Exploring the Use of Music Interventions on Emotion Competence in Individuals with Special Needs: A Systematic Review

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EXPLORING THE USE OF MUSIC INTERVENTIONS ON EMOTION COMPETENCE IN INDIVIDUALS WITH SPECIAL NEEDS: A SYSTEMATIC REVIEW

By

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A THESIS

Proposal submitted to the Faculty of the University of Miami in partial fulfillment of the requirements for the degree of Master of Music

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EXPLORING THE USE OF MUSIC INTERVENTIONS ON EMOTION COMPETENCE IN INDIVIDUALS WITH SPECIAL NEEDS: A SYSTEMATIC REVIEW

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Deficits in emotional competency negatively affect interpersonal skills, academic and occupational performance, and independent living skills. In individuals with intellectual and other developmental disabilities that affect cognitive functioning, increases in symptom severity tend to be correlated with increases in emotional deficits. Thus, these individuals may benefit from treatment programs that address emotion behaviors, such as emotion identification, emotion regulation, and emotional expression. One such treatment program can involve the use of music. As an initial exploration, this systematic review sought to summarize and analyze extant literature on the use of music interventions to address emotional skills in individuals with special needs. A comprehensive electronic database search yielded 18 studies that met predetermined inclusion criteria. Relevant data pertaining to the research questions were extracted, analyzed, and compared for trends and common findings. Results indicated an increasing interest in this clinical area in recent years, and that music therapists and other professionals most often utilize instrument playing, singing, and improvisation when addressing emotional skills. Implications for clinicians are discussed and theoretical guidelines for future research are explored.
Dedication

First and foremost, I dedicate this thesis to my parents:
In memory of my father, George, who always believed in me, even when I didn’t, and
To my mother, Mary, who has been an unwavering advocate since this journey began (and even before that).
I wouldn’t have made it here without your strength and guidance.

To my sister, Terri, and brother, Mike, (and their families), and to my friends,
Who understood when I couldn’t hang out because “I have to thesis.”

To John Britton and Daniela Schmiedlechner,
Who were so calm and accommodating during the first iteration of this thesis, and
gave me such wonderful voice recordings of nonsensical sentences in German!

To Brea Murakami and Allison Lockhart,
My partners-in-TA, for all the talks, laughs, fashion advice, late nights in the office, and relentless support.

And most importantly:

I dedicate this thesis to my clients, who have found a home in my heart and drive me to be the best therapist I can be.

Thank you.
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CHAPTER ONE
INTRODUCTION

Statement of the Problem

Emotional competence is a set of emotion behavior skills and abilities that can impact an array of other domain areas, including cognitive functioning, social skills, and other areas that affect independent living skills. Deficits in emotional competence can impact interpersonal relationships, academic and occupational performance, and independent living (Berkovits & Baker, 2014; Tsiouris, Kim, Brown, & Cohen, 2011). Research has also suggests that cognitive functioning may be related to an individual’s emotional abilities and competencies (Brennand, Schepman, & Rodway, 2011; Saarni, 1999). Thus, diagnoses that include cognitive delays (e.g., autism spectrum disorder, cerebral palsy with intellectual disability, etc.) may influence one’s emotional competence. In fact, individuals with intellectual disability (ID), a neurodevelopmental disability characterized by deficits in intellectual and adaptive functioning skills, may demonstrate difficulties in social judgment, empathy, interpersonal skills, emotion regulation, and emotional expression (American Psychiatric Association [APA], 2013b).

Occasionally in individuals with disabilities, instances of negative or aggressive behaviors (e.g., hitting or yelling) increase as severity of diagnosis increases and social competence decreases (Berkovits & Baker, 2014; Tsiouris et al., 2011). Regarding academic success, comprehending and appropriately using emotion-based skills is significantly related to higher academic success rates (Davis, 2008; Durlak, 2011). In this way, lower emotional competency might negatively impact learning experiences. Finally, deficits in emotion processing may inhibit an individual’s ability to properly interpret
social situations, resulting in poor social judgment, gullibility, and risk of exploitation by others (APA, 2013b), which impacts the ability to live independently.

Thus, individuals with special needs that impair cognitive functioning may benefit from programs that modify emotion-based behaviors to be more adaptive to everyday living. The overall importance of emotional competence on areas of functioning suggests that treatments addressing emotional competence would benefit the well-being, life skills, and behavioral, academic, and social needs of individuals with special needs. Due to this influence, researchers have begun examining possible therapeutic interventions for these need areas. In particular, researchers have focused on behavioral interventions for managing anger, particularly through the use of self-monitoring, instruction, and mindfulness (Brosnan & Healy, 2011; Singh et al., 2011). These management techniques positively impact success during academic tasks and when interacting with authority figures (Coughlin et al., 2012; Wadsworth et al., 2015), and evidence exists they increase independence and problem solving as well (Miller & Taber-Doughty, 2014).

Music-based interventions have been used to address various emotional skills in typically developing individuals and individuals with clinical needs. Not only are music interventions effective for facilitating the healthy expression of emotions and reducing negative social behaviors in typically-developing individuals (Roberts, 2016; Saarikallio, 2010; Saarikallio & Erkkilä, 2007), it has also been shown to improve problem-solving skills, modify arousal, and address healthy self-expression needs in individuals with global functioning delays (Gebhardt, Kunkel, & von Georgi, 2014). The success of music interventions to positively influence the outcomes of emotion goals in typical and clinical
populations provides a clinical and research-based foundation for using music to treat emotional skills in individuals with special needs.

This connection between music and emotional competency is not a coincidence. The experience of emotions and of music-induced emotions are neurologically similar. In particular, activation in the frontal regions, the hippocampus, the amygdala, and the cerebellum are reasonably consistent across both types of emotion experiences (Lane et al., 1997; Mitterschiffthaler & Williams, 2007; Trost et al., 2001). In addition to the above-mentioned effect that music may have on arousal, these neurological similarities suggest that music-induced emotions may be able to influence the experience of non-music emotions.

Thus, support exists that music can influence emotions. Furthermore, music is commonly used to address emotional skills throughout an individuals’ lifespan, regardless of diagnosis (if it exists), and across social, behavioral, and academic domains (Hoyle & McKinney, 2015; Saarikallio & Erkkilä, 2007; Sena Moore, 2013; Thompson & McFerran, 2015). For individuals with intellectual disabilities, the majority of literature exploring therapy and other treatment options seems to focus on their cognitive needs (Gebhardt et al., 2014; Leffert et al., 2010; Pellitteri et al., 2006). By extension, the importance of targeting emotional skills is an under-served area of research and clinical practice. As a clear association between music and emotions exists, the current systematic review seeks to provide a comprehensive examination of this treatment area in order to provide a foundation for further examination and create clinical practice guidelines.
Definition of Terms

Emotion

An emotion is an internal state experienced instinctively without the need for cognitive processing (Emotion, 1989; Davies, 2011). An individual’s emotional experience includes a number of behaviors, such as the ability to label the emotion (i.e., emotion identification), express the emotion, and regulate the emotion (Juslin & Sloboda, 2011) in a socially expected and accepted way.

Emotion identification. Emotion identification is the awareness of and ability to label emotions in oneself and in others. Accurate labeling can occur even when the emotion is not currently being experienced by the individual (Juslin & Sloboda, 2011).

Emotional expression. Emotional expression is the ability to convey an emotion verbally or through some other demonstrative way (e.g., using an augmentative communication device, changing facial affect or body language, etc.). Expressive acts may include crying, smiling, or other affective changes; other verbal or bodily gestures used to convey an emotion; and maladaptive behaviors such as hitting or spitting (Oolup et al., 2016). Skills related to expressing emotion states include communication skills, peer awareness, responsiveness to social and emotional situations, and emotion regulation (Saarni, 1991) in an age-appropriate manner.

Emotion regulation. Emotion regulation is an individual’s ability to manage and respond to emotional experiences in ways that are socially expected and accepted (APA, 2013a). It encompasses an individual’s abilities to respond to a range of emotions and express them in ways that are socially expected and accepted (Cole, Michel, & O’Donnell, 1994). This may also encompass flexibility when responding to an event, to
either outwardly respond or to delay response until a more socially appropriate time. Emotion regulation behaviors are consciously and explicitly performed, with strategies ranging from overt responses like talking to a friend, leaving or modifying the situation (e.g., hanging up the phone, putting away an upsetting letter, etc.), to more internal responses like taking a deep breath, thinking about a situation differently, or letting time pass while focusing on a different activity (e.g., reading a book) (Gross, 2015).

**Systematic Use of Music**

For the purposes of this systematic review, the term “systematic use of music” will include any methodical and purposeful use of a named music stimulus utilized to address a non-music goal area by an education or healthcare professional. Music must be the primary stimulus of the intervention, and will require participants’ active participation in the intervention. Types of music stimuli may include music improvisation, singing, instrument playing, or structured music listening, among others, or may include interventions specific to music therapy practice, such as the use of Neurologic Music Therapy or Nordoff-Robbins techniques.

**Individuals with Special Needs**

The initial focus of this systematic review was on exploring the use of music interventions to target emotion outcomes in individuals with intellectual disabilities. However, in order to provide a more comprehensive exploration of the use of music interventions on emotion outcomes in those with intellectual impairments, the search was expanded to include other developmental disabilities with a cognitive component. Thus, for the purposes of this systematic review, individuals with special needs refers to children, adolescents, and adults who have a diagnosis of an intellectual disability or one
of the following developmental disabilities that include a cognitive component: autism spectrum disorder, Williams syndrome, cerebral palsy, Down syndrome, learning disability, and traumatic brain injury.

Need for the Study

Theoretical Implications

This systematic review has both theoretical and clinical relevance pertaining to the use of music in the treatment of children, adolescents, and adults with cognitive impairments. Theoretically, this systematic review will provide insight into research on how music interventions are used to improve emotion processing and emotion development in children, adolescents, and adults with special needs. It will also expose any gaps in the existing literature, and may provide focus for further studies in this area. Furthermore, results from this systematic review may help promote evidence-based practice.

Evidence-based practice within the context of the systematic review is the clinical and research-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional (AMTA, 2010). Utilizing an evidence-based practice model is imperative for professions that incorporate problem-solving when addressing client needs, in order to develop interventions with the greatest probability of success based on past treatment outcomes (Horner et al., 2005). Thus, this systematic review will analyze and draw conclusions regarding the availability and integrity of current research, in order to support evidence-based practice when using music to address emotional outcomes in children, adolescents, and adults with ID.
Furthermore, due to the nature of conducting a systematic review, this study will provide an opportunity to examine the demographics of professionals who use music systematically and for therapeutic purposes related to improving emotional competence in individuals with special needs. Additionally, this review will provide a unique opportunity to analyze how this use of music has changed over time, and to explore changes in research interest or clinical practice, if such changes occurred.

Finally, results from this systematic review will inform and focus future research on this topic, particularly in regards to replication, consistent methodologies, and well-defined search parameters (Horner et al., 2005). In other words, future researchers will be better able to design studies that are better-informed by previous literature, and may be better suited to replicate literature effectively.

**Clinical Implications**

This systematic review has practical clinical applications, particularly for professionals who use music interventions to facilitate emotion-based goals in children, adolescents, and adults with cognitive deficits. Results of this review suggest which type of music interventions have been used most effectively to address emotional outcomes. Additionally, this systematic review encourages clinicians to more consistently address emotional outcomes in children and adolescents with cognitive needs in order to positively influence all areas of functioning impacted by emotional well-being and development.

**Purpose Statement and Research Questions**

The purpose of this systematic review is to summarize and analyze extant literature on the systematic use of music to address emotional outcomes in individuals
with special needs and to discuss practice and research implications that emerge. The following research questions will be examined:

1. How has music been used to address emotion identification, emotion regulation, and emotional expression in children, adolescents, and adults with special needs?

2. Which professionals use music to work toward emotional outcomes in children, adolescents, and adults with special needs, and in which settings?

3. How has the use of music to address emotional outcomes in children, adolescents, and adults with special needs changed over the years?
CHAPTER TWO
REVIEW OF RELATED LITERATURE

This chapter will review research pertinent to examining how music is used to address emotion needs in individuals with special needs. After a brief description of emotions and emotional development, research describing neurological structures involved during the processing of emotions during both music and non-music experiences will be discussed. Additionally, areas of functioning, including academic, social, behavioral, and daily living skills, as well as other developmental areas impacted by emotional outcomes, will be examined. Though this systematic review is inclusive of individuals with various developmental disabilities that impair cognitive functioning, for the purposes of this chapter review much of the literature focuses more specifically on those with intellectual disabilities (e.g., describing non-music interventions that target emotional outcomes in individuals with special needs) as this will provide a foundation of knowledge for treating individuals with cognitive impairments across diagnoses. This chapter will also present an argument for the use of music in addressing emotional outcomes in individual with special needs.

Emotions and Emotional Development

An emotion is an internal state experienced instinctively without the need for cognitive processing, though it includes the ability to label the emotion (Emotion, 1989; Davies, 2011; Lewis, 2013). Emotions are derived from the internal and/or external world(s), both physical and mental, and from personal reactions to that/those world(s) (Lewis, 2013; Wilson & Wilson, 2014). Emotions have multiple sub-components, each of which impacts daily functioning. For example, the experience and expression of emotions
influence human behaviors, including our abilities to learn, interact appropriately and meaningfully with others, and maintain independent-living skills (Dosen, 2005; Graziano, Reavis, Keane, Calkins, 2007; La Malfa, Lassi, Bertelli, Albertini, & Dosen, 2009; MacDonald, 2016). The appropriate regulation of emotions helps us navigate through the complex emotional demands of society (Leffert, Siperstein, & Widaman, 2010; Rey, Extremera, Duran, & Ortiz-Tallo, 2013). Furthermore, healthy emotional skills can also influence other competencies needed for activities of daily living, such as attention, communication, peer and environmental awareness, and social skills (Saarni, 1999; Thompson, 1991). For instance, as human society is social in nature, the ability to effectively understand and utilize emotion cues is important for interactions in school, professional, and social settings in ways that are socially expected and accepted (Saarni, 1999; Thompson, 1991).

**Development of Emotions**

Emotion development encompasses three core areas: emotion identification, emotion expression, and emotion regulation. The development of emotion skills begins in childhood (between infancy and 12 years of age in typically developing children), and it continues into adulthood (Saarni, 1999). After developing an awareness of self and others, children develop skills in emotion identification, first through an awareness of their own feelings, then through an awareness of the feelings of others (Saarni, 1999; Thompson, 1991). During this stage of emotion development, children also begin to develop language skills; this allows them to label their emotions and the emotions of social peers. As children become more proficient in identifying experienced and perceived emotions, they begin to develop an understanding of social norms in which to
identify, express, and respond to those feelings in a socially expected and accepted way (Davies, 2011; Denora, 2011; Saarni, 1999; Thompson, 1991).

Oftentimes, emotion skills are learned and practiced through interactions with peers (Saarni, 1999), providing context and immediate feedback during social exchanges. Social reactions alter how children respond to emotional cues, both internal and external, and guide the development of emotion expression skills and emotion regulation. Theoretically, due to difficulties in learning from experience and overall delays in cognitive ability (APA, 2013b), individuals with special needs may not develop these important emotional skills as they may lack the nuanced ability of a typically-developing individual to identify and respond to their emotions or the emotions of others. As skills become more delayed, social interactions may decrease, perpetuating the cycle and ultimately causing a profound delay in emotion development.

**Neuroanatomical Structures Associated with Emotion Induction**

The study of the neurological mechanisms underlying emotion processing has been explored through emotion induction via visual and self-induced means. One such study utilized silent film clips to induce either happy, sad, or disgusted emotions in participants, and compared active brain areas to a neutral control. Prior to watching the emotionally-salient film clip, participants were asked to focus on feeling, not identifying, the intended emotion. Positron emission tomography (PET) scans taken during viewing showed that the induction of all three emotions resulted in significant increases in activity in the prefrontal cortex, thalamus, and bilateral anterior temporal structures. Furthermore, happy emotions tended to correspond to significant increases in activation in bilateral temporal cortices, the hypothalamus, the left amygdala, the caudate, and the posterior
cingulate cortex; sad emotions elicited increased activity in the amygdala, bilateral temporal cortices, caudate, cerebellum, midbrain, and other areas. In addition to activation in the prefrontal cortex and thalamus, disgust also evoked an increase in the midbrain and cerebellum. From these results, the researchers concluded that specific neural structures are involved in the processing of individual emotions. More specifically, the frontal cortices seem differentially involved in the processing of positive and negative emotions, and the insular cortex, including the thalamus and amygdala, are more active during the processing of negative emotions (Lane, Reiman, Ahern, Schwartz, & Davidson, 1997).

Similarly, self-induced emotions have also been used to examine brain structures activated when experiencing positive and negative emotions. In a study by Pelletier and colleagues (2003), professional actors were asked to self-induce happy and sad emotions by recalling intense emotional experiences from their personal lives, before undergoing a functional magnetic resonance imaging (fMRI) scan. Scan results indicated that induced happy emotions tended to activate the bilateral orbitofrontal cortex, the medial prefrontal and left ventrolateral prefrontal cortices, the left anterior frontal pole, and the right pons. Self-induced sad emotions resulted in increased activation in the bilateral orbitofrontal cortex, the medial and left ventrolateral prefrontal cortex, and the left anterior temporal pole. Due to the absence of activation in areas generally associated with the experience of emotions, such as the limbic system, insula, and amygdala, the researchers proposed that emotions may be processed differently depending on the situation (e.g., visually-induced, self-induced, and environmentally-induced). With these variations in mind, other
researchers have examined how environmental factors may influence the experience of emotions, particularly in regards to anger and aggression.

In a study by Harmon-Jones and Sigelman (2001), participants wrote short essays on a researcher-provided topic and were provided with either neutral or insulting (i.e., negative) feedback. Participants were erroneously told all essays were reviewed by another participant who was sitting in the adjoining room. After receiving feedback, participants underwent an electroencephalogram (EEG) and were asked to choose a type of drink, ranging from very unpleasant tasting to very pleasant tasting, to give to the fictional person who had given feedback on the essay. Behavioral results showed that participants felt significantly more anger following insulting feedback (i.e., “I don’t know how an educated person could think like this”) than following neutral feedback, and subsequently chose unpleasant tasting drinks for the fictional person. Scan results reinforced this pattern, as the more intensely felt anger correlated with significantly greater left-prefrontal activity than following neutral feedback. Additionally, neural activation showed a significant relationship to aggressive acts, as measured through chosen drink choices. Although this study focused primarily on prefrontal activity, the researchers concluded that activity in this brain area is significantly related to the experience and expression of anger and aggression.

**Summary.** Research demonstrates an emerging map of neural activation patterns associated with emotion processing. Areas implicated include the prefrontal and orbitofrontal, although other areas in the insular cortex, including the thalamus and the amygdala are active, particularly during the processing of negative emotions. Research also indicates that the causes of emotions may influence neural activation patterns, as
environmentally-induced emotions may be processed differently than self-induced or visually-induced ones. The PFC and OFC seem most active during self-induced emotions, although this may be due to the additional concentration needed to self-induce an emotion. The expression of anger and aggression results in activation of the prefrontal cortex, especially when these negative emotions are induced due to environmental factors.

**Emotional Outcomes in Individuals with Special Needs**

While individuals with ID do not necessarily have an inherent emotional deficit (Baurain & Nader-Grosbois, 2013), the characteristic delay of intellectual functioning may negatively impact the interpretation of external social cues, the understanding of internal emotional cues, and may delay overall emotional development (Baurain & Nader-Grosbois, 2013; Graziano et al., 2007; La Malfa et al., 2009; Leffert, Siperstein, & Widaman, 2010). In addition to impacting quality of life (Rey et al., 2013) and the ability to function independently (APA, 2013b; La Malfa et al., 2009); emotional-based deficits may also negatively impact behaviors (Dosen, 2005), academic skills (Graziano et al., 2007), and socio-emotional skills (Baurain et al., 2013).

These difficulties may also be shared by people with other diagnoses that negatively affect the cognitive domain. For instance, individuals with traumatic brain injuries may have difficulties regulating emotions (Dethier, Blairy, Rosenber, & Sky McDonald, 2013), and individuals with autism spectrum disorder have difficulties with processing emotions (APA, 2013a), which may lead to difficulties in emotion regulation (Mazefsky, 2015) and other areas. However, in the case of autism spectrum disorder, certain emotional outcomes are affected by cognitive ability (Quintin, Bhatara, Poissant,
Thus, this section will focus primarily on individuals with specific cognitive deficits.

**Influence of Emotional Competence on Behavior**

Emotion development impacts emotional outcomes, including the expression of emotions (Dosen, 2005), which play an important role in the manifestation of both adaptive and maladaptive behaviors. Within the context of one detailed case study, Dosen (2005) illustrated how an adult with ID presented conflicting evidence regarding cognitive versus emotional development level, although her cognitive development was determined to be around 5 years of age and her emotional development around 2 years of age. After evaluating the participant’s abilities using standardized assessment tools and observing the participant interact with family and staff members, the researcher concluded that the emotional development and needs of the participant impacted her behaviors toward others to a more substantial degree than her intellectual abilities.

Further research supports this proposed link between emotional outcomes and behavior. In a comprehensive study of over 4,000 individuals diagnosed with ID, Tsiouris et al. (2011) collected data on instances of aggressive behaviors toward self and others and compared these occurrences with the severity of ID and the presence of other diagnoses (e.g., autism spectrum disorder, psychiatric conditions). Results pertinent to the current study showed that verbal aggression toward self and others tended to be associated with mild to moderate ID, whereas physical aggression toward self and others was more greatly associated with severe to profound ID. Although the researchers do not comment on this relationship specifically, the implications of severity of behavior and
diagnostic symptoms demonstrate a need for further investigation into possible causes of these emotional outbursts in individuals with ID.

To that end, other researchers have examined how emotional development influences the incidence of challenging behaviors in adults with ID. Sappok et al. (2014) assessed adults with ID for overt aggression and atypical behaviors, then compared those scores to the participants’ emotional development, severity of ID, employment, living situation, co-morbid diagnosis, and other daily life factors. Results demonstrated that lower levels of emotional development were associated with more severe negative behaviors toward self, whereas aggressive behaviors demonstrated by individuals with high levels of emotional development tended to be verbal and directed toward others.

The most profound predictors for aggressive behavior specific to individuals with ID were level of emotional development and age (Dosen, 2005). Level of emotional development was also predictive of unemployment rates and living situations, as individuals with lower emotional development were less likely to work, either in sheltered or unsheltered settings, and were more likely to live in supervised residences (e.g., residential facility or at home with parents), compared to individuals with higher emotional development. Sappok et al. (2014) concluded that emotion development is predictive of challenging behaviors and aggression toward the self and others, both of which negatively impact the ability of an individual to attain and maintain employment and live independently.

This conclusion is supported for other diagnoses that affect the cognitive domain area, as well. In individuals with traumatic brain injury, neural structures related to emotion regulation may be disrupted (van der Horn, Liemburg, Aleman, Spikman, & van
der Naalt, 2016), which may result in socially unacceptable emotional responses. In individuals with autism spectrum disorder, emotional impairments can likewise result in distressful behaviors in the individual as they try to emotionally regulate (Berkovits, Eisenhower, & Blacher, 2017; Mazefsky, 2015) or express, which increases social difficulties across time (Berkovits et al., 2017), and may also affect independent living skills.

Influence of Emotional Competence on Academic Success

Although cognitive delay is the principle symptom of intellectual disability and has a profound impact on learning (APA, 2013b), the academic success of individuals with intellectual disabilities may theoretically also be influenced by their emotional outcomes, particularly their emotional development level and ability to regulate their emotions. In one study with typically-developing (TD) individuals, college-aged participants underwent a positive or negative mood induction procedure, then were asked to attend to and demonstrate learning for three school-related subjects (Knörzer, Brünken, & Park, 2016). Participants were assessed based on their retention and comprehension of the information, as well as the transfer of knowledge. Results indicated that individuals with positive-induced emotions performed significantly less well on comprehension and transfer of new material, compared to negative-induced and neutral mood groups. While these results contrast to the well-supported belief that negative moods are harmful to memory and cognitive functioning (Bower, 1981; McClintock et al., 2010; Zaninotto et al., 2016), the authors pose a possible explanation. They acknowledge that the participants’ emotional states may not have been captured accurately through the subjective rating scales; meaning that reported negative emotions might not have been
consistent with true, profoundly negative feelings. Instead, the negative emotions may have simply been somewhat negative, but tending toward neutral. Otherwise, due to the reduced performance in individuals with positively-induced emotions, the researchers concluded that when emotions are not regulated (i.e., brought to within a neutral range), they will negatively impact the comprehension and application of newly learned material.

Further research supports this connection between emotion regulation and academic success. Graziano et al. (2007) conducted a large-scale study on typically developing (TD) 5-year-olds, testing them for emotion regulation skills, behavior problems, academic achievement, overall intelligence, and student-teacher relationships. Relevant results indicated that emotion regulation was a significant predictor of academic success and productivity. Additionally, behavior problems and the quality of student-teacher relationships were significantly predicted by a child’s ability to regulate his or her emotions. When scores were controlled for IQ, behavior problems were significant in predicting academic success. Furthermore, while emotion regulation and the quality of the student-teacher relationship contributed to the predictability of academic success, behavior problems were not a significant mediator (i.e., when researchers controlled for behavior problems, their effect on academic success was not significant). However, emotion regulation skills predict behavior problems, which may in turn influence the student-teacher relationship and thus academic success. The researchers therefore concluded that emotion regulation has a unique effect on academic success, and that emotion dysregulation disrupts cognitive (i.e., learning) processes. They also posed that better emotion regulation skills could provide the tools needed to maintain attention and behave appropriately in the classroom within the ever-shifting and social learning
environment, fostering greater academic success. Although this systematic review focuses on the impact of emotional outcomes on TD children, results of these studies provide a foundation for examining the connection between emotional outcomes and academic skills in children and adolescents with ID.

**Emotional Competence and Socio-Emotional Concerns**

Emotion regulation, as part of emotional development, can have a profound impact on a child’s social development, regardless of diagnosis. Berkovits and Baker (2014) examined the relationship between emotion regulation and social development in middle-school aged children with and without ID. After using standardized assessment tools to measure cognitive ability and emotion regulation skills, researchers asked the teachers and mothers of the participants to complete an emotion regulation survey. Results indicated that children with ID showed significantly more emotion regulation issues than their TD peers. However, although results from parental reports showed a significant negative correlation between emotion regulation problems and social competency in both typical and clinical populations, results from teachers’ reports showed a significant negative correlation for TD individuals only.

Additionally, although emotion regulation skills were correlative with social problems, it was not predictive of social problems with individuals with ID. Emotion regulation was, however, predictive of social problems in TD peers. Considering the significant difference between children with ID and their TD peers, this discrepancy may have been due to other factors. For instance, children with ID may play by themselves and not interact with TD peers, which could also undermine social development. Additionally, the small sample size may have skewed the results. Regardless, the
researchers concluded that a significant relationship exists between emotion dysregulation and social problems in both populations.

Other researchers have also focused on the link between emotion regulation and teachers’ perceptions of appropriate social skills in children with ID. Baurain and colleagues (2013) assessed children with and without ID for socio-emotional problem solving, social adjustment, and intellectual ability. Teachers then rated the children on emotional expression, social behavior, and behavior toward social rules. Results indicated a significant positive link between behavior toward social rules and the teachers’ perceptions of an individual’s social abilities. This signifies that if an individual follows social norms, demonstrates an ability to regulate their emotions and behavior, and follows agreed-on social rules (e.g., are patient with others, moderate externalizing negative behaviors, etc.), teachers – and possibly other social partners – will perceive the individual as socially adapted and able to participate in daily social relationships.

Furthermore, when the researchers controlled for developmental age, no significant difference between children with and without ID was found. This indicates that while ID does not include an inherent social delay, as may be found in other diagnoses, an individual’s cognitive abilities are linked to their emotional development. This link can result in difficulties with socio-emotional problem-solving, which can influence everyday social interactions.

To that end, Baurain and Nader-Grosbois (2013) examined the impact of emotion development on an individual’s socio-emotional problem-solving skills and understanding of theory of mind. In this study, young children with and without ID were matched for developmental age, and then evaluated based on responses to theory of mind
emotion tasks, socio-emotional problems solving skills, and social regulation tasks using standardized assessment tools. Results indicated that developmental age, regardless of disability, significantly and positively correlated to theory of mind abilities, including understanding the cause and consequence of emotions in others. Developmental age was also significantly correlated with socio-emotional problem solving and emotion regulation in children with and without ID, indicating that more severe symptoms of ID are related to more underdeveloped emotional skills. In addition, results supported that developmental age influenced social information processing in both children with and without ID, although the chronological ages of children with ID tended to be older than their TD peers within the same developmental age. This lends further support to the conclusion that poor emotional development can negatively influence social skills and understanding. Moreover, outside of a controlled education or living arrangements, these misinterpretations of social cues and situations may put individuals with ID at-risk for accidental or purposeful exploitation by others.

Leffert et al. (2010) proposed that children with ID experience social deficits because social and emotional skills have a foundation in cognitive abilities. They further asserted that interpreting the intentions of a social partner is an important component of choosing an appropriate behavioral response. Based on these assumptions, the authors examined whether children with ID, as compared with TD peers, have difficulties interpreting another child’s intentions when presented with conflicting social information. Participants watched three video vignettes: the first depicted a negative-event paired with a benign non-verbal response from a social partner (e.g., a child opens a door into a ball that knocks down the blocks of another child); the second was of a negative-event paired
with a benign verbal response (e.g., a child knocks over a drink and apologizes after his social partner exclaims an accusation); and the third was of a negative-event paired with an insincere expression of benign intention (i.e., passive aggressive, where a child may deliberately knock into another child’s arm while drawing, and then stating that they like the scribbled picture better than how the picture looked before).

Results showed that across all three conditions, children with ID performed less well than their TD peers with interpreting the correct intention. Interestingly, during the second condition, individuals with ID had more difficulty than during the first condition, although these differences were not significant. The researchers indicated this was possibly due to the negative event being enhanced by the speech of the child performing the negative action. The third condition produced significantly poorer results than the first two conditions, indicating that conflicting and complex information may be misinterpreted by children with ID, particularly if an intention is presented in a subtle manner or is sarcastic.

From these results, the authors concluded that children with ID demonstrate greater difficulty in interpreting mixed intention cues than their TD peers, which may lead to increased gullibility of the individual with ID. This increased gullibility could subsequently put the individual at greater risk of exploitation and therefore impact the individual’s ability to live and function independently.

Interestingly, these patterns are also seen in other populations with developmental disabilities, including traumatic brain injury and autism spectrum disorder (Aboulafia-Brakha, Allain, & Ptak, 2016; Baker, Fenning, Crnic, Baker, & Blacher, 2007; Berkovits et al., 2017; Gerstein, Arbona, Crnic, Ryu, Baker, & Blacher, 2011). Gerstein et al.
(2011) studied the relationship between emotion regulation and behavioral problems in individuals with developmental delays. Relevant results from surveys administered to parents of the participants indicated a significant difference between individuals with developmental delays and typically developing peers, particularly in coping skills and appropriate expression of emotions. Overall, individuals with developmental delays showed more reported behavior problems and demonstrated fewer constructive coping skills than typically developing peers, demonstrating overall poorer emotion regulation strategies compared to peers without any developmental delays.

Likewise, Baker, Fenning, Crnic, Baker, and Blacher (2007) studied social interactions and emotion regulation skills in individuals with developmental disabilities. In this longitudinal study, 172 children with and without developmental disabilities were observed in a laboratory setting for emotion regulation and social skills when interacting with their parents. Results showed that individuals with developmental disabilities scored significantly lower than typically developing peers for social skills, and showed a stronger negative correlation between emotion regulation and social skills. This means that the less able an individual was at regulating his/her emotions, the poorer their scores in social skills, and this correlation was more visible with individuals with developmental disabilities than those without them.

Some research has focused on emotional needs in specific clinical populations. One study with children diagnosed with autism spectrum disorder (Berkovits et al., 2017) surveyed parents of children with autism spectrum disorder (aged 4 to 7) on their children’s emotional regulation, social skills, and behaviors two times over a course of ten months. Results showed that emotion regulation (i.e., emotion dysregulation) was
highly correlated with social and behavioral functioning. Emotion dysregulation was also shown to significantly predict increases in social and behavioral difficulties across time. Interestingly, the researchers found that emotion regulation skills were independent of both language and cognitive development, but highly correlated to “autism symptomatology.” Regardless, the results from this study indicate that emotion dysregulation may cause more instances of social and behavioral problems in individuals with autism spectrum disorder.

Likewise, individuals with traumatic brain injury also experience difficulties regulating emotions (Aboulafia-Brakha et al., 2016). In this studies, individuals with and without traumatic brain injury underwent skin conductance monitoring during various emotion recognition, regulation, and expression tasks, including responding to both prompted and unprompted anger-inducing situation. Results showed that individuals with traumatic brain injuries experienced a significant increase in skin conductance (i.e., arousal) between the neutral and uninstructed anger (i.e., recalled) condition, indicating a more profound reaction to organically experienced situations than their typically developing peers. This and the other studies discussed in this section indicate that individuals with special needs that affect the cognitive domain have emotional needs that, left untreated, may negatively impact their abilities to live and function independently.

**Treatment of Emotional Competence in Individuals with Special Needs**

As emotional competence permeates many areas of daily living, researchers have begun to investigate means of addressing these need areas in individuals with ID. For the purposes of this systematic review, only behavioral treatments specific to emotional
outcomes will be discussed, as pharmacological alternatives cannot be prescribed or utilized by the intended audience of this paper.

Considering the need for interventions within the emotion domain, relatively few articles outline techniques for addressing this goal area. However, literature supports developing interventions and being aware of the emotional outcomes of individuals with special needs. For example, Pellitteri and colleagues (2006) suggest that emotion regulation influences attention, which can affect learning and responding appropriately to social situations. While these authors propose an environmental-based intervention (i.e., that environments should be manipulated in order to provide the most enriching and supportive environment), other researchers have proposed more direct approaches to addressing the emotional outcomes in individuals with special needs.

**Self-monitoring, Behavior Modification, and Education for Individuals with Special Needs**

Research has shown that most behavioral interventions for adults with ID address anger management, often through instructional techniques and self-monitoring (Brosnan & Healy, 2011; Singh, Lancioni, Winton, & Singh, 2011). These behavior modification techniques are used to identify the function of the aggressive behavior and modify it, with the goal of eventually reducing the undesired behavior and replacing it with a more adaptive and socially acceptable one. Self-monitoring is often identified as an effective tool for increasing on-task behavior, particularly during academic tasks, for increasing compliance toward authority figures (Coughlin, McCoy, Kenzer, Mathus, & Zucker, 2012; Wadsworth, Hansen, & Wills, 2015), and for increasing independence and problem-solving within an academic setting (Miller & Taber-Doughty, 2014).
One study proposed the use of a “Stop, Think, Relax” model for self-monitoring and anger management with individuals with ID (Chapman, Shedlack, & France, 2006). The premise of this program is to provide the adults with ID a simple, easy-to-remember technique to incorporate during instances of anger. The researchers taught the technique in a group setting, where individuals were encouraged to “stop” (i.e., self-monitor or utilize staff-monitoring to cease the inappropriate expression of a negative emotion), “think” (i.e., consider an alternative way to behave in the situation, which may or may not have been taught during the group), and “relax” (utilize a relaxation technique, such as progressive muscle relaxation, taking a deep breath, etc.). Across the three case studies the researchers used to support the technique’s efficacy, results indicated that, when used appropriately, the technique reduced aggressive behaviors in the adult participants with ID. In addition, study results indicated that participants must have the intellectual capacity to understand directions and participate in a cognitively demanding self-monitoring task.

When working with children with special needs, some researchers suggest including parents in educating their children about healthy regulation and expression techniques through examples and active direction (Gerstein et al., 2011). Other studies suggest that providing a concrete external cue for appropriate behavior (e.g., “What would [character’s name] do?” versus “What should you do?”). One such study (Zambo, 2007) describes the use of social narratives to teach children with special needs how to regulate their emotions and appropriately express their emotions. In this theoretical paper, the author describes how social narratives could be used effectively to explain to students how to identify emotions in themselves, and how to regulate them. Although this topic
has not been explored much in the literature, the available studies are encouraging, as one study showed how the use of a social narrative tailored for identifying emotions was successful in teaching a boy with Asperger’s syndrome to name emotions in himself and other people (Bernad-Ripoll, 2007).

Singh et al. (2011) presented a study on mindfulness approaches to emotion regulation in adults with ID. However, in contrast with other studies where the intervention is facilitated by a TD individual, the mindfulness practitioner in this study was a man diagnosed with ID who learned and utilized mindfulness techniques to monitor and remediate his anger. During the course of the study, three of his peers learned the mindfulness techniques from him and began using them. Pertinent results showed decreased self-reported instances of anger and aggressive behavior across all the three participants. Staff members also reported no anger or aggressive acts from the three participants during the course of the study, although the researchers did not report on the statistical significance of these results. It should be noted, however, that this type of intervention requires a certain level of cognitive ability and would not be appropriate with other populations or with individuals unable to intellectually handle the cognitive load inherent in mindfulness practice. Thus other treatment options for individuals with ID must also be examined.

Summary

Addressing emotional competence, which includes emotion regulation, may have a profound impact not only on the quality of life and social experience of an individual with special needs (Dosen, 2005; La Malfa et al., 2009; MacDonald, 2016), but also on their ability to interpret complex social situations and live independently (Baurain &
Individuals with special needs may demonstrate problematic behaviors due to poor emotion regulation and overall emotional development, which not only affects social interactions, but also learning and other cognitive abilities (Baurain et al., 2013; Gerstein et al., 2011; Graziano et al., 2007; Knörzer et al., 2016; Sappok, 2014; Tsiouris et al., 2011).

While overall developmental age affects emotional development and emotional competence in individuals with special needs (Baurain & Nader-Grosbois, 2013; Baurain et al., 2013), and conflicting information exists about the role cognitive and verbal development play in emotional competence (Berkovits et al., 2017), emotional outcomes for these individuals are still worth examining. Individuals with special needs may benefit from programs that modify these behaviors toward ones that are more adaptive to everyday living. The overall importance of emotional outcomes on areas of functioning suggests that treatments addressing emotional outcomes could benefit the well-being, life skills, and behavioral, academic, and social needs of children with special needs.

Considering the effect emotional outcomes can have on other areas of functioning, relatively little research exists describing effective interventions for addressing the emotional outcomes of children and adolescents with special needs (Pellitteri et al., 2006). Available literature suggests that adults with ID participate in various emotion regulation treatments. These treatments may emphasize behavior modification through self-monitoring and redirection, which positively influence on-task behaviors, interactions with authority figures, independence, and problem-solving skills (Brosnan & Healy, 2011; Coughlin et al., 2012; Miller & Taber-Doughty, 2014; Singh et
al., 2011). Other interventions include mindfulness-based training (Singh et al., 2011) designed to decrease aggressive behaviors and foster appropriate interactions with others, and some advocate for education of individuals with special needs either through interactions with caregivers (Gerstein et al., 2011) or through social narratives (Bernard-Ripoll, 2007; Zambo, 2007).

While the results of these studies are encouraging, there are limitations. For example, the treatments extended to only one facet of emotional outcomes (emotion regulation), and the therapy techniques used required participants to have a certain level of cognitive ability in order to execute and benefit from treatment. The studies that address emotion regulation were also conducted with adults with a higher level of cognitive ability, so results might not generalize to other age groups or cognitive levels. In order to appeal to a wider range of emotional outcomes and intellectual ability, other therapy modalities should be examined. Music is one such potential treatment option, as it is commonly used to address the emotional outcomes in individuals throughout one’s lifespan (Hoyle & McKinney, 2015; Saarikallio & Erkkilä, 2007; Sena Moore, 2013; Thompson & McFerran, 2015).

**Music and Emotion Processing**

The study of the effect of music and other arts on emotions has been a topic of interest since the late nineteenth century (Sena Moore, 2016) as philosophers and researchers grappled with defining emotions and understanding the influence arts have on their experience and expression. As stated above, music and music-based interventions have been used to facilitate emotional processes in both clinical and non-clinical populations (Gebhardt et al., 2014; Saarikallio, 2010; Saarikallio & Erkkilä, 2007). As a
precursor to exploring how music has been used as a treatment medium, it is important to understand the connection between music and emotion processes.

One such philosopher, Daniel Berlyne (1971), proposed that art and music exist to induce or influence the experience of emotions. In order to understand multifaceted aesthetic experiences, Berlyne proposed that the complexity of a presented task influences arousal, as the difficult task may challenge an individual’s existing cognitive processes. For instance, when presented with stimuli that are too complex for the individual to effectively process or are too unfamiliar to understand easily, arousal may increase to an unpleasant level (i.e., the individual may experience an unpleasant emotional reaction). If unpleasant enough, the task may eventually be considered aversive, and the individual may avoid the task altogether (Berlyne, 1971). Conversely, a stimulus that is too simple or familiar lowers arousal levels and decreases feelings of pleasure. Therefore, in order to optimize the performance of a task, the complexity must be carefully balanced based on the abilities of the individual in order to avoid frustration or complete aversion toward a task. If left unchecked, inappropriate arousal levels may become strongly associated with certain tasks. If this occurs, unpleasant emotions may be induced by an unfamiliar stimulus that is reminiscent of a stimulus from a past emotional experience (Berlyne, 1971; Sloboda & Juslin, 2001).

Thus, an individual may become frustrated before attempting a new task, which may influence behavior toward the task, the individual, or others. Learned behaviors stemming from frustration can have detrimental effects on an individual’s life, as the maladaptive skills may be generalized and thus interfere with tasks that are cognitively demanding (Berlyne, 1971), such as formal education, social interactions, or other daily
living skills. For example, an individual with ID in school may be presented with an academic task that is too complex, eliciting a negative emotional response. If presented with this type of task often, or if the task results in a particularly unpleasant consequence, the individual may decide to not attempt academic tasks in other subject areas in order to avoid similar unpleasant spikes in arousal.

Theoretically, music may help in large part by altering task complexity to be more manageable. In other words, by organizing the incoming information into simpler and more understandable portions through the structural properties of music, frustration may be mediated. This, in turn, improves the likelihood of the individual understanding and retaining the learned information.

Organizing individual music sounds into one cohesive “whole” (or Gestalt) is an effective means of perceiving and processing music stimuli (Lipscomb, 1996). Structuring this incoming auditory information through the five categorical principles of proximity, similarity, common direction, simplicity, and closure allows the brain to more efficiently process what it is hearing. Imposing structure is considered essential to music listening (Lipscomb, 1996), and Gestalts can be used for both melodic and temporal (rhythmic) information. For example, an eight-note Western diatonic scale would be perceived as one “closure” gestalt, as to take away the final note would result in a strong expectation to fill in the additional information. Rhythmically, the first three beats of Ukrainian Bell Carol (also known as Carol of the Bells) may be perceived as one “similarity” Gestalt, especially as the pattern repeats during the song. By organizing smaller portions of music (e.g., melodic notes or rhythms) into larger, cohesive wholes,
the brain is better able to perceive, encode, and retain the information contained in the music (Lipscomb, 1996; Wallace, 1994).

Berlyne (1971) suggests that clear organization of a task will not only structure the information into more understandable sections, but will also lower arousal levels by manipulating the perceived difficulty of the task, which further helps support information processing. For example, rhythm’s organizational properties may work to both increase and decrease arousal levels as needed (Berlyne, 1971). By differentiating patterns of information while maintaining temporal rhythmic patterns, an overarching structure is imposed on otherwise ambiguous information, enhancing information encoding. This organization will result in a regulation of arousal levels, influencing the emotional reaction toward a cognitively demanding task. As research has demonstrated, regulation of emotions (or arousal) can influence cognitive, behavioral, and social needs of an individual (Baurain et al., 2013; Baurain & Nader-Grosbois, 2013; Graziano et al., 2007), including modifying arousal and organizing cognitively demanding tasks, among others, for individuals with special needs. Additionally, associations made between music and the learning task may be more pleasant than learning tasks without music (Berlyne, 1971), and so may promote approach behaviors in individuals with special needs.

**Neural Mechanisms Underlying Music-induced Emotions**

In addition to exploring the connection between music and arousal as a way to lower cognitive demand, researchers are also interested in exploring the neural mechanisms underlying music-induced emotions. Current research suggests that many neural structures are active when experiencing music-induced emotions, including the
frontal cortices, the amygdala, the hippocampus, the hypothalamus, and structures within the limbic system, among others (Koelsch, 2014).

Other researchers have focused on determining differences in brain activation patterns when experiencing positive and negative emotions. In one such study, participants listened to orchestral pieces that depicted joy, happiness, fear, and sadness while undergoing EEG scans. Results showed that positive emotions tended to be lateralized in the left hemisphere and negative emotions tended toward right hemispheric activation. Additionally, during positive-emotion music, frontal activation was significantly greater in the frontal cortices during positive-emotion music than during negative-emotion music. The researchers concluded that the experience of emotions are lateralized, although the nature of the study did not focus on activation in specific brain areas (Schmidt & Trainer, 2001).

To that end, Trost, Ethofer, Zentner, and Vuilleumier (2012) used fMRI to explore brain areas activated when listening to music categorized into four main groups: happy/power/joy, peaceful/nostalgic/tender, tension, and sadness. Results showed significant activation in the bilateral superior temporal gyrus (STG), the left ventral striatum, and the insula during happy-emotion music, and significant activation in the bilateral STG, the right caudate nucleus, the precuneus, the cerebellum, and the motor and premotor cortices during tension-emotion music listening. When participants listened to sad-emotion music, scans showed significant activation in the right parahippocampus and the anterior cingulate cortex, whereas peaceful-emotion music elicited additional activation in the right ventral striatum, the hippocampus, and the medial orbitofrontal cortex, among other areas. These results tentatively provide support that emotions are
processed laterally based on valence (positive or negative), and indicate that certain
neuroanatomical areas are active for specific emotions.

In another fMRI study, participants used a visual analogue scale to rate musical
excerpts from 0 (sad) to 100 (happy). Participants then underwent fMRI scans while
listening to the music excerpts that were rated as having the clearest emotional salience
for happy, sad, and neutral emotions. Relevant results showed that happy-emotion music
corresponded to activation in primarily left hemisphere structures, including the superior
frontal gyrus (SFG), medial frontal gyrus (MFG), anterior cingulate cortex,
parahippocampal gyrus, and precuneus. Other areas active during happy-emotion music
were the bilateral ventral striatum and areas associated with auditory processing.
Interestingly, sad-emotion music corresponded to bilateral activation, including the left
MFG, the left posterior cingulate gyrus, the left cerebellum, and the right hippocampus
and amygdala. The researchers concluded that the areas active when listening to the
emotionally salient music excerpts were the brain structures associated with rewards, and
the appraisal and processing of emotions (Trost et al., 2012). In other words, relevant
music to a listener is experienced as pleasurable, possibly making a difficult task seem
more approachable or attractive to an individual with ID.

**Overlap in neural mechanisms underlying emotion induction and music-
induced emotions.** The above research suggests neuroanatomical activations during the
processing of emotions in music. While results do not show conclusively whether
positive and negative music emotions are processed laterally, clear patterns of activation
are available. With the exception of the amygdala, which is associated primarily with
emotions; the thalamus, which is associated with sensory input; and the hippocampus,
associated with memory; the majority of active neural structures are within the frontal cortex. These include the anterior cingulate cortex, MFG, and ventral striatum, among others. However, research does suggest that negative music emotions may exclusively elicit strong activation in the thalamus, the hippocampus, and the amygdala, unlike when processing positive music emotions, which does not activate these areas as strongly.

The presence of neurologic overlap between emotions experienced both with and without music induction may infer generalization of music treatments and non-music goals. As the above research has shown, the prefrontal and frontal cortices, the limbic system and proximal areas, and the cerebellum are the three main areas in the brain are active both when processing emotions induced by music or by other means. Within the limbic system, the amygdala, the thalamus, and the hypothalamus are active, as well as the nearby anterior and posterior cingulate cortex and anterior temporal pole. Additionally, within the frontal cortices, the superior temporal gyrus, medial frontal gyrus, and anterior frontal pole are active when processing both music and non-music emotions.

While more neuroanatomical areas are active when processing music-induced emotions than when processing emotions not induced by music, the above common areas represent brain areas responsible for the experience of emotions and cognitive processing of information. Although these fMRI studies were performed on adults, the common areas activated when processing general and music-induced emotions provide a theoretical neurological foundation for the use of music to address emotional outcomes for individuals with special needs of all ages, and support the use of music to treat emotional outcomes.
Music as a Treatment for Addressing Emotional Outcomes in TD and Clinical Populations

The use of music as a treatment option for addressing emotional outcomes is not new; in fact, study results indicate that music may be effective in addressing emotion expression and regulation for both typical and clinical populations. One study with typically developing adolescents examined the use of music on emotion regulation (Saarikallio & Erkkilä, 2007). Within the context of a semi-structured interview in a group setting, adolescents were asked to discuss their music habits in relation to their emotions. Patterns that emerged through this investigation showed that music affected the valence (i.e., positive or negative) and intensity (i.e., high or low) of the experienced emotion. More specifically, results indicated the music helped strengthen positive feelings and reduce negative ones.

Participants also described the music as providing a way to experience and express strong emotions in ways that were socially appropriate (e.g., through movement or the feeling of enhanced physiological experiences), especially when experiencing emotions that may have otherwise elicited an aggressive response. Additionally, music was used to address other emotional outcomes, such as in supporting the expression of strongly felt positive emotions and facilitating moments of quiet contemplation. From these results, the authors concluded that the use of music was effective in the healthy experience and expression of negative emotions, as well as a means of regulating any strong emotion regardless of valence.

A similar study was completed with adults in middle and late adulthood (Saarikallio, 2010). In addition to collecting data relating to the use of music to self-
regulate emotions, the researcher explored whether the use of music for this purpose changed throughout adulthood. Relevant results indicated that music was used to modify and improve mood through mood vectoring, or the process of matching an individual’s emotion/arousal and altering it by gradually changing the mood of the music (Shatin, 1970). Music was also used to both energize and relax participants, and to maintain positive moods. No significant difference in music usage occurred across the included stages of adulthood, and all participants reported that music provided powerful emotional experiences, regardless of emotional valence of the music. These results are encouraging as they provide evidence to support the use of music to improve mood through the systematic use of music.

Music has also been shown to help regulate emotions in clinical populations, particularly psychiatric patients. In a study by Gebhardt et al. (2014), adults with various psychiatric diagnoses were assessed for global functioning level and use of music during intense emotional experiences. Results showed that the patients’ Global Assessment of Functioning had a significant effect on the use of music for relaxation, arousal modulation, and cognitive problem solving. Although all patients used music for emotional processing, individuals with lower functioning scores used music more often for problem-solving and relaxation than individuals with higher scores. While this study did not report on a specific music treatment, results indicated that the patients’ use of music was used intentionally for emotional outcomes. These results are encouraging for the use of music in addressing emotion itself, and by extension the influence of emotion regulation on cognitive functioning, within clinical populations.
Music has also been used as a self-expressive tool with various clinical populations. In one study with bereaved children and adolescents, songwriting and other music activities were used to assist with emotional expression and coping with the loss of a parent (Roberts, 2006). While the study did not provide statistical information, qualitative results indicated that songwriting was an effective means for the participants to express emotions that they may not have been able to express accurately in words. Additionally, songwriting may have provided a healthy outlet for feelings that may have otherwise had a negative impact on the participants’ behaviors (i.e., “acting out”).

Other studies have likewise focused on the effect of music interventions on self-expression and social behaviors in clinical populations (Ross, 2016). School-age children diagnosed with either an emotional or behavioral disorder, some with comorbid diagnoses, including developmental disabilities, participated in school-based music therapy for one school year. The sessions followed a structured format, and included interventions that facilitated self-expression through adding personal lyrics to a drum improvisation. Results showed that self-expression and instances of appropriate participatory behaviors increased by between 40 and 50% between the beginning and end of the school year. Although the researcher did not conduct statistical analyses of the data, she noted that during the course of treatment teachers reported that students required fewer instances of verbal redirection after completing the music therapy sessions. Additionally, participants demonstrated an overall decrease in inappropriate social behaviors, including aggressiveness, through the course of the music-based treatment.

Further studies have explored a variety of music interventions to aid in self-expression, particularly with the terminally ill (Clements-Cortés, 2004). In a series of
three case studies with terminally ill adults, the researcher used songwriting, singing, improvisation, instrument playing, and other music interventions, to address self-expression goals and to alleviate social isolation, in addition to goals specific to terminally ill patients such as life review. While the study did not provide statistical analysis, results from the case studies showed that all of the participants demonstrated self-expression through the music interventions, which fostered social interactions with the therapist and family members. The researcher suggested that the flexibility of music can provide individualized experiences, which foster participation and, therefore, the achievement of therapeutic goals.

**Summary.** Music has been used successfully with TD populations to modify the valence and intensity of emotions, and to provide and overall increase in positive emotions while decreasing negative ones (Saarikallio, 2010; Saarikallio & Erkkilä, 2007). In particular, music is effective in providing acceptable means to express emotions that may otherwise be expressed in a socially negative way or may result in “acting out” behaviors in clinical populations (Roberts, 2006; Ross, 2016). The success of music interventions was seen across studies with both typically-developing and clinical populations, although with individuals with lower global functioning skills, the use of music to problem solve, express emotions, and modify arousal was significantly greater than with typically-developing populations (Gebhardt et al., 2014). Given the success of music to treat various emotional outcomes in both typical and clinical populations, particularly in individuals with global delays, the success of music to treat emotional outcomes is apparent and warrants further exploration with individuals diagnosed with special needs.
CHAPTER THREE

METHODS

The purpose of this systematic review was to examine the literature available on the systematic use of music to address emotional outcomes in individuals with special needs. Systematic reviews are comprehensive examinations of extant literature related to a specific research or clinical topic (Hansen-Abromeit & Sena Moore, 2014). Due to the quantity of information gathered during a systematic review, these types of studies provide a means for a topic’s pertinent literature to be gathered into one place and meticulously analyzed as a whole. Thus, trends and bias in the field may be realized that may not be apparent during other reviews. Systematic reviews detail clear search and analysis strategies incorporated during the study; this serves the purpose of providing transparency to the research process and thus better inform future research and clinical practice techniques. The search and analysis protocol for this review will follow the guidelines presented in Hanson-Abromeit and Sena Moore (2014).

Search Strategies

To ensure a comprehensive review of literature, the following databases were searched: PsycINFO, CINAHL, ERIC, MEDLINE, PubMed, and Academic Search Primer, as well as the Nordic, British, and Australian Journal of Music Therapy. In addition, the student researcher searched current and archived issues of the Journal of Music Therapy and Music Therapy Perspective articles available through Oxford Press’s online database. Studies considered for this review were published between January 1980 through January 2017, with the intention of including potential literature published after children with special needs were mainstreamed into general education schools following
the implementation of the Education for All Handicapped Children Act of 1975. This milestone legislation may have corresponded with an increased interest in addressing the needs of individuals with special needs, and thus was used to set the range of included studies.

Search keywords included “music and developmental disabilities and emotions,” and “music and special needs and emotions.” Once potential articles had been identified, titles and abstracts were scanned by the student researcher to determine if the study met inclusion and exclusion criteria.

**Article Inclusion Criteria**

Articles that were considered for the current systematic review were required to meet inclusion criteria delineated here. All studies had to be primary research studies in which a music-based experience was used to target an emotional need. Study participants must have a diagnosis of an intellectual or one of the following developmental disabilities that include a cognitive component: autism spectrum disorder, Williams syndrome, Down syndrome, learning disability, cerebral palsy with intellectual disability, and traumatic brain injury. The primary modality used in the intervention must be music. Furthermore, accepted interventions required participants’ active involvement; however, surveys of professionals working directly with individuals with special needs would be considered if the survey focused on uses of music to address emotional needs in those clients. Potential music interventions included, but were not limited to, music listening, music improvisation, singing, or instrument playing, as well as music therapy-specific interventions, such as a Nordoff-Robbins techniques or Neurologic Music Therapy techniques as applicable. However, the music interventions must have be part of a
program to address emotional outcomes; thus a study pertaining to passive music listening during another primary activity was not included (i.e., environmental music therapy).

Although the primary focus of this systematic review is on emotional outcomes, studies with a different primary focus, such as social responsiveness and communication, interpretation of social cues, expression or regulation of emotions, social skills, or independence, were considered and included as long as study results addressed at least one emotion-based outcome. Finally, included studies were published in English and were published in peer reviewed journals. However, to address potential for bias, unpublished yet systematic research, including theses and dissertations, were also considered for inclusion.

**Article Exclusion Criteria**

Articles were excluded from this systematic review if they were theoretical papers, other review studies that did not meet inclusion criteria, or editorials. Studies were also excluded if the primary diagnosis of the participants was a mental health disorder, such as bipolar disorder or depression, even if an intellectual disability was included as a co-morbid or secondary diagnosis. This isolated the emotional outcomes specific to an individual with a primary cognitive deficit, thus clarifying the needs between this diagnosis and others.

Studies were also excluded if they did not specifically report on emotion-based outcomes, even if the domain was influenced by emotion development. Excluded behaviors included the development of production of speech sounds or vocabulary, delays in conversational reciprocity due to other, physical conditions such as hearing or
visual impairments, or behaviors influenced primarily by another primary diagnosis, such as depression, bipolar disorder, or other mental health diagnoses. Methodologies that did not provide any information about the music technique used, or that did not require active participation by the study’s participants (e.g., use of background music) were also excluded.

**Data Collection and Analysis Process**

Due to the systematic nature of this review, data extraction was conducted by the student researcher, with supervision from the thesis supervisor. A table for recording extracted data from included articles was created based on the three research questions. Data extracted included: participant characteristics (gender, age, primary diagnosis, and whether diagnosis was congenital or acquired), study information (research design, research questions, treatment/survey), characteristics of the music interventions (duration of intervention, music used, genre, type of experience, other descriptive information about the treatment), characteristics of the professional using the music intervention (professional title, number of professionals facilitating), study setting, and outcomes of the emotional outcomes addressed (emotion expression, emotion regulation, emotion identification).

Extracted data were analyzed for trends in diagnoses, goal areas, music techniques, study and professional demographics, and trends across time. Data were also collected for study setting, duration of the intervention, frequency of the treatment, professional demographics (i.e., description of professional conducting the study), research design, description of intervention/type of music intervention used, primary focus, and participant demographic information.
Quality Assessment and Impact Factor

Included studies were assessed for quality. The student researcher qualitatively analyzed the texts of the studies for clarity of methods and treatment description (Khan, Kunz, Kleijnen, & Antes, 2011). Studies were examined for clear statement of goal area, type of intervention used, music characteristics (i.e., genre, use of live or recorded music), and a description of the treatment process, as well as for inclusion of information on the length of each treatment session, the session frequency, and total number of sessions conducted. Studies that met all these criteria were deemed to have “moderate” clarity. Studies that provided additional information regarding duration and frequency were classified as having “high” clarity. Studies that provided unclear information or no information in these areas were deemed as having “low” clarity.

For example, a study conducted by Paul (2008) was rated as “high” quality. Although study results did not include statistical analyses, the methods section included clear information on the name and genre of music used in the study, as well as the duration of each listening selection conducted with participants. Additionally, the researcher provided an example of the script used, as well as clear information regarding data collection and analysis procedures. By providing pertinent information regarding the intervention and study procedures, this article was rated as having a “high” level of quality based on the transparency of its description.

In addition to conducting a quality assessment, one-year impact factors for each journal that had an article included in the study were examined. The impact factor of a journal is its citation rate, or the number of times articles from that journal are cited (Seglen, 1997). This number is determined by comparing the total number of articles...
published by a journal in a year to the number of articles from that journal cited by other works in the same year (Garfield, 1999). While the classification of impact factors (i.e., low, moderate, and high impact) changes from field to field (Seglen, 1997), it is common practice in the behavioral sciences to consider an impact factor above 2.000 as high impact. While the use of impact factors as a means to assess journal quality has been questioned recently (Garfield, 1999; Kurmis, 2003; Seglen, 1997), others support the use of impact factors to assess the quality of publications (Kurmis, 2003), as professional – yet qualitative – ratings of articles tend to be positively correlated with impact ratings (Saha, 2003). As impact factor is still a trusted means of assessing article quality, this systematic review included this information during the article quality assessment process.

Search and Inclusion Results

As illustrated in Figure 1, the search yielded a total of 284 studies considered for inclusion in the systematic review. After screening study titles and abstracts, only 44 studies met inclusion criteria. Studies were excluded when the target diagnosis did not affect the cognitive domain, the study was a professional topic or theoretical paper, was a book chapter or review, or was a systematic (or similar) review paper, among other reasons illustrated below. Following this preliminary screening, each full-text article was read and assessed for admissibility. At this stage, studies were excluded for the following reasons: failing to address an emotion outcome, being a duplicate of another article, or not being available through an online database or via the University of Miami’s Interlibrary Loan service. This resulted in 18 total studies included in the final systematic review (Appendix A).
**Articles Identified Through Database Search** (*n* = 171)
- PsycINFO (*n* = 50)
- Academic Search Primer (*n* = 42)
- PubMed (*n* = 25)
- *Australian Journal of Music Therapy* (*n* = 16)
- CINAHL (*n* = 13)
- ERIC (*n* = 10)
- Medline (*n* = 10)
- *Nordic Journal of Music Therapy* (*n* = 4)
- *Arts and Psychotherapy* (*n* = 1)
- *British Journal of Music Therapy* (*n* = 0)

**Articles Identified Through Oxford Press Search** (*n* = 113)
- *Music Therapy Perspectives* (*n* = 72)
- *Journal of Music Therapy* (*n* = 41)

**Studies Excluded** (*n* = 240)
- Diagnosis does not affect cognitive domain (*n* = 74)
- Professional topic (*n* = 46)
- Theoretical (*n* = 22)
- Book chapter/review (*n* = 20)
- Other (*n* = 20)
- Systematic/literature/historical review (*n* = 18)
- Assessment tool (*n* = 13)
- No emotional goal reported (*n* = 9)
- No music as treatment (*n* = 8)
- Other language (*n* = 6)
- TD population only (*n* = 4)

**Full-Text Articles Excluded** (*n* = 26)
- No emotional goal reported (*n* = 17)
- Article not available through Interlibrary Loan (*n* = 4)
- Duplicates (*n* = 5)

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*Figure 1.* Study selection flow chart.
CHAPTER FOUR

RESULTS

Characteristics of Included Studies

The publication dates of included studies ranged from 1986 to 2016, with one study being conducted between 1986 and 1996, three studies between 1997 and 2006, and 13 studies between 2007 and 2016 (Figure 2). The number of published studies fluctuated from year to year (Figure 3), with a spike in studies occurring in 2015.

Across all eighteen studies, 56% had a music therapist as the facilitating professional, and 11% had a music therapist-designed intervention that was facilitated by a non-music therapist. Thus, 67% of the included studies involved a music therapist in a meaningful way. The remaining studies (22%) did not specify a facilitating professional or were surveys. However, in the eleven studies published in journals specific to music or music therapy, seven (64%) had a music specialist or music therapist facilitating the treatment, three (27%) had either a music therapist as a co-facilitator or who had designed the treatment, and one (9%) consisted of a psychologist collecting data from a choir led by a musician. Of the remaining seven studies published in non-music or – music therapy journals, three (17%) utilized a music therapist or musicians during the study. Two surveys were included in this systematic review (11%), as they collected data pertaining to how music is used by individuals with special needs for emotional outcomes. Seven of the remaining sixteen studies (49.5%) did not include statistical analysis or the results. This means that approximately 60% of studies relating to the treatment of emotional needs with music were not quantitative research studies.
Figure 2. Number of music-based studies addressing emotional competence in individuals with special needs across decades. This figure demonstrates the recent increase in studies pertaining to the treatment of emotional outcomes in individuals with special needs.
Figure 3. Number of studies addressing emotional competence published year to year (1986-2016). The number of studies examining the treatment of emotional outcomes with music has been irregular, with an increase of studies completed in 2015 decreasing in 2016.
Figure 4. Age groups of participants represented in included studies. Infants/toddlers were only present in one study included in this analysis.
Regarding populations, school-age children (ages 5 to 12 years) were the most often treated, with eight studies (42%) reporting results for that age group. Adolescents (13 to 18 years) and adults (over 18 years) each were included in four (21%) studies, and infants/toddlers (0 to 4 years) were included in one study (5%), as illustrated in Figure 4. The remaining studies either did not specify an age or were surveys.

**Quality Assessment and Impact Factor**

Quality assessment for included studies ranged from “low” to “high,” with 11 of the included 18 studies (67%) deemed of “high” quality as they provided descriptions of goal areas, treatment protocol, intervention and music characteristics, and length and duration of sessions. Four studies (22%) fell within the “moderate” range, with studies lacking details pertaining to length and duration of sessions. The remaining two studies did not have clear descriptions of treatment protocol, music characteristics, or session lengths and durations, and were thus deemed “low” quality.

Of the ten studies that focused on active treatment, five (50%) were of “high” quality, two (20%) were of “moderate” quality, and the remaining three did not provide the clear details mentioned above to fall within the moderate or high quality designations. Stated differently, studies that were both active treatment and provided high quality descriptions of methods comprised 33% of all studies collected. Studies examining active treatments that possessed moderate clarity accounted for 11% of the studies, and two studies (11%) were both active treatment studies yet had low clarity.

Additionally, one-year impact factors for each journal that had an article included in the study were examined. Of the 18 included studies, three had high impact factors greater than two (17%), twelve had low impact factors below one (67%), and two articles
had a moderate impact factor that fell between one and two (11%). One journal did not supply an impact factor. These values speak to the quality of the articles available, as well, with 67% of the articles having low impact within the behavior sciences.

**Synthesis of Results by Research Question**

The following results address the three research questions of the current systematic review.

**Research Question 1: How Music was Used**

The first research question asked how music has been used to address emotion identification, emotion regulation, and emotional expression in children, adolescents, and adults with special needs. Music has been used predominantly for emotion regulation (nine studies, or 50%), particularly mood enhancement. Four studies (22%) addressed emotional expression, five studies (28%) focused on emotion identification, and the remaining two studies were surveys. Two studies reported on multiple goal areas (emotional expression and emotion regulation); thus, across the 16 studies that were not surveys, there were 18 instances in which an emotion goal was targeted. Types of emotional outcomes across the three target areas (expression, regulation, and identification) appear specific to disabilities, with 80% of emotion identification studies involving individuals with autism spectrum disorder (Figure 5).

Regarding type of intervention used, listening to music (either live or recorded) was used seven times across all studies, making it the most predominantly used music intervention (Figure 6). However, five of these instances were during basic research (i.e., post-test design) studies for emotion identification, thus they do not represent a treatment of an emotional outcome. Taking this into account, instrument playing was the most
commonly used experience for addressing emotional outcomes (four studies, or 36%) in applied research studies (i.e., studies describing active treatment). Other interventions included singing (27%), improvisation (27%), songwriting (18%), listening (18%), and music and movement (9%; see Figure 7).

As indicated in Figure 8, type of study conducted is inconsistent throughout the past 30 years, with designs ranging from qualitative, to post-test only, to empirically-designed studies with pre- and post-test designs.

Ten studies (55%) described therapeutic interventions or treatment programs to address emotional outcomes; two of these ten studies were qualitative in nature, with no statistical analyses performed (in 1986 and 2002). One-third of all eighteen included studies (33%) were focused on collecting data regarding the participants’ natural ability in a particular emotional area, usually emotion identification. These studies did not describe a treatment, but instead sought to compare the accuracy or abilities of a clinical population to either typically-developing peers or other clinical populations.

**Examples of music-based interventions.** Qualitatively, the studies provided information for clinicians regarding potential treatment techniques to address emotion identification, expression, and regulation goal areas. The follow descriptions highlight examples of the types of music interventions that were examined when measuring and addressing emotion identification, emotional expression, and emotion regulation.

For example, when measuring accuracy of emotion identification, participants most often were asked to listen to recordings of classical music before identifying an emotion either verbally or by using a face picture (Brown, 2016; Paul, 2008). When addressing emotion expression goals, researchers commonly utilized active music-
making (e.g., singing, instrument playing, etc.) followed by verbal discussion to process the expression experience (Hopyan, Laughlin, & Dennis, 2010; Ross, 2015).

Emotion regulation interventions employed a variety of techniques. Some research involved using singing or instrument playing to either convey behavioral cues for emotion regulation (Fees, Kaff, Holmberg, Teagarden, & DelReal, 2015; Hoyle & McKinney, 2015), or singing to modify the environment to facilitate an external regulation of emotions (de l’Etoile, 2015).

One study (Carpente, 2016) utilized an improvisatory protocol to address both emotion expression and emotion regulation. The researcher split the intervention into three sections, comprised of validating the participant’s emotional needs, followed by turn-taking experiences, then ending with matching and vectoring the participant’s emotions. The researcher used interventions such as singing, instrument playing, and music and movement to facilitate these phases.

**Research Question 2: Professionals and Settings**

The second research question asked which professionals use music to work toward emotional outcomes in children, adolescents, and adults with special needs, and in which settings. Nine studies (50%) had music therapists as primary facilitators. The remaining nine studies reported primary facilitators as teachers (n = 2), mothers (n = 1), choir directors (n = 1), and certified music specialists (n = 1), or did not specify facilitating professional (n = 2) or reported results from survey participants (see Figure 9). Other professionals involved in the treatment of emotional outcomes but not included in the graphic representation included psychologists (n = 2), mothers (n = 1), nurses, and personal care staff (n = 1).
Figure 5. Emotional goal area by diagnosis. Emotion identification is studied most prevalently with individuals with autism spectrum disorder, although this number includes studies that are measuring ability to identify emotions, as well as any studies that describe treatment interventions for this emotional outcome.
Figure 6. Music interventions for all studies. These music interventions were reported across studies, and include interventions that were not used for treatment (e.g., surveys, post-test only studies, etc.).
Figure 7. Music-based treatment interventions. The above chart illustrates the types of music interventions used in studies that described a treatment for an emotional outcome, and so excludes data from surveys and post-test only studies.
Eight (42%) studies took place in school classroom settings; however, one-third of the studies (n = 6) did not specify the location of the study, although two of these were surveys. Other locations included residential care facilities (16.6%), inpatient rehabilitation centers (5.5%) and other locations (e.g., community centers, etc.) (5.5%), as shown in Figure 10.

**Research Question 3: Historical Implementation**

The third research question asked how the use of music to address emotional outcomes in children, adolescents, and adults with special needs has changed over the years. Emotion-based goals began to appear more consistently beginning in the late 1990s. However, studies that address emotion-based outcomes continue to be published inconsistently, with interest increasing in recent years. Figure 2 indicates that the interest in emotional outcomes has dramatically increased over the past three decades. However, this systematic review showed an increase in studies from the year 2015 (which may have contributed to this rise in number of studies), followed by a slight decrease in 2016. Overall, when examined year-by-year (Figure 3), the number of studies addressing emotional outcomes in individuals with special needs has fluctuated.

Likewise, type of goal studied over time has been inconsistent, although emotion regulation has gained more interest in the past few years (Figure 11). An analysis of these studies shows that 44% of the nine studies addressing emotion regulation did not use statistical analysis. Of the five studies that provided statistical information, one was post-test only, indicating that of these nine studies, only 45% examined a treatment in a quantitatively measurable way. Additionally, statistical analysis was only performed for 50% of the studies included in this systematic review.
Figure 8. Study design by year. “Post-test only” refers to studies that only had a one-time measure (e.g., de l’Etoile, 2015), which did not provide a treatment, but measured a clinical outcome of an intervention after one visit. “Treatments” include interventions across a few sessions, and “surveys” gathered information from secondary sources regarding the clinical use of music with this systematic review’s target population.
Figure 9. Music intervention facilitator. Other facilitators included mothers of infants (de l’Etoile, 2015), and a choir director (Dingle et al., 2013). Survey results from Jackson (2007) were not included as the results were not clear enough to determine how many professionals were surveyed from the targeted professions. The survey conducted by Allen, Hill, and Heaton (2009) was also not included, as the survey did not specify facilitating professionals.
Figure 10. Study settings. Other settings included community centers or church halls.
Figure 11. Emotion behavior needs addressed since 1986. The use of music for emotion regulation and emotion identification have been studied most frequently in the past 30 years.
CHAPTER 5
DISCUSSION

The purpose of this systematic review was to analyze and summarize extant research on the systematic use of music to address emotional outcomes in children, adolescents, and adults with special needs affecting cognitive functioning. Results were intended to both examine possible treatment applications of the findings and to analyze available research for common findings and patterns. Findings from this systematic review demonstrate that music has been used effectively to address emotion regulation and emotional expression, as well as glean information regarding emotion identification. Although music therapists are commonly the primary facilitating professionals, teachers, psychologists, and nurses have also reported on the use of music for treating emotional outcomes. The topic of emotional outcomes has begun to gain popularity in recent years, with studies being published with more fluency over the past decade than over the past thirty years.

The majority of studies were conducted with children in a school setting, with many of these studies examining the ability of children with autism spectrum disorder to correctly identify emotions in music. This topic seems to be of particular interest in the included studies (Brown, 2015; Heaton, Allen, Williams, Cummins, & Happe, 2008; Paul, 2008; Whipple, Gfeller, Driscoll, Oleson, & McGregor, 2015), although most studies indicate that the ability to identify emotions in individuals with autism spectrum disorder is not significantly different from individuals without autism spectrum disorder, especially when verbal intelligence is controlled for (Whipple et al., 2015, Quintin et al., 2011). While understanding the accuracy of individuals with ASD to identify emotions is
important, these studies continue to support knowledge that is already available and yet do not offer information regarding the treatment of emotional needs like regulation or expression, or how to improve identification accuracy, if needed.

Other patterns in the literature emerged, as well. Most often, music therapists were the music treatment facilitators, although classroom teachers and other professionals like choir directors also facilitated music interventions (Dingle, Brander, Ballantyne, & Baker, 2013). The types of music interventions used tended to be associated with the emotional outcome being addressed, with instrument playing and music listening used for emotion regulation; songwriting, singing, and song discussion used for emotional expression; and music listening used for emotion identification.

Other studies were coded as “post-test only,” in which participants were tested once at the end of the study, and so did not have baseline (pre-test) data to compare results (Brodsky & Niedorf, 1986; de l’Etoile, 2015; Fees et al., 2015; Graham, 2004). While this sort of study design is helpful when beginning to explore a research topic previously unexamined, as more of these studies are published, a transition to more treatment-based, or pre-test/post-test designed studies, will further the available knowledge on how to effectively and systematically use music to address emotional needs in individuals with cognitive deficits.

Over the past three decades, the frequency of studies conducted examining the systematic use of music to address emotional needs in individuals with special needs has increased, even if the number of studies published per year on this topic has not drastically increased. The sudden increase in studies in 2015 may have been a result of this slow rise in interest, as researchers may have begun to see studies performed in this
area that left lingering questions about the accuracy or efficacy of treatments in clinical populations (Brown, 2016; de l’Etoile, 2015). For example, many of the studies relating to emotion regulation tended to address the needs of individuals with potentially higher cognitive abilities, either due to diagnosis (e.g., learning disability) or severity (e.g., individual with intellectual disability who can participate in song discussions) (Dingle et al., 2013; Hoyle & McKinney, 2015; Montello & Coons, 1998; Ross, 2015; Rossiter, Slaney, & Tulloch, 2011), although this was not always the case (de l’Etoile, 2015; Fees et al., 2015; Magee & Davidson, 2002).

Other emotional outcomes are associated with different diagnoses, in particular autism spectrum disorder and emotion identification (Brown, 2016; Heaton et al., 2008; Paul, 2008; Whipple et al., 2015). The accuracy of individuals with autism spectrum disorder to correctly identify emotions in music has been reported, across multiple studies, to not be significantly different from typically developing peers (Heaton, Hermelin, & Pring, 1999; Quintin et al., 2011). However, this research aim continues to be an area of interest for researchers. While this may speak to a desire to understand how individuals with autism spectrum disorder process emotions, the three skills of emotion identification, expression, and regulation are linked (APA, 2013a; Juslin & Sloboda, 2011; Saarni, 1991) and all should be addressed in these clinical populations.

The reviewed studies do not examine how populations with lower cognitive abilities or more complex emotional needs (e.g., autism spectrum disorder, severe intellectual disability, etc.) may benefit from music to regulate emotions. As clinicians work with individuals with varying levels of cognitive ability and with varying emotional needs, research must be made available to examine and explain effective treatments for
clients at any ability level. In other words, future research should begin to focus on using music to treat the emotional needs of individuals with more severe diagnostic symptoms, in order to glean an effective means of addressing these important social-emotional skills across all ability levels.

Recently, researchers have been calling for more transparency when describing the methods used during music-based interventions (Robb, Burns, & Carpenter, 2011; Sena Moore, 2013). Although the assessed quality of the studies included in this systematic review was high overall, this caliber of treatment and methods transparency was not consistent across goal areas. For example, in general the studies examining emotion expression and regulation had the least amount of clear and replicable descriptions of music interventions. As emotion identification, emotional expression, and emotion regulation are important clinical needs that can affect life skills and other areas of functioning (Miller & Taber-Doughty, 2014; Roberts, 2016), further clear and systematic descriptions of treatments for these clinical need areas is warranted.

Additionally, a majority of the studies came from journals reporting low impact scores, which is used for reporting how often articles in a journal are cited, compared to the total articles published by the original article’s journal (Garfield, 1999). For the purposes of this review, impact factors of the included journals were used to draw further conclusions regarding the quality of the included studies. So, while articles were assessed as being high using the criteria for this review, the included articles were published in journals with relatively low impact, which may or may not speak to their quality when compared to other research in the behavioral sciences (Garfield, 1999; Seglen, 1997). This perceived quality impacts how confidently study results can be generalized, and may
influence the significance of the results from this systematic review, thus affecting the confidence of applying these music treatments clinically.

**Implications for Clinical Practice and Future Research**

Results from this systematic review have demonstrated an interest in using music to address various emotion outcomes in individuals with special needs. From these findings, clinicians may better understand which interventions are effective for addressing emotion identification, emotional expression, and emotion regulation needs in individuals with diagnoses that affect cognitive functioning. Historically, reporting on the success of music-based treatments has been anecdotal (Allen et al., 2009; Brodsky & Niedorf, 1986; Fees et al., 2014; Graham, 2004; Jackson, 2007). This qualitative interest demonstrates a clinical interest in the use of music to address emotional outcomes with individuals with special needs. Furthermore, as the qualitative results from the included studies have been positive, clinicians may use these and other studies (Carpente, 2016) as examples of successful interventions to target these goal areas.

While the anecdotal and qualitative results of the above-mentioned studies are promising for clinical purposes, they also serve as a call-to-action for researchers and clinicians alike to design interventions that can be quantitatively measured. Occasionally, researchers will pose that music therapy need not be – and cannot be – examined through the lens of the “medical model” adapted by other therapies and helping professions (Aigen, 2015). While it is outside the scope of this paper to discuss the theoretical implications of this argument, researchers should not be dissuaded from measuring outcomes before and after treatments in quantitative ways, as even the most improvisatory sessions may be documented in this way (Carpente, 2016).
The foci of research may also begin to shift from the information-gathering style of post-test studies and surveys to more applied research, particularly with populations such as autism spectrum disorder and with more severe cases of intellectual disability. This will provide more information regarding the treatment of emotional outcomes in individuals with more complex cognitive and emotional needs, in order to serve a wider variety of abilities and needs than the studies included in this review.

**Limitations**

One major limitation to this review was the lack of pertinent literature. While eighteen studies were assessed as meeting all inclusion criteria, the low number of research articles also makes generalization of the results and emergent trends and patterns difficult. One possible reason for this limitation is that the search criteria did not take into account variations of the term “emotion,” such as “affect” or “mood,” or other interpretations of the other search terms (e.g., “perception” in addition to “identification”) which may have resulted in fewer studies being included in this review than are available (e.g., Heaton et al., 1999; Quintin et al., 2011) Another limitation was that the studies assessed for inclusion needed to be available through an online university database or available through an interlibrary loan system. Due to this, some studies that may have been appropriate for inclusion were not available to be fully assessed for inclusion (e.g., Drapeau, Gosselin, Peretz, & McKrkal, 2017; Silber, 2008).

**Conclusions**

In conclusion, results from this systematic review indicate that the systematic use of music may have a positive impact on emotional outcomes of children, adolescents, and adults with special needs, particularly needs that affect the cognitive domain. Results
indicate that interventions such as instrument playing, singing, and music listening, among others, are effective for addressing emotion regulation and emotional expression needs, and that individuals with special needs are as accurate as typically developing (and cognitively-matched) peers when identifying emotions in music (Hopyan et al., 2010; Paul, 2008). While qualitative outcomes have been positive, and are encouraging for clinical practice, further quantitative and empirical studies are needed to better represent the efficacy of music when addressing emotional outcomes. Overall, when used systematically, music interventions appear to be effective when focusing on emotional outcomes, and a recent increase in studies published on this subject reflects an increase in interest in this area.

As indicated, the results of this review are preliminary and require additional study. Future research can further explore the use of music to address emotional expression and emotion regulation in populations with more severe cognitive and emotional needs (e.g., autism spectrum disorder, more severe intellectual disability, etc.). These studies may begin to move away from the information-gathering “post-test” model to more empirically-based models, or models that examine the efficacy of specific music interventions. This review provides preliminary support for the systematic use of music to address emotional outcomes in individuals with special needs, but further research is needed as this area of interest continues to be addressed in clinical settings.
References


## Appendix A

### Summary of Included Studies by Goal Area

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Journal (1-year Impact Factor)</th>
<th>Database</th>
<th>Music Intervention Facilitator(s)</th>
<th>Study Setting</th>
<th>Participant Characteristics</th>
<th>Music Intervention Characteristics</th>
<th>Study Outcomes</th>
<th>Type of Emotion Skill</th>
<th>Quality</th>
</tr>
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<tbody>
<tr>
<td>Brown, 2016</td>
<td><em>Journal of Music Therapy</em> (0.786)</td>
<td>OUP online archives</td>
<td>Music therapist</td>
<td>School</td>
<td>Children (n = 20) Diagnosis: Autism spectrum disorder Typically developing control (n = 30)</td>
<td>Music listening Recorded music Classical genre</td>
<td>No statistically significant difference between groups</td>
<td>Emotion identification</td>
<td>High</td>
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<tr>
<td>Heaton, Allen, Williams, Cummins, &amp; Happe, 2008</td>
<td><em>British Journal of Developmental Psychology</em> (1.719)</td>
<td>ERIC</td>
<td>Music therapist</td>
<td>School</td>
<td>Children and adolescents Diagnoses: Autism spectrum disorder (n = 29) Downs syndrome (n = 14) Typically developing controls (n = 160)</td>
<td>Music listening Recorded music Classical genre</td>
<td>No statistically significant difference between groups. Clinical population scored lower than neurotypical peers</td>
<td>Emotion identification</td>
<td>High</td>
</tr>
<tr>
<td>Author, Year</td>
<td>Journal (1-year Impact Factor)</td>
<td>Database</td>
<td>Music Intervention</td>
<td>Facilitator(s)</td>
<td>Study Setting</td>
<td>Participant Characteristics</td>
<td>Music Intervention Characteristics</td>
<td>Study Outcomes</td>
<td>Type of Emotion Skill</td>
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<tr>
<td>Paul, 2008</td>
<td><em>Journal of Music Therapy</em> (0.786)</td>
<td>Oxford Press Search</td>
<td>Certified music specialist</td>
<td>School</td>
<td>Children (n = 14)</td>
<td>Diagnoses: Autism spectrum disorder, Learning disability, Speech delay, Physical disability (not specified), Attention-deficit/hyperactive disorder</td>
<td>Music listening</td>
<td>Recorded music Classical genre</td>
<td>Results analyzed qualitatively (no statistical analysis performed)</td>
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<td>Results support children can identify emotions in music, regardless of experiencing the feeling</td>
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<td></td>
<td>Significant difference in word count between neurotypical peers and children with special needs.</td>
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<tr>
<td>Author, Year</td>
<td>Journal (1-year Impact Factor)</td>
<td>Database</td>
<td>Music Intervention Facilitator(s)</td>
<td>Study Setting</td>
<td>Participant Characteristics</td>
<td>Music Intervention Characteristics</td>
<td>Study Outcomes</td>
<td>Type of Emotion Skill</td>
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<tr>
<td>Whipple, Gfeller, Driscoll, Oleson, &amp; McGregor, 2015</td>
<td><em>Journal of Music Therapy</em> (0.786)</td>
<td>OUP online archives</td>
<td>Music therapist</td>
<td>Not specified</td>
<td>Children ($n = 24$) Diagnoses: Autism spectrum disorder, Hearing impaired</td>
<td>Music listening Recorded music Researcher-composed music</td>
<td>No statistically significant difference in accuracy across groups overall</td>
<td>Emotion identification</td>
<td>High</td>
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<tr>
<td>Brodky &amp; Nierdorf, 1986</td>
<td><em>The Arts in Psychotherapy</em> (0.695)</td>
<td>PsycINFO</td>
<td>Music therapist</td>
<td>School</td>
<td>Adolescents ($n = 5$) Diagnoses: Cerebral Palsy, Hearing impaired</td>
<td>Song discussion Recorded music Pop genre</td>
<td>No statistical analysis performed</td>
<td>Emotion expression</td>
<td>Low</td>
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<tr>
<td>Graham, 2004</td>
<td><em>British Journal of Learning Disabilities</em> (0.391)</td>
<td>PsycINFO; CINAHL</td>
<td>Music therapist Residential care facility</td>
<td>Adults ($n = 2$) Diagnoses: Learning disability, Speech delay</td>
<td>Singing Live music Unspecified genre</td>
<td>Improvement in target behaviors No statistical analysis performed</td>
<td>Emotion expression</td>
<td>Low</td>
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<tr>
<td>Author, Year</td>
<td>Journal (1-year Impact Factor)</td>
<td>Database</td>
<td>Music Intervention Facilitator(s)</td>
<td>Study Setting</td>
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<td>de l’Etoile, 2015</td>
<td><em>Journal of Music Therapy</em> (0.786)</td>
<td>OUP online archives</td>
<td>Mothers (music therapist designed program)</td>
<td>Not specified</td>
<td>Infants ($n = 15$) Diagnosis: Downs syndrome</td>
<td>Typically developing control ($n = 15$)</td>
<td>Music listening</td>
<td>Live music Unspecified genre (participant-chosen music)</td>
<td>No statistically significant difference between groups</td>
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<tr>
<td>Fees, Kaff, Holmberg, Teagarden, DelReal, 2015</td>
<td><em>Music Therapy Perspectives</em> (0.350)</td>
<td>OUP online archives</td>
<td>Classroom teachers (music therapist designed program)</td>
<td>School</td>
<td>Children ($n = \text{approx.15}$) Diagnoses: Autism spectrum disorder, Downs syndrome, Speech delay, Emotionally disturbed</td>
<td>Singing</td>
<td>Live music Adapted melody</td>
<td>Intervention implemented 18 times over 5 weeks</td>
<td>Emotion regulation</td>
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<tr>
<td>Author, Year</td>
<td>Journal (1-year Impact Factor)</td>
<td>Database</td>
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<tr>
<td>Hoyle &amp; McKinney, 2015</td>
<td><em>Music Therapy Perspectives</em> (0.350)</td>
<td>OUP online archives</td>
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<tr>
<td>Magee &amp; Davidson, 2002</td>
<td><em>Journal of Music Therapy</em> (0.786)</td>
<td>OUP online archives</td>
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<td>Montello &amp; Coons, 1998</td>
<td><em>Journal of Music Therapy</em> (0.786)</td>
<td>OUP online archives</td>
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<table>
<thead>
<tr>
<th>Music Intervention Facilitator(s)</th>
<th>Study Setting</th>
<th>Participant Characteristics</th>
<th>Music Intervention Characteristics</th>
<th>Study Outcomes</th>
<th>Type of Emotion Skill</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Music therapist</td>
<td>Residential care facility</td>
<td>Adults (n = 3) + Diagnoses: Intellectual disability, with emotional or behavioral issues</td>
<td>Instrument playing + Song discussion</td>
<td>No statistically significant changes in behavior + Improvements in behavior reported</td>
<td>Emotion regulation</td>
<td>High</td>
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<tr>
<td>Music therapist</td>
<td>Inpatient rehabilitation center</td>
<td>Ages not specified (n = 14) + Diagnoses: Traumatic brain injury</td>
<td>Improvisation + Instrument playing + Live music + Unspecified genre</td>
<td>Statistically significant improvement in target behaviors</td>
<td>Emotion regulation</td>
<td>Moderate</td>
</tr>
<tr>
<td>Music therapist</td>
<td>School</td>
<td>Adolescents (n = 16) + Diagnoses: Learning disability, Emotional/behavioral disorder</td>
<td>Improvisation + Instrument playing + Self-disclosure through music</td>
<td>Statistically significant improvements in target behaviors</td>
<td>Emotion regulation</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No statistically significant difference between active and passive music therapy</td>
<td></td>
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<tr>
<td>Author, Year</td>
<td>Journal (1-year Impact Factor)</td>
<td>Database</td>
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<td>Rossiter, Slaney, &amp; Tulloch, 2010</td>
<td>Learning Disability Practice (not available) CINAHL</td>
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<td>Not specified</td>
<td>Not specified</td>
<td>Adolescents (n = not specified) Diagnosis: Learning disability</td>
<td>Unclear methods</td>
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<tr>
<td>Carpente, 2016</td>
<td>Music Therapy Perspectives (0.350) OUP online archives</td>
<td></td>
<td>Music therapist</td>
<td>School</td>
<td>Children (n = 4) Diagnosis: Autism spectrum disorder</td>
<td>Improvisation Live music Improvised, no genre specified</td>
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<tr>
<td>Ross, 2015</td>
<td>Music Therapy Perspectives (0.350) OUP online archives</td>
<td></td>
<td>Classroom teachers (music therapist designed intervention)</td>
<td>School</td>
<td>Children (n = 12) Diagnoses: Pervasive developmental disorder, Emotion/behavior disorder, Learning disability, Intellectual disability, Speech delay</td>
<td>Instrument playing Music and movement Self-disclosure through music Live music Original, therapist-composed music</td>
</tr>
<tr>
<td>Author, Year</td>
<td>Music Intervention</td>
<td>Study Setting</td>
<td>Participant Characteristics</td>
<td>Music Intervention Characteristics</td>
<td>Study Outcomes</td>
<td>Type of Emotion Skill</td>
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<tr>
<td>Allen, Hill, &amp; Heaton, 2009</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Adults (n = 12) Diagnoses: Autism spectrum disorder</td>
<td>N/A – survey</td>
<td>Reported using music predominantly for:</td>
<td>Survey</td>
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<tr>
<td>Jackson, 2007</td>
<td>Not specified</td>
<td>Not specified</td>
<td>9 professionals surveyed (clinical population: intellectual disability)</td>
<td>N/A – survey</td>
<td>Music therapy perceived as effective in treating target behaviors</td>
<td>Survey</td>
</tr>
</tbody>
</table>
Appendix B

Research Studies by Participant Age Group

Studies with Infants/Toddlers


Studies with Preschool Children


Studies with School-Aged Children


*Studies with Adolescents*


*Studies with Adults*


