritone**

Participant Two again growled in her throat in response perhaps to the deepness of this male vocal timbre. She did not exhibit the rapid mouthing movements of the selection prior; she growled as if to match the lower, deeper pitches whereas during the presentation of the mezzo timbre, she hummed and stretched her neck as if sensitive to the highness and lowness of the sounds.

Piece: "Danny Boy"**Timbre: Piano**

Again, this participant exhibited a familiarity to the timbre of the piano instrument. The psychologist said that perhaps the piano prompts a memory for her. She also tried to form some words or voice syllables throughout the piece. She did not exhibit any pacing or highly agitated behavior as is normal for her during activities.

Piece: "Danny Boy"**Timbre: Guitar**

Participant Two stuck her tongue out of her mouth and puckered her lips, but made no other attempts to babble or exhibit any other stereotypy movement. She seemed calmer during this selection as if soothed by the sound of the guitar perhaps. She still maintained eye contact between both observers.

Piece: "Danny Boy"**Timbre: Tone Chimes**

During this selection, Participant Two cocked her head toward the sound and appeared to listen attentively throughout the piece. At no time did she exhibit any of her usual stereotypy movements. Nor did she make movements with her mouth, lips or tongue.

General Notes on Observation of Participant Two during Session Three

Participant Two overall exhibited no adverse stereotypy behavior. Her vocalizing attempts seemed in response to the music instead of escape from the environment of the session room. At times her rapid eye contact between observers caused some concern as to whether she was afraid or not, but her overall response to the music by singing and humming and forming vowel sounds made it seem as if she was attentive and enjoying herself.

Participant Two/Session Four

Piece: “To the Sky”

Timbre: Mezzo-soprano

This piece caused some babbling from Participant Two at first. Then she actually bit into her lip during the first session. Otherwise, she puckered her lips repetitively during the piece and began shaking her foot as if agitated. The psychologist and researcher agreed that she was losing her attention span at this point as her agitation became heightened. After the presentation of the mezzo timbre in this session, this participant became highly agitated. The psychologist wrote on the questionnaire that this reaction was due to the length of each study session. Thus, the participant was allowed to leave the room and the session ended at this point.

Participant Two/Session Five

In Session Five, the researcher presented the timbral selections randomly to Participant Two. She exhibited babbling and some agitation during the first three pieces, “Danny Boy” tone chimes, “To the Sky” mezzo, and “All Through the Night” guitar. She then got up from the chair and exhibited self-injurious behavior by way of striking at her head so the session ended.

Participant Three/Session One

Piece: “All Through the Night”

Timbre: Mezzo-soprano

Participant Three got quiet and attentive to the sound. She stopped stereotypy movements except for some wringing of her hands. She appeared to be slightly apprehensive at first, but into the music selection she appeared to relax. She seemed to make some guttural sounds in her throat but did not actually vocalize.

Piece: “All Through the Night”

Timbre: Bass-baritone

Participant Three began laughing and wringing her hands more quickly. At the highest pitch in the piece, she clapped and grinned with seeming excitement. There was less hand wringing stereotypy during the refrain. Her laughs were very robust and deep. Then she would emit a high pitched scream and go back to laughing.

Piece: “All Through the Night”

Timbre: Piano

This participant’s vocal stereotypies, hand wringing, and finger flapping all got faster and more exuberant during this timbre presentation. She seemed to combine laughs with high vocalizations on nonsense syllables. All the while she kept her head and eyes toward the sound source.

Piece: “All Through the Night”**Timbre: Guitar**

Participant Three started rocking during this timbre presentation as well as exhibiting finger flapping and hand wringing. Her vocal stereotypies remained constant throughout the piece. They consisted of ahs and ohs and laugh-like sounds. She appeared to be enjoying the music throughout the selection. Constant vocalizations were present throughout the selection and she smiled often and made eye contact. At one point she started patting her thigh and the researcher noted that it seemed to match the rhythm if accidentally so.

Piece: “All Through the Night”**Timbre: Tone chimes**

Participant Three began to vocalize loudly and shake and wring her hands in agitation. The psychologist indicated it would be best to stop the selection and move to another one.

General Notes on Observation of Participant Three during Session One

Participant Two overall exhibited no severely adverse stereotypy behavior. Her vocalizing attempts seemed in response to the music instead of escape from the environment of the session room. Her overall response to the music by singing and humming and smiling made it seem as if she was attentive and enjoying herself.

Participant Three/Session Two**Piece: “Amazing Grace”****Timbre: Mezzo-soprano**

Participant’s stereotypies of vocalizations and hand wringing were constant during the selection. The main response noted by the researcher and psychologist was that she stopped all stereotypy on the highest pitch of the selection and cocked her head toward the sound source. Afterward, she would seemingly raise her vocalizations in an apparent attempt to mimic the pitches she heard.

Piece: “Amazing Grace”**Timbre: Bass-baritone**

During this timbral presentation, Participant Three heightened her level of hand wringing and rocking back and forth. She also started hitting herself in the chest area. Thus, the researcher stopped the music. The same reaction occurred in subsequent sessions to this selection and the researcher had to stop the piece each time.

Participant Three/Session Three

Piece: “Danny Boy”

Timbre: Mezzo-soprano

Participant Three got very still at the onset of this selection for about 12 bars of the piece. After, she started rocking back and forth until the refrain came and the tone climbed in pitch and intensity at which time she got very still for the song duration. Her head was turned toward the sound source for the duration of the selection.

Piece: “Danny Boy”

Timbre: Bass-baritone

The participant’s hand wringing increased as did her body rocking and her vocalizations went without pause. When the singer sang the highest pitch of the piece, octave E above middle C, her pitched vocals rose as well in both tone and in dynamic level.

Piece: “Danny Boy”

Timbre: Piano

The participant got very still at the beginning of the piece then went into a seeming pattern of still and listening then an eruption of vocal stereotypy and hand movements. This pattern held the duration of the piece. Participant Three did, however, appear to be engaged and attentive to the sounds of the song.

Piece: “Danny Boy”

Timbre: Guitar

Participant Three got very still at onset of piece then vocalized with less frequency than any selection prior to this one. As piece progressed to refrain, she got very still with her head turned toward the sound source. Her only movement at this point was a seemingly caressing-type of movement over the material of her shirt tail. No other stereotypy was exhibited during the piece.

Piece: “Danny Boy”

Timbre: Tone Chimes

Participant Three began to vocalize and rock her body as soon as the timbre of the chimes sounded in the room. She got increasingly agitated with her movements so the researcher stopped the selection. After the piece was stopped, this participant got up and started bumping against the walls and her vocal stereotypies got much more shrill and intense than they had been earlier each session. The psychologist again noted that the length each session most likely played a part in losing the attention of Participant Three the same as it had with Participant Two.

General Notes on Observation of Participant Three during Session Three

Participant Two overall exhibited no severely adverse stereotypy behavior. Her vocalizing attempts seemed in response to the music instead of escape from the environment of the session room. Her overall response to the music by singing and humming and smiling made it seem as if she was attentive and enjoying herself. She did

begin to get agitated towards the end of the session and the length of the session was judged to be the culprit.

Participant Three/Session Five

Participant kept head turned toward the sound source, smiled, and vocalized pitches throughout the random presentation of pieces in the session. She exhibited hand wringing, clasping and unclasping of her thumbs, and some body rocking during the session today. Overall, however, the intensity and amount of stereotypy behavior was less during the music selections than what this participant usually presents during daily activities. Since she appeared to prefer the female singer, the piano, and the guitar out of all the timbres, the researcher presented them in random order in this session. The participant remained engaged in the activity as evidenced by her continual attention toward the sound source.

Appendix D

Music Example: "All Through the Night"

Welsh Folk Song. In *Folk and Art Songs: Armitage Book Two* (1938). Boston: C.C.

Birchard and Company, 90.

♩ = 88

Voice

7

13

♩ = 88

Voice

7

13

Music Example: "Amazing Grace"

Early American Melody. In *Folk Songs for Solo Singers*, Jay Althouse, ed. (1983). Van

Nuys, California: Alfred Publishing, Inc. 3.

$\bullet = 80$

Alto

9

$\bullet = 80$

Alto

9

Music Example: "Danny Boy"

Early American Melody. In *Folk Songs for Solo Singers*, Jay Althouse, ed. (1983). Van

Nuys, California: Alfred Publishing, Inc. 23.

$\text{♩} = 60$

Voice

6

12

Detailed description: This system contains the first three staves of the vocal melody for 'Danny Boy' in treble clef. The first staff begins with a tempo marking of quarter note = 60. The melody starts on a whole rest, followed by a quarter rest, then a series of eighth and quarter notes. The second staff continues the melody with a measure number '6' at the beginning. The third staff concludes the system with a measure number '12' at the beginning and ends with a double bar line.

$\text{♩} = 60$

Voice

6

12

Detailed description: This system contains the first three staves of the vocal melody for 'Danny Boy' in bass clef. The first staff begins with a tempo marking of quarter note = 60. The melody starts on a whole rest, followed by a quarter rest, then a series of eighth and quarter notes. The second staff continues the melody with a measure number '6' at the beginning. The third staff concludes the system with a measure number '12' at the beginning and ends with a double bar line.

Music Example: "To the Sky"

Early American Melody. In *Folk Songs for Solo Singers*, Jay Althouse, ed. (1983). Van

Nuys, California: Alfred Publishing, Inc. 28.

♩ = 72

Voice

9

♩ = 72

Voice

9

Detailed description: The image shows two systems of musical notation for the song "To the Sky". The first system is in treble clef and the second is in bass clef. Both systems are in 3/4 time and have a tempo marking of quarter note = 72. Each system consists of two staves. The first staff of each system contains the first eight measures of the melody, and the second staff contains measures 9 through 16. The key signature has one flat (B-flat). The melody is a simple, folk-style tune with a mix of eighth and quarter notes.

Appendix E

Human Subjects Review Form

Informed Consent Form



THE UNIVERSITY OF SOUTHERN MISSISSIPPI

Institutional Review Board

118 College Drive #5147
 Hattiesburg, MS 39406-0001
 Tel: 601.266.6820
 Fax: 601.266.5509
 www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26,111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Event Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **29071801**

PROJECT TITLE: **Does Change in Timbre Alter Stereotypy Movements Exhibited by Three Persons With Diagnosis of Mental Retardation: A Case Study**

PROPOSED PROJECT DATES: **07/17/09 to 07/16/10**

PROJECT TYPE: **Dissertation**

PRINCIPAL INVESTIGATOR(S): **Kathy Webb**

COLLEGE/DIVISION: **College of Arts & Letters**

DEPARTMENT: **School of Music**

FUNDING AGENCY/SPONSOR: **N/A**

HSPRC COMMITTEE ACTION: **Full Committee Review App**

PERIOD OF APPROVAL: **09/03/09 to 09/02/10**

Bradley A. Green, Ph.D.
 HSPRC Co-Chair
 The University of Southern Mississippi

9/04/2009

Date

HUMAN SUBJECTS REVIEW FORM
UNIVERSITY OF SOUTHERN MISSISSIPPI
(SUBMIT THIS FORM IN DUPLICATE)

Protocol # 29071801
(office use only)

Name Kathy Webb Phone (601) 493 9008

E-Mail Address katwebb@aol.com

Mailing Address 662 Three Mile Stretch Rd Ellisville, MS 39437
(address to receive information regarding this application)

College/Division SOAL Dept School of Music

Department Box # 5081 Phone 6-6944

Proposed Project Dates: From July 17, 2009 To July 16, 2010
(specific month, day and year of the beginning and ending dates of full project, not just data collection)

Title Does Change in Timbre alter stereotypy movements exhibited by three persons with diagnosis of mental retardation: A case study

Funding Agencies or Research Sponsors N/A

Grant Number (when applicable) N/A

- New Project
- Dissertation or Thesis
- Renewal or Continuation: Protocol # _____
- Change in Previously Approved Project: Protocol # _____

Kathy Webb Principal Investigator 7/17/09 Date

Jennifer Shank Advisor 7/17/09 Date

Michael Miles Department Chair 7/17/09 Date

RECOMMENDATION OF HSPRC MEMBER

- Category I, Exempt under Subpart A, Section 46.101 () (), 45CFR46.
- Category II, Expedited Review, Subpart A, Section 46.110 and Subparagraph ().
- Category III, Full Committee Review.

[Signature] HSPRC College/Division Member 7-19-09 DATE

[Signature] HSPRC Chair 9/04/2009 DATE

AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT

Consent is hereby given to participate in the study titled: “Does Change in Timbre Alter Stereotypy Movements Exhibited by Three Persons With Diagnoses of Mental Retardation and Autism Spectrum Disorder: A Case Study”

1. **Purpose:** The purpose of the investigation is to determine if change in music timbre will in any way affect the repetitive movements of three individuals involved in the case study.
2. **Description of Study:** The study will involve music listening only. The participant will be taken to a room in the participant’s dormitory, a room familiar to the participant. During a 25-minute session, the participant will be exposed to four folk songs each presented in five timbres: mezzo-soprano, bass-baritone, piano, acoustic guitar, and tone chimes. The study will be held during the participant’s routine music and socialization time on her daily schedule so as not to interfere with her normal routine. There will be nothing asked of the participant to do other than to be in the room with the music playing on a recorded CD, there will be no invasive techniques employed in this study. The participant will be monitored by the researcher, the participant’s psychologist, and the participant’s primary caretaker at all times.
3. **Benefits:** Research shows that stereotypy movements exhibited by institutionalized persons with mental retardation and autism are often measures taken by those persons to avoid engaging with others, to escape a sometimes sensorially overloaded world. Research also advocates the use of music as therapy to engage such individuals and lead them into a way to express themselves and communicate with others, to socialize with others, and to become more aware of their environment. Thus, the benefits are potentially great in regard to enabling individuals described in this study to better function in their least restrictive environment and become more independent and better able to express their wants and needs.
4. **Risks:** As this study is observation only to the participants’ reactions to recorded music and that the music to be used is nonthreatening in nature, the risks to the participants involved is very minimal. The setting where the study will take place is a room familiar to the participants and should not be threatening to them in that respect. Measures will be taken to minimize any risk to a participant in this study in that three staff who work daily with the participants will be present during the session and will provide the participant with immediate removal from the room and the session if the participant shows even the slightest resistance or adverse reaction to the music.

5. **Confidentiality:** At no time nor in no way will the privacy of the individuals participating in the study be violated. The participant is protected under federal HIPAA laws. The only information that will be used will be gender, age, diagnosis, and reactions to study variables. Participant records will not be accessed.
6. **Alternate Procedures:** The participants are all clients in a state-operated facility where they have 24-hour schedules in which they receive daily active treatment rehabilitation, including music therapy and socialization activities. If a participant indicates aversion to the present study and the music selections, the participant can be offered an alternate genre of music to listen to if they wish. Also, the participant may indicate a desire to return to her peer group and will be able to do so immediately upon indicating so.
7. **Participant's Assurance:** Whereas no assurance can be made concerning results that may be obtained (since results from investigational studies cannot be predicted) the researcher will take every precaution consistent with the best scientific practice. Participation in this project is completely voluntary, and participants may withdraw from this study at any time without penalty, prejudice, or loss of benefits. Questions concerning the research should be directed to Kathy Wade Webb at 601-477-5959. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820. A copy of this form will be given to the participant.
8. **Signatures:** In conformance with the federal guidelines, the signature of the participant or parent or guardian must appear on all written consent documents. The University also requires that the date and the signature of the person explaining the study to the subject appear on the consent form.

Research Participant

Date

Person Explaining the Study

Date

Parent/Guardian/Surrogate of Participant

Date

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