A Theoretical Model of Contributing Variables in Music and Physical Therapy Co-Treatment in Pediatric Physical Rehabilitation

By

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Abstract

Allied health professionals, such as physical and music therapists, utilize collaborative treatment in pediatric physical rehabilitation to address patient needs during hospitalization. Co-treatment is a collaborative strategy of intervention facilitated by therapists from different disciplines treating simultaneously during a single treatment session to optimize patient outcomes. Co-treatment literature shows promising outcomes, but generalizability is inhibited by limited research. The purpose of this study was to define a theoretical model of co-treatment between music and physical therapists in pediatric physical rehabilitation. This model encompassed patient needs, therapists' scope of practice, and additional variables that contribute to co-treatment intervention. Phenomenological reflection and content analysis of related literature were utilized to conceptualize the variables and relationships within the model. Ten areas of patient needs were identified. Therapists' scopes of practice related to co-treatment and suggestions for expert roles are outlined. Implications for practice, advocacy, and a trajectory for future research are described.

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Philippians 2:14 says to “do everything without complaining or arguing” and while I cannot say I did this whole thing without complaining, I think it is safe to say I will never complain about writing a 10 page paper ever again.

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Chapter 1: Introduction

"It takes a village" is an excerpt of the well-known saying "it takes a village to raise a child." This quote has been used in many contexts: as book and article titles, school mantras, guiding principles for action plans, among many other avenues. Although the origins and meaning of this proverbial quote can vary slightly by the context in which it is said, the quote suggests the necessity of teamwork and collaboration in order to optimally aid the individual (Goldberg, 2016). When things are too big to do alone, a group effort (i.e. the "village") can positively affect the process. This idea can be illustrated in the way we view collaborative treatment planning in the therapeutic field and may be even more imperative for children in pediatric rehabilitation.

In the pediatric medical setting, treatment planning and implementation for medically complex children requires collaboration from doctors, nurses, family, and therapy services such as physical therapy, occupational therapy, speech therapy, and music therapy. Collaborative treatment planning is necessary to provide well-rounded care for all of the patient's needs. Additionally, research has shown that allied health professionals are actively seeking out collaborative intervention strategies, such as co-treatment, to utilize within patient care (Register, 2002; Wilhelm, 2017).

Each team member provides distinct and invaluable expertise towards patient care and utilizes a variety of methods of intervention during treatment planning. Although these intervention strategies are unique to the scopes of practice of each discipline, co-treatment is an intervention that transcends discipline to allow for interdisciplinary cooperation. Co-treatment is defined as a collaborative strategy of intervention facilitated by therapists from different disciplines treating simultaneously during a single treatment session to optimize patient

outcomes. (American Speech-Language-Hearing Association, 2012; Monas, 2013; Spring, 2010). A variety of disciplines can participate in co-treatment, but this study will examine the music therapy and physical therapy co-treatment relationship and processes in pediatric physical rehabilitation.

Music Therapy

The "healing power" of music on health and behavior is an idea that has been documented in writing from early philosophers such as Plato and Aristotle. To this day, many people in the general public use music as a way to self-regulate and shift mood without understanding how or why it appears to alleviate their mood (American Music Therapy Association, n.d.a). Although references to music's use in a therapeutic setting dates back to the 18th century, music therapy as a formalized profession did not come to be until World War II. During this time, various community musicians would travel to veterans hospitals and play for those suffering from the physical and emotional trauma of wartime (American Music Therapy Association, n.d.b). According to the American Music Therapy Association (AMTA), music therapy is the use of evidenced-based music intervention as the modality to accomplish individualized goals in a therapeutic setting (American Music Therapy Association, n.d.d) In order to work as a professional music therapist, board certification must be obtained after completing an accredited bachelor's level or graduate equivalency music therapy program. Board certification must be maintained though continuing education credits throughout the professional's career (Certification Board for Music Therapists, n.d.). Music therapists address goals across the spectrum of domains including emotional, social, communication, physical/motor, and cognitive. Present day music therapists work in a variety of settings such as schools, private practices, medical facilities, veteran's affairs, and hospice services.

Physical Therapy

The profession of physical therapy began in 1907 during World War I. During the polio epidemic, those providing support were known as "reconstruction aids." Within the next decade and a half, the American Physical Therapy Association had been formed as their governing organization (American Physical Therapy Association, 2011). Currently, physical therapists are defined as healthcare professionals who diagnose and treat individuals of any age that have medical conditions limiting their ability to perform activities of daily living. According to the American Physical Therapy Association, physical therapy promotes optimal physical functioning through the use of scientifically established clinical applications in order to restore and maintain quality of life (American Physical Therapy Association, 2019a). By preventing the progression of impairments, physical therapy promotes overall optimal wellness in life as it pertains to movement and health (Veerbeek et al., 2014). In order to become a physical therapist, individuals are required to achieve a doctorate of physical therapy as an entry-level requirement for practice. In addition to a doctorate degree, a physical therapist must obtain and maintain state licensure, and complete additional continuing education credits (American Physical Therapy Association, 2019c).

Co-treatment in Therapeutic Professions

Currently, there are no published guidelines or specific standards for co-treatment that encompass all therapeutic professions. AMTA's *Scope of Music Therapy Practice* (2015) briefly states that music therapists can and should (when appropriate) co-treat with various allied health professionals, but there are no parameters set to guide music therapists in the ethical scope of practice considerations for this collaborative treatment approach. Although therapeutic professions lack an all-encompassing standard of practice for co-treatment, there has been

collaborative effort between a few therapeutic professional organizations to provide guidelines for practice.

The American Physical Therapy association (APTA), American Speech-Language-Hearing Association (ASHA), and American Occupational Therapy association (AOTA) have set forth joint guidelines specifying requirements for co-treating in patient care. According to these guidelines, considerations for co-treatment as an intervention strategy should only be used as it benefits the patient to enhance the quality of care and not out of logistical convenience or expediting patient care. Therapists should collaboratively co-treat only after documenting specific rationale for this type of intervention and what goals can be appropriately addressed. A maximum of two disciplines can co-treat during a single session (American Speech-Language-Hearing Association, 2012). As this joint statement specifically addresses co-treatment within Medicare billing, it raises questions as to which of these guidelines (if any) can be adjusted if billing was not being factored into these decisions.

Although the joint statement provides an outline with specific information related to criterion, documentation, and examples, the information targets specifically the use of co-treatment for physical therapy, occupational therapy, and speech-language pathology. The exclusivity of their statement leaves out other allied health professionals, specifically music therapists, who are participating in co-treatment as an intervention strategy during treatment (Wilhelm, 2017).

Music Therapy in Co-treatment

Existing research that utilizes music therapy in co-treatment settings with other disciplines is limited, but supportive of the intervention strategy (Darsie, 2009; Geist et al., 2008; Guerrero et al., 2014). Collaborative work such as co-treatment has been shown to affect the

awareness and understanding of music therapy from other professionals (Darsie, 2009). Perceptions of the validity and effectiveness of music therapy have been shown to be directly related to the amount of exposure to music therapy that other professionals have (Monas, 2013). Although the body of literature on music therapy co-treatment is promising, it is limited in its scope due to the situational nature of these studies (often case study format), preventing generalizability of the conclusions.

Physical Therapy in Co-treatment

In the guiding principles that the American Physical Therapy Association (APTA) uses to support their vision statement, collaboration between physical therapists and other health professionals is stressed in order to address society's health-related challenges (American Physical Therapy Association, 2019b). Interdisciplinary research is emphasized as a means to provide evidence for the use of this treatment strategy. Similarly to music therapy, there is limited research that focuses on physical therapy co-treatment outcomes. This gap in research has been attributed to studies failing to elaborate outcome data that is specific to joint therapy outcomes and share specific collaborative methodologies. But despite this gap, supporting case examples of co-treatment with physical therapy are positive, and suggest that without co-treatment there would be a disconnect and fragmentation in client progress (Sylvester et al., 2017).

Collaboration Literature

Collaborating with other professionals requires a set of skills in itself and cannot exist without its own challenges. Collaboration requires interprofessional skills, flexible thinking, and a team-player mentality. Research suggests that professionals may benefit from receiving

additional training before entering a collaborative relationship in order to adapt to the changing needs of a team and changes in the client (Register, 2002).

Previous research had found well-seasoned music therapists (those with 10+ years of experience) to have significantly higher self-report of identifying as a collaborator and consultant of music therapy services than professionals with less experience (Register, 2002). This suggested that as music therapists gain experience and improve their clinical skills, they are more likely to participate in collaborative intervention strategies like co-treatment. Music therapy literature has frequently mentioned professional collaboration, but scarcely has been the actual focus of the study (Register, 2002). More recently there has been an increasing positive trend in co-treatment and collaboration in the treatment process (Hall et al., 2018; Wilhelm, 2017), but the body of literature supporting this practice is still limited. Recent research suggests that the demographic category of collaborating music therapists has shifted, and professionals with zero to five years of experience are increasingly reporting collaborative practice (Boswell-Burns, 2016).

Collaborative literature highlights numerous settings that co-treatment and other multidisciplinary treatment strategies are taking place in, including schools (Geist et al., 2008; Guerrero et al., 2014; Register, 2002), geriatric facilities (Register, 2002; Wilhelm, 2017), in-home (Register, 2002), psychiatric facilities (Register, 2002), outpatient clinics (Johnson et al., 2019; Wilhelm, 2017), and medical facilities (Hall et al., 2018; Register, 2002; Wilhelm, 2017). Within these settings, professionals are providing collaborative intervention for both children (Geist et al., 2008; Monas, 2013; Sylvester et al., 2017) and adults (Johnson et al., 2019; Talbot et al., 2014; Wilhelm, 2017).

Pediatric physical rehabilitation is a subcategory of the medical setting with promising literature in support of collaborative treatment strategies such as co-treatment (Darsie, 2009; Guerrero et al., 2014; Hall et al., 2018; Johnson et al., 2019; Monas, 2013; Sylvester et al., 2017). Although literature is promising in its outcomes, the benefits are limited due to the narrow number of related studies, preventing generalizability to the entire pediatric rehabilitation population. By further investigating the relationship and contributing variables for music and physical therapy co-treatment, it may provide insight into experiences that can foster better understanding and recognition of music therapy as a legitimate method of treatment.

Currently music therapists, physical therapists, and other allied professionals are currently taking part in collaborative professional relationships (Sylvester et al., 2017; Talbot et al., 2014; Johnson et al., 2019; Geist et al., 2008; Wilhelm, 2017), but there is a gap in the foundational research supporting the efficacy of co-treatment in comparison to individual therapies. By lacking a thorough understanding of the contributing factors and ethical considerations for co-treatment, therapy services cannot be streamlined and every co-treating relationship and process can present in a vastly different fashion from one another.

Purpose

The purpose of this study is to fill the gap in foundational knowledge regarding music and physical therapy co-treatment by creating a theoretical model that integrates patient needs and indicative factors for the use of co-treatment that is accessible, ethical, and functional within each discipline's scope of practice in order to optimize patient outcomes. The theoretical model will inform a discussion of specific suggestions for the trajectory of music therapy and physical therapy co-treatment research in order to further fill the gap in evidence necessary for practice.

Chapter 2: Review of Literature

Overview of Development for Early Childhood

The first five years of a child's life can be comparable to that of being in the fast lane of a highway. In the fast lane, cars are moving quickly and everyone is maintaining a steady but rapid speed that is similar to those around them. When there is a malfunction in the car, such as the transmission going out, that can affect how quickly a car continues their journey while the rest of the cars continue to speed by. The car's ability to run smoothly and get to its destination could be affected through vibration in the handling, slippage, or problems with gearshift changes. This example is analogous to early childhood development; medical complications can change the developmental trajectory, i.e. how they get to the destination. Children are in the "fast lane" working towards achievement of numerous developmental milestones throughout early childhood. Children achieve developmental milestones similar to one another. While there may be small differences, the timeframe and trajectories for developing skills in a variety of domain areas are comparable in children marked by age. The presence of a chronic condition or heightened need for medical care can remove a child from their environment that would naturally foster the attainment of cognitive, physical, and social/emotional skills. This set of layered circumstances can therefore affect how a child "gets to their destination" in the attainment of different developmental milestones throughout early childhood. Treatment interventions, such as co-treatment, can help patients improve and maintain developmental skills similarly to how a mechanic provides a tune up or service check to cars in order to keep the vehicle running and on track.

The Center for Disease Control and Prevention has published a comprehensive checklist of developmental milestones that highlight skillsets across the first five years, or the early

childhood stage, of a child's life. Below is a comprehensive summary of the CDC's Development Milestones lists (2019) that provides timelines and trajectories related to the development of important skills within the cognitive, physical, and social/emotional domain categories. Developmental milestones provide benchmarks for skill acquisition that can be tracked, and when problems or delays arise interventions can be implemented to minimize the negative impact on a child's development.

Two Years Old

Cognitive Development. At two years of age, children should be able to complete one and two step directions as their cognitive development increases. The complexity of their tasks and desires increases and children will begin to sort shapes and colors, build toy structures with four or more parts, and can uncover objects that may be hidden under two or three covering layers. At two years old a child may also begin to use one hand more than another (Centers for Disease Control and Prevention, 2019).

Children at this age will communicate using two to four word sentences. A child should be able to point to named pictures or objects, and know the name of familiar people and body parts. As children begin to develop the skill of mimicking others, they should be able to repeat words they overhear in conversation or mimic some complete sentences and rhymes from familiar books (Centers for Disease Control and Prevention, 2019).

Physical Development. Physical and motor development at two years old displays the beginnings of strength in a child's muscles and movements. As this strength increases, the child's need for physical assistance from an adult decreases. Children at this age should be able to stand on their tiptoes, kick a ball, throw a ball from overhead, and climb on furniture without

assistance. In terms of writing and drawing, children at this age should be able to create and copy straight lines and circles (Centers for Disease Control and Prevention, 2019).

Social/Emotional Development. At two years old interest in children other than themselves begins to increase, but there continues to be a strong focus on self. A two-year-old child would likely copy others and get excited with other children. Intentional defiant behaviors should begin at this age, with children specifically doing what they have been told not to. Although interest in others has increased at this age, a child will likely be using parallel play, where they play independently but beside other children. Children's interest in others may be observed by a child beginning to integrate chase games into their play (Centers for Disease Control and Prevention, 2019).

Three Years Old

Cognitive Development. A child's creative thinking and problem solving skills develop at age three in many ways that can be reflective of the complexities in their cognitive development. A child can complete three to four piece puzzles, create make-believe play with dolls or people, and can utilize buttons, levers, and moving parts to different toys. Children at this age can follow more complex directions (typically two to three step directions) and demonstrate an understanding of what "two" is.

The communication of a three year old should consist of increased vocabulary, using "in/on/under" words, some plurals, the ability to name most familiar things, all while using two to three sentences at a time in conversations. The child's sense of self is now being reflected in their language through the use of "I," "me," and "we" words, along with the ability to say their name, age, and sex (Centers for Disease Control and Prevention, 2019).

Physical Development. Children can complete almost all physical and motor tasks without assistance from others. A child has the ability to run with ease, climb, use the stairs while stepping one foot at a time, and pedal a tricycle. Fine motor development consists of improving grasps and grips strength, which is evident in the child gaining the ability to screw and unscrew the lid of a jar and turning door handles (Centers for Disease Control and Prevention, 2019).

Social/Emotional Development. At three years old, a child's independence and sense of autonomy increases as they are now able to dress and undress themselves and separately easily from their parent figures. A child now comprehends the idea of "mine" and "yours" and demonstrates turn taking with others. In terms of emotional development, a three-year-old child can demonstrate a wide range of emotions and may become upset when there are major changes in their routine. Through their social relationships with others, a child now shows unprompted affection for friends and would demonstrate concern for a crying friend (Centers for Disease Control and Prevention, 2019).

Four Years Old

Cognitive Development. The cognitive development of a four year old includes an increased understanding of the world around them. Children can now identify same verses different, the beginnings of understanding the concept of time, and can draw a person with minimal body parts. Awareness and anticipation increases at this age as four year olds can make educated guesses by verbalizing what they think is going to happen next in a situation or book. A four year old can name some colors and numbers and can participate in board games and card games that do not have complex rules. Grammar skills also begin to develop such as utilizing the

proper use of "he" and "she." As cognition develops, children are able to tell stories and sing simple children's songs from memory (Centers for Disease Control and Prevention, 2019).

Physical Development. By age four, children have the ability to complete more complex movements that require strength, attention, and anticipation. Movements such as catching a bounced ball and hopping/standing on one foot become easier. Autonomy continues to increase and children can complex more tasks with independence such as pouring, cutting with scissors, and mashing food, although they may still require supervision for these (Centers for Disease Control and Prevention, 2019).

Social/Emotional Development. Creativity begins to flourish at age four, as make-believe play becomes more complex and children would choose to play with other children rather than by themselves (Perrin & Gerrity, 1984). A child's interests begin to develop and likes/dislikes begin to develop. Four year olds cooperate with other children and they enjoy taking part in new experiences (Centers for Disease Control and Prevention, 2019).

Five Years Old

Cognitive Development. Cognitive developments at age five relate heavily to pre-academic skills that they are beginning to understand and utilize. Now that children can identify some shapes, letters, and numbers, they are able to copy these themselves on paper and verbalize them aloud. Details emerge as a child's awareness of the world around them increases, for example, they can draw a person with at least six body parts, and they have knowledge about facets of everyday life, such as money and food. Although their awareness of themselves and the world around them increases, it is still a limited and oversimplified version of the world (Perrin & Gerrity, 1984). A five-year-old child communicates with clear speaking and by telling stories

using full sentences. A child has developed some grammar skills, understanding and utilizing future and past tense (Centers for Disease Control and Prevention, 2019).

Physical Development. A five year old's physical/motor development includes development of fine motor skills and movements utilizing individual body parts. Standing and balancing on one foot for 10 seconds, hopping and skipping, swinging, and performing a somersault are all physical movements that a five year old should be able to complete. Grasps improve at five years old, as a child should have the ability to use their fork, spoon, and occasionally a butter knife while eating. Finally, by age five a child should have developed the ability, by integrating development in multiple domains, to use the toilet on their own (Centers for Disease Control and Prevention, 2019).

Social/Emotional Development. At age five, social and emotional development relates much to a child's relationships with others. A child may demonstrate being both demanding and cooperative, but are more likely to agree with rules. Five year olds want to please their friends and be like them, and often enjoy singing, dancing, and acting. Independence of many tasks – such as walking to a next-door neighbor's house – is increasing, but continues to require supervision despite having the desire and ability (Centers for Disease Control and Prevention, 2019).

Medical Complexities

Children with medical complexities (CMC) are defined as those with increased risk of a chronic physical, developmental, behavioral, or emotional conditions requiring medical care beyond what is generally needed by children (Cohen et al., 2011). Children with medical complexities require prolonged dependence upon medical care and high levels of support through nursing, therapy, and technology (Yost & Hochstadt, 1987). Although this term may be

associated with specific chronic conditions, it is an all-encompassing term to describe children who may require medical needs that look very different from person to person. For example, one child may be undergoing cancer treatment requiring high medical need through inpatient treatment, while another child may not have a formal diagnosis yet multiple functional limitations requires ongoing advanced care within the home setting. Identification of needs, chronic condition(s), functional limitations, and health care use are the four tenants to define children with medical complexities (Cohen et al., 2011).

Thirteen to 18% of children in the United States are considered to have special needs, not including those who are at risk for special needs. Children with medical complexities are usually those with multisystem diseases, functional impairment due to a neurologic condition, or patients who have cancer or are undergoing cancer treatment (Bethell et al., 2008). Children with medical complexities frequently have diagnoses that traditionally include one or more of the following terms: complex, chronic, medical, conditions, and/or needs such as complex chronic conditions, complex medical needs, complex medical conditions, and complex health conditions (Cohen et al., 2011).

Providing professional caregiving and therapy for children with medical complexities is not a new topic for healthcare providers, although it has increased in recent years. Previous research suggests that children with medical complexities are likely increasing in prevalence because of the increased survival rates of infants born prematurely (Msall, & Tremont, 2002). Preterm infants may not necessarily develop into children with medical complexities, but frequently display difficulties in attaining developmental milestones. Preterm children have been found to demonstrate significantly lower levels of developmental achievement in cognitive, fine and gross motor, and social/emotional areas of development when compared with their peers

born at term (Little, 2006). Despite this delay, research suggests preterm infants catch up in developmental milestone attainment with their term peers as they mature into early childhood (Little, 2006). However, if a child is both pre-term and diagnosed with additional medical complexities, this may inhibit their ability to "catch up" to their peers on their own. This is because children with medical complexities or chronic illness are more likely to experience effects on their social, educational, and psychological development (Perrin & Gerrity, 1984)

Increasing understanding of the unique developmental complexities that arise in the care for children with high medical needs also requires advancements in the type of care provided. Professional caregiving and therapy should be particularly sensitive to the effects medical complexities have on the developmental trajectory of these children across domains. Before highlighting rehabilitative treatments, it is important to look closer at how the development of a child with medical complexities may be affected.

Factors of Developmental Effects

When examining developmental impairments, there are three important factors to consider: Rate of development, sequence/order of development (whether development progresses through the same stages), and structure of development (relationship between development in one area and development in other areas) (Hodapp, 1998). Research has found that rate of development may vary person-to-person but generally the sequence of development stays the same (Beckett & Taylor, 2010, p.148). Although this overview focuses generally on the effects of medical complexities on development, it is important to note that the trajectories of developmental milestones differ around the world and what is considered a delay by the United States' standard, may not indicate a delay in a different part of the world (Selvam et al., 2016).

Effects on Cognitive Development. When a child is restricted, whether it be physically, environmentally, or in any way, this can affect the child's development of self-awareness. By having an oversimplified understanding of themselves and their body at this point in their development, there may be a lacking of understanding of their complex needs or what is happening in their body. Parents may often relay illness to a child in adaptive terms and understood by a child based upon the conditions and restrictions that it creates. This may be observed through a child equating illness with having to stay in bed or an understanding that not sharing drinks will prevent sickness (Perrin & Gerrity, 1984). Additionally, speech development, but not motor development, has demonstrated a small, yet statistically significant effect, on educational attainment (Murray et al., 2007).

Effects on Physical Development. At this time there has been limited research that supports a correlation between the timing of motor development and educational attainment. In a longitudinal study, Jenni et al. (2013), surveyed typically developing individuals from childhood through late adulthood, tracking the timing of their attainment of motor milestones such as sitting without support and independent walking, then comparing it to later developmental outcomes. Results of the study found that timing of attainment of these milestones were not related to motor and cognitive performance, although there was a weak correlation between acquisition of independent walking skill and dynamic balance tasks later in childhood. On the other hand, there has been some research that suggest language impairments may negatively affect a child's physical development (Diepeveen et al., 2018) and a relationship between standing/walking development and adult intelligence (Flensborg-Madsen & Mortensen, 2018). Although research supporting effects of medical complexities on physical development is lacking, challenges can be observed based on the difference in care of children with medical complexities and their peers

without medical complexities. For example, a child with medical complexities will likely experience less exposure to their natural environment that can promote physical development. A child with severe eczema may not participate in social and physical activities as often, such as tossing a ball with their parent, due to physical restrictions and pain, which may affect the timing of their development of hand eye coordination and strength in their arms.

Effects on Social/Emotional Development. Although all individuals typically developing or otherwise may carry emotional burdens with them, those with medical complexities may experience effects on psychological development. Examples may include depression due to prolonged challenges in their lives related to their medical complexities, chronic illness, and/or hospitalization (Blumberg, 1978; Perrin & Gerrity, 1984). The following paragraphs provide some detail regarding social and emotional development. Table 1 also summarizes a developmental overview and potential effects of medical complexities by age and domain.

Anxiety and Depression. Children may develop increased fear and anxiety while hospitalized as a result of separation from family (Blumberg, 1978). Affective depression in hospitalized children is often present but unrecognized by health professionals due to a child's verbal communication skills being underdeveloped. Therefore, children mask symptoms and are unable to articulate their emotions (Blumberg, 1978).

Autonomy. Children with medical complexities also often lack sufficient opportunity to exercise choices in their own lives, perhaps due in part to family members that feel the need to protect them beyond what is necessary. By preventing a child from making appropriate choices they may become clingy, apathetic, or submissive (Meijer et al., 2000). Lack of choice due to over-involved parents may lead to increased dependency on parents, which inhibits their

development of autonomy. Parents/caregivers of a child with a medical complexity may also be apprehensive in setting appropriate boundaries and limitations for the child. This lack of boundaries could in turn interfere with the child's development of impulse control (Perrin & Gerrity, 1984).

Social Experiences. On a related note, these children may also have limited social experiences with peers (Beckett & Taylor, 2010, p. 151). Limited social experiences may be due to physical restrictions or pain, and may inhibit a child's ability to develop social skills such as turn taking or sharing, bridging from independent play to cooperative play with others, or reciprocal conversation.

Many modalities have been historically utilized to track development or provide use in detecting variation from typical development. Yet, they do not have the capacity or sensitivity to provide in-depth adaptations for children with medical complexities. For example instruments such as Achenbach's Child Behavior Checklist (1983) highlight the limitations that many developmental checklists have, in that it was not created to have the scope to assess these milestones or behaviors in children with medical complexities. Karanth (2011) sought to create a checklist that encompassed those who are "difficult to test" such as children with developmental disabilities, but medical needs and complexities were still not included in this checklist. This deficit rationalizes the need for continued research into comprehensive developmental tracking and assessment tools for children with medical complexities in order to treat needs as they arise. Although there is still a gap in research related to these methods of early detection, there are many strategies of intervention that can be implemented in order to promote the child's attainment of developmental milestones.

Table 1

Developmental Milestones and Effects of Medical Complexities

Domain	Developmental Milestones (Centers for Disease Control and Prevention, 2019)	Effects from Medical Complexities
Cognitive	**2 Years Old**: Completes 1-2 step directions, sorts by shape and color. May use one hand more than another and can uncover hidden objects. Child may use 2-4 word sentences and point to named pictures or objects. Child begins to mimic words, rhymes, and sentences. **3 Years Old**: Creative thinking and problem solving skills develop through make-believe play, 3-4 piece puzzles, following 2-3 step directions, and using buttons, levers, and moving parts in toys. Vocabulary increases in use of word descriptors, some plurals, and naming familiar things, while using 2-3 sentences at a time. Can articulate their name, age, and sex. **4 Years Old**: Identifies same verses different, begins to grasp concept of time, and can draw minimal body parts. Child can make educated guesses and verbalize what they expect to happen next in a scenario. Can name some colors and numbers and play simple games. Grammar begins to develop. Memory for stories and simple children's songs begins. **5 Years Old**: Identifies, verbalizes, and copies some shapes, letters, and numbers. Can draw a person with 6+ body parts and knows facts about everyday life. Communicates in full sentences with future and past tense.	Language impairment may impact overall physical development (Diepeveen et al., 2018). Speech development has significant effects on educational attainment (Murray et al., 2007). Having an oversimplified understanding of self at this point in development may lead to a child having a lack of understanding of their complex needs and what is happening in their body. Prematurity may lead to significant overall lower levels of developmental achievement in cognitive abilities (Little, 2006).
Physical	**2 Years Old**: Child is developing strength and need for assistance decreases. Child can stand on tip toes and kick a ball, throw from overhead, and climb furniture without assistance. Child can create and copy straight lines and circles. **3 Years Old**: Almost all physical and motor tasks can be	Delayed acquisition of independent walking skills may impact dynamic balance tasks later in childhood (Jenni et al., 2013). Delays in standing/walking development has also been

	completed without assistance including running, climbing, using stairs, and pedaling a tricycle. Fine motor grasp and grip strength increases. **4 Years Old**: Child can catch a bounced ball, hop/stand on one foot, and demonstrate other physical tasks that require strength, attention, and anticipation. Increased autonomy for completing tasks such as pouring, cutting, and mashing food. **5 Years Old**: Demonstrates one foot standing balance, hopping/skipping, swinging, and somersaults. Fine motor skills develop via improved grasp as child can use of dining utensils. Can use toilet on own.	linked to adult intelligence (Flensborg-Madsen, & Mortensen, 2018). Prematurity may lead to significant overall lower levels of developmental achievement in fine and gross motor abilities (Little, 2006).
Social/Emotional	**2 Years Old**: Interest in others through parallel play and play that includes others and shares in positive emotions. Intentional defiant behaviors develop. **3 Years Old**: Increased independence via dressing/undressing self and easily separating from parent figures. Comprehends "mine' and "yours" and demonstrates turn taking. Range of emotions increases and may become upset with major changes in routine. Child shows increased affection and concern for friends when appropriate. **4 Years Old**: Make-believe play increases in complexity. Children cooperate with others and would rather play with others than self (Perrin & Gerrity, 1984). Develops likes/dislikes and enjoys new experiences. **5 Years Old**: Child can be both demanding and/or cooperative, but is more likely to follow rules. Child wants to please others and may enjoy singing, dancing, and acting. Independence in tasks increases.	Decreased opportunity to make choices and exercise independence. Depressive symptoms may lead to social withdraw, depression, or submissiveness (Blumberg, 1978; Meijer et al., 2000). Limited social experience inhibits the development of turn taking and sharing, bridging from independent play to cooperative play with others, and reciprocal conversation (Beckett & Taylor, 2010, p.151). Child may be clingy, apathetic, or passing. Lack of choice may lead to decreased autonomy and lack of boundaries may interfere with development of impulse control (Perrin & Gerrity, 1984). Prematurity may lead to significant overall lower levels of developmental achievement in social/emotional abilities (Little, 2006).

Promoting Developmental Capacity

In 2011, an optimal model of care was created that integrates previous models of medical caregiving that were unable to fully capture the needs of children with medical complexities. Guiding principles from the Chronic Care Model (Wagner et al., 2001, 2002) were integrated by Cohen and colleagues to create a model of care tailored for children with medical complexities. This model was applied as a framework for medically complex children highlighting four specific components as imperatives for medically complex children's care (Cohen et al., 2011). These components are:

- → Needs: a family-centered care approach that provides accessible health care services as well as empowerment to families in fostering self-management by sharing information and provider inclusion of families as advisors to treatment planning.
- → Chronic conditions: emphasizing sufficient knowledge, understanding, and decision-making support across the entire continuum of care including both the community and tertiary care levels. This emphasis can be accomplished through ongoing education or support to primary care providers on the care requirements of the child or population as needed.
- → Functional limitations: ensuring availability of necessary supports for the family and community, including medical technology for maximization of functioning within the key dimensions of body structure and function, performance of activities, and participation in communal life.
- → Health care use: prioritization of high-quality and efficient care through enhanced care coordination and clearly defined provider roles across different settings.

Key features to this module include using a family centered approach, the sharing of knowledge between providers and family members, providing support for medical, social, and communal needs of the family, and promoting efficiency through care coordination/collaboration and defining of roles across the care team.

Collaboration in Healthcare

Collaborative Care. One way that institutions have been working to enact collaboration in hospital processes in a system-wide format is through the use of Collaborative Care. Collaborative Care (CC) is the coordinated application of clinical management that centers on the quality of clinical results assessed by the comprehensiveness and particularity of the people in the lived experience in the context of interprofessional and interdisciplinary collaboration. This approach was developed in order to eliminate repetitive, redundant, expensive, contradictory, or inadequate measures. The collaborative care approach was constructed through integrated feedback from patients, caregivers, clinicians, and administrators in order to provide an increased coordination and continuity of care during transition from acute hospital stay to outpatient rehabilitation centers (Talbot et al., 2014). By opening the lines of communication within the treatment team, providers can be more attuned to when a patient is slowing in progression on specific aspects of development, even if it is not directly related to the primary medical complexities of the child.

Care Mapping. One method that may positively affect a child's developmental capacity is the use of care mapping by patients and family members. Care maps are short, one-page visual narratives that highlight the most important people, places, and services that interact with the family and provide support and coordination of the child's needs. Care maps are frequently created by the primary caregiver of the patient and illustrate the parent's workload and priorities

that are necessary in order to maintain the lifestyle and needs of the medically complex child. Three main themes surfaced from previous research on the purpose of care mapping, including: features (characteristics of the care maps), function (describing what the care map does), and emerging outcomes (Adams et al., 2017). Creating a care map with patients and/or caregivers allows for not only family reflection, but also helps to provide a sense of re-grounding for the physicians and care team by visually absorbing and understanding what the family is going through. By visually assessing a child's treatment, care coordination effectiveness can increase by highlighting gaps in patients' care and identify patient and family goals that may be separate from treatment goals (Cady, 2017).

Roles in Collaboration. Roles play a critical part in a therapeutic co-treatment setting, but also in any collaborative situation. *Role expectations* are the evaluative standards or description of required behaviors/tasks that are given to a person taking on the organizational role. In most employment position descriptions there is a "job duties" section, which describes the role expectations that are given by the *role sender*, who defines and disseminates roles.

On the other side of the role is the *received role*, which describes the perception of the sent role. The *received role* reflects the expectation and perception of the role that the receiver creates for themselves, reflecting the cognitions and motivations of that individual. These perceptions – what is expected by those who give the roles and by those who receive the roles – do not always line up, which can lead to cyclical conflict within the therapeutic relationship (Coghlan, & Shani, 2005; Katz, & Kahn, 1978). When there is an incompatibility in expectations between the sender and the receiver, it can lead to role behavior that does not align with original expectations (Darsie, 2009). This misalignment creates a cyclical pattern of misunderstanding of the perception of what behavior is expected and what is being done.

Cyclical conflict can happen within co-treating relationships as well. Music therapists have a wide scope of practice that allows them to work on a variety of goal areas that can overlap with other therapeutic disciplines (American Music Therapy Association, 2015). For example, a music therapist's scope of practice includes training to address physical skills, which overlaps with the scope of practice of physical therapists. Additionally, other professionals do not always have a thorough understanding of music therapy and its benefits. Perceptions of music therapists' roles and responsibilities in the medical setting significantly improved following educational provisions for interdisciplinary team members, suggesting previous misunderstandings of music therapists' roles and responsibilities (Darsie, 2009).Therefore, the opportunity for disconnect between role expectations and received roles is increased. When entering a new collaborative relationship, misunderstandings of the role each therapist perceives for themselves and the other therapist to have can inhibit the therapeutic relationship and flexibility in treatment, thus affecting overall communication and collaborative capacities. If the quality of the therapists' relationship is impacted due to ambiguity and conflict, such can affect the individual client-therapist relationships, therefore potentially affecting the quality of services being provided to the patient (Darsie, 2009).

Professionals may benefit from receiving additional training before entering a collaborative relationship, in order to adapt to the changing needs of a team and changes in the client (Register, 2002). Training in intervention strategies come in various form, some as brief as one hour seminars overviewing the concept, while other therapists may have taken part in interprofessional education courses during their pre-professional educational training.

Interprofessional Education

Interprofessional education (IPE) is an educational initiative for members of multiple social and health care professions to interactively learn together about various allied health professions for the purpose of improving interprofessional collaboration (Reeves et al., 2013). IPE is implemented in a variety of ways across many health disciplines, including physicians, nurses, physical therapists, occupational therapists, and speech-language pathologists (Sylvester et al., 2017; Reeves et al., 2013). IPE is guided by four core competencies that emphasize values and ethics, roles and responsibilities, interprofessional communication, and teamwork (Interprofessional Education Collaborative, 2016). By training health professionals through these guiding competencies, IPE curriculums aim to optimize quality of services, therefore improving overall health of patients (Sylvester et al., 2017). Interprofessional education experiences should provide training experiences that teach therapeutic professionals about other professions, and how to participate in successful collaborative relationships (Reeves et al., 2013).

A systematic review analyzing the efficacy and quality of interprofessional education and learning highlighted discrepancies in the methodology of these programs. Discrepancies included content, duration, and professional participation. Despite these variabilities, results found that IPE programs were generally well received by learners and enabled the attainment of the necessary knowledge and skills for collaborative work (Reeves et al., 2010). In a more recent update of the review, outcomes continued to be limited due to the persistently small body of literature on IPE and the variance in the structure of the studies. Additionally, the review found that the quality level of the evidence presented in the included IPE studies was rated either “low” or “very low” when utilizing the GRADE Working Group grades of evidence (Reeves et al., 2013). Until the depth of sound research in interprofessional education increases, policy development and definitive conclusions cannot be realized and streamlined into educational

training. However, aspects of IPE could inform qualities of collaborative relationships in the healthcare setting.

Within AMTA's *Professional Competencies* (2013), interprofessional collaboration is outlined as a topic that music therapists should be competent in through their ability to understand therapist roles in collaborative work, communicate rationale for music therapy services and their role, and design and implement interdisciplinary treatment. Additionally, AMTA further emphasizes this role in the *Scope of Music Therapy Practice* (2015) by defining a music therapist's role as being a member of the interdisciplinary team and suggests supporting treatment goals through co-treatment with other members of the treatment team. Despite highlighting co-treatment and interdisciplinary collaboration throughout these standards and competencies, there are limited provisions being made within the music therapy curriculum for teaching what collaboration is and its value within the profession, and the practices that are currently included vary greatly between training institutions (Register, 2002; Spring, 2010). Previous research attributes the lack of uniformity within the music therapy profession to variability within procedures, ideology and philosophy (Register, 2002).

Despite not being a new concept, the slow growth of interprofessional education's acceptance, has been attributed to the multifaceted nature of IPE, the challenges of measuring its outcomes, and the necessary large-scale changes, both structural and cultural, required for successful implementation (Reeves et al., 2010). Additionally, student acceptance of the concept of collaborative care has been found to be influenced by age, previous work experience and profession interaction within the collaborative care model (Hammick et al., 2007).

More recently, Olson and Bialocerkowski (2014) sought to highlight best approaches to interprofessional education in pre-licensure, university based allied health IPE curriculum to

determine what modifications are necessary for optimal learning experiences. Conclusions determined that IPE in this phase of education is both feasible and effective, but that there may not be a one-size-fits-all solution for IPE initiatives. Authors suggest that the evaluation phase should be the primary focus for future research in this area, noting the need for young professionals to gain understanding in the necessity of interprofessional socialization and its benefits in the allied health profession.

Inpatient Rehabilitative Medicine

Patients with serious medical needs may utilize pediatric rehabilitation as an intervention strategy for treatment. When children are admitted to the hospital they may undergo physical rehabilitative medicine, which seeks to restore functional ability and quality of life that has been affected by physical impairments (American Academy of Physical Medicine and Rehabilitation, n.d.). Although this treatment is utilized in order to promote patient wellness, it can create problems itself that must be addressed. During treatment in a pediatric rehabilitation setting, ethical considerations must be made relating to treatment consent and refusal, patient autonomy, information sharing, and the transition from the rehabilitation setting to home (Deaton, 1996). Pediatric rehabilitative medicine is an overarching umbrella that includes a variety of health professionals including doctors, nurses, social workers, psychiatrists, and a variety of therapists. Together these health professionals work collaboratively as a part of a singular treatment team in order to plan and implement optimal care for each patient.

Acute inpatient rehabilitation is a subcategory of rehabilitative medicine that seek to treat patients within a condensed timeline and therapy schedule. The average hospital stay for patients in acute inpatient rehabilitation is 20 days and many of these programs have set minimum requirements for the number of hours of therapy the child must receive in a day (American

Academy of Physical Medicine and Rehabilitation, n.d.; American Speech-Language-Hearing Association, n.d.). During this time the patient may undergo a variety of treatment strategies including physical therapy, occupational therapy, speech therapy, and music therapy (Chen et al., 2004). Members of this diverse treatment team have the ability to address various developmental domains, but not all at the same time. Therefore, professionals from different disciplines may co-treat in order to support other disciplines' goals, and to allow patient improvements in one goal area to build on another area, expediting patient progress (American Speech-Language-Hearing Association, n.d.). The use of combined therapeutic intervention targeting multiple domain areas for rehabilitation has been found to have significant effects on functional gains (Chen et al., 2004). Many of the therapy disciplines have training in cognitive, communication/language, and motor domain areas, but not as many have the necessary training to treat a patient's psychosocial needs. If psychosocial needs are not met by young patients, such may result in tantrums, refusal to participate in therapy, depression, or social withdrawal (Blumberg, 1978). Music therapy can complement other fields in the acute rehabilitation setting by using music as a distraction and motivator to complete less desirable tasks (Monas, 2013).

Terminology

Despite the increasing awareness and teaching about collaboration and co-treatment in IPE curriculum, there continues to be misunderstandings about the differences in various terminology. Surveys sent to music therapy training program directors have indicated confusion related to definitions when using collaborative terminology and mistaken interchangeable use of various terms (Spring, 2010). Conclusions of Spring's study detailed specific definitions for common terminology in collaborative work in order to promote a common language for co-treatment. These definitions are listed below in Table 2.

Spring's (2010) definitions will generally inform the use of the related terms throughout this study, although some modifications will be made. The term *co-treatment* will be reflective of the intent in Spring's definition (2010), but will be modified to also encompass this author's clinical experience. Thus, for this study *co-treatment* is defined as a collaborative strategy of intervention facilitated by therapists from different disciplines treating simultaneously during a single treatment session to optimize patient outcomes. Within the definitions for various collaborative models listed above, *multidisciplinary* and *transdisciplinary* highlight the boundaries and scope of practice within participating disciplines, but *interdisciplinary* does not reflect similar specificity. For the purposes of this study, an interdisciplinary model will include therapists working within their respective disciplines' boundaries and scope of practice but with more thorough communication than a multidisciplinary model.

Table 2

Spring's (2010) Definitions of Collaborative Terminology

Term	Definition (Spring, 2010, pp. 60-61)
Collaboration	A general term in reference to joint work between two disciplines; may appropriately encompass the variety of collaborative models including multidisciplinary, interdisciplinary, transdisciplinary and co-treatment.
Consultation	Used in situations when advice is given from one discipline to another, rather than the professional directly interacting with the patient/client.
Interprofessional	An approach that incorporates a team of healthcare professionals who work together to maximize the strengths and skills of each team member to achieve the optimal patient care; may be used as a general term for collaboration because it is not specific to a collaborative model, but may also include models such as interdisciplinary and transdisciplinary.
Co-Treatment	Simultaneous joint treatment between two disciplines; if the collaborative effort is not simultaneously present in treatment, than the collaborative relationship may be better described as consultation.
Models	Specific collaborative, interprofessional or co-treatment models, referred to as **multidisciplinary, interdisciplinary and transdisciplinary**.
Multidisciplinary	A multiple discipline model that addresses client needs with each discipline providing services within the boundaries of their respective disciplines with little or no communication between disciplines.
Interdisciplinary	A model that addresses client needs through multiple disciples who communicate to create a coherent whole treatment approach.
Transdisciplinary	A model that addresses client needs through multiple disciplines who communicate to extend traditional discipline specific boundaries to create a holistic approach.

Music Therapy in Collaborative Care

There is little evidence in the literature of music therapy in a collaborative or co-treatment role. However, collaboration and co-treatment experiences exist in the clinical setting, as evidenced by case examples (Hall et al., 2018; Hannan, 2008) and clinical experience. Moreover, music therapy is a frequently under-utilized treatment strategy. Cohen et al.'s care model (2011) provides an outline for providing well-rounded care for children with medical complexities that illustrates how music therapy can be integrated into pediatric rehabilitation in a

way that relates to all four of the important tenants for collaborative care. These four tenets are needs (i.e. accessible services that include and empower family in managing care), chronic conditions (i.e. supportive information, consideration and decision-making for the family and service providers across a continuum of care), functional limitations (i.e. availability of supports for family and service providers that account for developmental function, activities and participation), and health care use (i.e. coordination of care with defined provider roles that prioritize high-quality and efficient care). Translation of these four tenets through music therapy are as follows:

- → Needs: Music therapy frequently facilitates within a family-centered approach, integrating both the patient and their family members into sessions. Music therapists have the training to address a variety of needs through treatment goals across the spectrum of domains, with cognitive, communication/language, social/emotional, and motor/physical goal areas possible to be addressed (American Music Therapy Association, n.d.d, 2015).
- → Chronic conditions: As a way to emphasize sufficient understanding for the patient, a music therapist may utilize songwriting with the patient to not only allow for choice and creative expression, but to build awareness through verbal processing, in terms that are developmentally appropriate for that child, what is happening in their body (Nolan, 2005). This strategy integrates educating the patient while building rapport, thus the music therapist is able to build a therapeutic relationship while highlighting positive coping strategies that the child may use when they are distressed or in pain.
- → Functional limitations: Music therapists are trained to utilize music as a strategy of intervention to promote goals in all domain areas. Music therapists understand how to

manipulate music elements so that therapeutic tasks and music are accessible to the patient. By participating in individual or co-treating music therapy sessions, a patient can be motivated to complete a task that is appropriate for their current developmental level, with small adaptations made to increase difficulty and milestones are met (Vaudreuil et al., 2019).

→ Health care use: Music therapists work in a variety of settings, from schools, to private practices, to hospitals. Continuity of care can be maintained through the coordination of services while a child is in a hospital, back at home, and being at school. By continuing care as the child transitions between different settings, the music therapist can track their developmental progress across all domains and assess the trajectory of their developmental attainment.

The use of music therapy with children with medical complexities in the pediatric physical rehabilitation setting allows for a credentialed professional to monitor a child's developmental progress in a way that is sensitive to the potential effects that medical complexities may have on development. This will promote overall continuity of care and a transdisciplinary approach to treatment.

A music therapist's wide scope of practice allows them to address all of the domain categories, and therefore encompassing goals for the patient as a whole, along with their family (American Music Therapy Association, 2013). Music therapists can utilize techniques such as songwriting in order to address similar outcomes of patient care mapping such as promoting communication, acceptance, and awareness for the patient, their family, and the treatment team as a whole. Therefore, by integrating music therapy services into the treatment team of children

with medical complexities, their progress can be better documented and the focus on the patient and family as a unit can be promoted through the lens of family-centered music therapy.

Music and Physical Therapy in Pediatric Physical Rehabilitation

The gap in foundational research and knowledge is evident within the topic of co-treatment as a whole, although existing research is promising. Wilhelm (2017) identified this lack in knowledge and sought to address it by surveying music therapists working with physical therapists in neurologic rehabilitation setting. Demographic information indicated that music therapists with all levels of experience were collaborating with physical therapists, and concluded that the benefits of collaborative work outweighed the challenges.

Physically-based needs are often the reason a patient requires physical rehabilitation; existing co-treatment evidence suggests psychosocial needs may also need addressing. Although there are few publications highlighting the relationship between music therapists and physical therapists, the physical rehabilitation setting is the most well represented in the literature. In co-treating sessions between music and physical therapists in physical rehabilitation, music therapy has been found to support goals other than physically-based goals by supporting needs such as endurance, task attention, motivation, and distraction from discomfort/pain (Vaudreuil et al., 2019; Wilhem, 2017). Properly addressing psychosocial factors has been found to contribute to positive results in physical recovery and aid in the prevention of re-injury (Ahern, & Lohr, 1997; Chmielewski et al., 2011; McDonnell, 1983).

Despite the limitations in the literature, co-treatment and collaborative practices are becoming more common across allied health professionals including physical therapists (Guerrero et al., 2014; Interprofessional Education Collaborative, 2016; Sylvester et al., 2017; Wilhelm, 2017), occupational therapists (Interprofessional Education Collaborative, 2016,

speech-language pathologists (Geist et al., 2008; Interprofessional Education Collaborative, 2016; Sylvester et al., 2017, and music therapists (Geist et al., 2008; Hall et al., 2018; Guerrero et al., 2014; Register, 2002; Vaudreuil et al., 2019; Wilhelm, 2017). Music therapists have the scope of practice capacity to work in collaborative roles to fill the treatment gap in patients' psychosocial needs that other therapeutic professionals may be unable to effectively address within their own scope of practice (American Music Therapy Association, 2015). Music therapists utilize music as a way to help patients distract, motivate, endure, cognitively organize, and/or cope with various aspects of physical rehabilitation treatment. However, little is understood as to how music therapy can be integrated with physical therapy to successfully optimize patient outcomes.

Children with medical complexities present various cognitive, physical, and social emotional needs, and children under the age of seven have been found to make statistically smaller gains than older children in physical rehabilitation (Chen et al., 2004). Despite this need to support young patients in pediatric physical rehabilitation, research in promoting efficacious strategies that improve treatment outcomes is lacking. Research in this area is limited in its generalizability due to the heterogeneous nature of the various diagnoses within children with medical complexities (Srivastava et al., 2005). The inability to generalize this literature has led to limited measurable improvements in the quality of care particularly within pediatric physical rehabilitation in young children.

Due to limited research available on co-treatment, evidence is lacking in its support of the efficacy and scope of practice considerations used to inform clinical decision making by therapists in a collaborative setting. Additionally, despite the collaborative role that music therapists fill, they, and other therapeutic professionals, are not receiving thorough and

standardized training that prepares them for these roles. The interprofessional education curriculum has a shortage of concrete data that supports specific practices within educational training. Existing research on interdisciplinary work recommends investigating further into the nature and specific methods of these interactions through proper evaluation and documentation in order to determine process for best practice (Kelly, 2013; Wilhelm, 2017). By improving the clarity of roles, other allied health professionals may be more willing to participate in this collaborative treatment strategy (Coghlan & Shani, 2005). Therefore, there is a need to develop a theoretical model for co-treatment between music and physical therapists to fill the gap in foundational knowledge specific to treatment rationale, scope of practice, and treatment indicators, as a precursor to analyzing outcome-based data.

The purpose of this study is to identify primary patient needs and indicative factors for the use of co-treatment. These identified variables will be synthesized into a theoretical model that is functional, ethical, and sensitive to therapist scope of practice. In turn, by clarifying therapists' roles and responsibilities, this model can attribute to overall optimization of patient outcomes in pediatric physical rehabilitation.

The research aim is to articulate a theoretical model for co-treatment between music and physical therapists for pediatric physical rehabilitation that encompasses patient needs, therapists' scope of practice, and additional variables that contribute to collaborative treatment planning.

Research Question #1: What are the primary variables in pediatric physical rehabilitation?

Research Question #2: What is the music therapist's scope of practice in co-treatment with a physical therapist in pediatric physical rehabilitation?

Research Question #3: What is the physical therapist's scope of practice in co-treatment with a music therapist in pediatric physical rehabilitation?

Research Question #4: What is the potential relationship between these variables in the emerging model?

Chapter 3: Method

This study conceptualized a theoretical model that supports co-treatment intervention between music and physical therapy to optimize pediatric rehabilitation outcomes. Theory development generally involves five phases – conceptualization, operationalization, confirmation, application and refinement – that are interconnected and iterative. The process can oscillate between inductive and deductive reasoning using practice to inform theory and theory to inform practice. The purpose of theory development is to foster a deeper understanding of a phenomenon and application in practice of what to do and why something works (Swanson & Chermack, 2013). Conceptualizing the variables involved in a phenomenon are an important first step to improving best practices and intervention design, particularly for aspects of practice that are newly emerging or have limited research to support the practice. Therefore, the *Music Therapy-Physical Therapy Co-Treatment Model for Pediatric Physical Rehabilitation* articulates a theoretical model based on the existing published literature and framed in the context of the researcher's lens.

Knowledge Framework

A *knowledge framework* seeks to improve research development and design through the description of four main components in a clearly defined direction that promotes sound outcomes (Crotty, 1998). These four components are epistemology, theoretical perspective, methodology, and method. The description of the various components within this knowledge framework highlights the connection between the research processes and justifies the addressment of the research questions.

Epistemological Stance

Epistemology describes the theory of knowledge, therefore the *epistemological stance* outlines the fundamental philosophical grounding that supports what knowledge is possible and the approach to uncovering it (Crotty, 1998). The epistemological approach for this study is constructionism. Constructionism lies between objectivism and subjectivism, meaning that truth and understanding come from the study of both the object and the subject, and that that they are separate but connected (Crotty, 1998; Matney, 2019). Constructionism utilizes both subjective and objective data in order to conclude meaning and truth related to co-treatment. This theoretical model was designed based upon synthesized objective data that includes peer reviewed journal articles related to co-treatment and published case studies viewed through the subjective data of the researcher's own lived experiences as a clinician.

Theoretical Perspective

The theoretical perspective outlines the philosophical stance that supports the chosen methodology and aligns it with the *epistemological stance* (Matney, 2019). Describing the *theoretical perspective* provides context and grounding for the research process and allows for the identification of assumptions brought into the research (Crotty, 1998). This study supports the utilized methodologies through structuralism and phenomenology.

Through model creation, the researcher will be analyzing relational structures and systems and relevant research that supports the creation of the different facets of this model. Structuralism supports the methodology of literature review and content analysis and the structure of analyzing experiences both in relevant research and experiences of the researcher in order to create a theoretical model for how co-treatment optimizes patient outcomes (Pace, 1978).

Phenomenological research seeks to describe the common understanding or meaning of individuals' life experiences of a lived phenomenon. Although the idea of a phenomenon suggests mystery or illusiveness, Merriam-Webster defines a phenomenon as simply an "observable fact or event" (n.d.). A phenomenon sparks interest in others, often from a lack of understanding surrounding it. Phenomenological research reduces individual experiences with a phenomenon down to a description or collection of themes of the universal "essence". By collecting and synthesizing data from those who have experienced the phenomenon, researchers can develop a composite description of the experience in order to understand the "what" and the "how" of the phenomenon (Creswell, 2016, p. 80)

Co-treatment is an intervention strategy that therapists have utilized in clinical and research settings, but co-treatment has rarely been the focus of the research itself. This lack of understanding and research supporting the use of co-treatment suffices its categorization as a phenomenon for the purpose of this study. Additionally, by lacking a foundational base of research that specifically supports the efficacy of this treatment strategy, the use of co-treatment as a tested intervention is not evidenced-based. Furthermore, there is a lack of research that describes and outlines the use of co-treatment in order to provide ethical and/or strategic guidelines for successful co-treating services. Although many treatment strategies may present differently each time they are utilized, there are often guidelines to the procedures or planning considerations for therapists to use in order to guide the implementation of that strategy. Co-treatment as a treatment intervention does not have such guidelines or all-encompassing ethical considerations for how to go about facilitating it. Phenomenology is utilized in order to critically describe the under-studied phenomenon of co-treatment by uncovering themes and applying truth and meaning from the researcher's knowledge and clinical lens. Therefore, by utilizing an

iterative literature review that is shaped by initial phenomenological reflection, the researcher was able to identify variables highlighted in the literature related to the phenomenon and make an emerging interpretation of the variables from the perspective of the researcher's lived experience as a co-treating music therapist in pediatric rehabilitation.

Researcher's Lens. The description of the researcher's lens (known as *bracketing*) is a tool of qualitative research that mitigates the potential bias and preconceptions that may be unintentionally present and influential within the research due to the close relationship between the researcher and the research topic (Tufford & Newman, 2012). Described below is the researcher's lens that grounds their understanding of the co-treatment phenomenon based on previous experience prior to the implementation of the research study.

The researcher has participated as a music therapy clinician in co-treatment intervention in both professional and pre-professional clinical experiences throughout their career. A majority of these clinical experiences have taken place within the physical rehabilitation context, but the settings have ranged from a small outpatient clinic to an inpatient physical rehabilitation unit at a large children's hospital. Throughout these experiences, the researcher has had the opportunity to co-treat alongside physical therapists, occupational therapists, speech-language pathologists, and a variety of other health professionals. The researcher commonly received referrals for co-treatment when another therapist was unable to motivate a patient to complete a task or participate in their physical rehabilitation due to pain, fatigue, or other factors. The researcher utilized music therapy as a way to support the physical rehabilitation goals in an engaging format that was tailored to the patient's preferences and needs. While preparing for co-treatment intervention, the researcher found gaps within collaborative literature regarding co-treatment, despite the researcher's experience of co-treatment's frequent use in the medical setting. As the

researcher dug deeper to better navigate concepts such as the relationship between therapists with overlapping scopes of practice and addressing multiple goals in co-treatment, there was limited research that outlined guidelines for these processes, or even acknowledged the challenges that can arise within the co-treating therapeutic relationship for music therapists. As the researcher transitioned back to academia for a graduate degree, it was clear that the combination of scattered support of co-treatment intervention and its prevalence around the researcher, required further study.

Methodology

The methodology encompasses the research design that articulates a plan of action to support connections between specific methods and the desired research outcomes (Crotty, 1998; Matney, 2019). The methodology in this study was an iterative literature review that utilized content analysis and reflection based on the researcher's clinical experience in order to construct a theoretical model of co-treatment. Analysis of the researcher's lived clinical experiences related to co-treatment in pediatric physical rehabilitation provided the initial identification of potential variables for the co-treatment model and search terms for the literature. An iterative literature review then supported and guided the creation of the skeletal structure for the model and the identification of common themes, fleshing out the model. Throughout the process, continual reflection of clinical experiences informed the iterative literature search to fill additional gaps wherever possible. In-depth reflection by the researcher may improve the acuity of the research and allow for multifaceted analysis within results (Tufford & Newman, 2012).

Methods

Researcher Reflection. The initial step to developing the theoretical model involved the researcher participating in a deductive process of identifying contributing variables of the co-

treatment phenomenon based on clinical experience. Brainstorming sessions included journaling and review of previous clinical experiences in order to identify variables and factors to examine throughout the literature analysis. The researcher then utilized their clinical experience to articulate an initial problem statement that identified the primary challenges within this setting, and begin to hypothesize the potential affect that this research can have on it. Four research propositions were then written for comparison following the completion of the model. Based on the initial brainstorming of potential variables, initial key words were identified for use in the content analysis.

Literature Analysis. The following steps outlined in bullet format were utilized to gather information from the literature to develop the theoretical model. The literature was searched and analyzed to identify variables until the process illustrated saturation of the potential variables, i.e. when patterns in the literature were repeated, therefore indicating that the researcher had identified all potential variables to define the conceptualization phase of the theoretical model.

- Literature was reviewed via PsychINFO, PubMed, and Web of Science databases by searching key words and phrases that include “music therapy co-treatment,” “physical therapy co-treatment,” “co-treatment,” “physical rehabilitation,” “interdisciplinary,” “transdisciplinary,” “patient needs,” and “collaborative treatment” for peer reviewed journals and books that related to co-treatment in pediatric physical rehabilitation.
- Collaborative terminology definitions within differing articles were compared for similarities and the most relevant definitions were utilized. Core terms and concepts were defined based on the combination of existing literature and definitions, along with the researcher’s knowledge and experience.

- Within related literature that was gathered, themes were extracted that related to the following topics:
    - Goals of co-treatment intervention
    - Patient needs in physical rehabilitation
    - Patient reported benefits of co-treatment
    - Music therapy goals in co-treatment
    - Physical therapy goals in co-treatment
    - Music therapy scope of practice
    - Physical therapy scope of practice
    - Rationale for use of co-treatment
    - Co-treatment methods
- The variables that were identified based on the researcher's initial phenomenological reflection and the content analysis were compiled into list with groupings based on relatedness of variables.

Model Assembly. Once literature had been reviewed and common themes and variables were extracted, the researcher created a list that includes variables and factors that are necessary to consider in co-treatment and therefore required inclusion within the visual representation of the model. The process of assembling the model included the following:

- Identified relationships within the literature were connected with a solid-lined arrow to visualize the association.
- Relationships that were eluded to within the literature but did not provide generalizable conclusions were connected with a dotted line, signifying an extant relationship that required further research to discern the nature of the relationship and its effects.

- Ten areas of patient needs in physical rehabilitation were identified and were then categorized into two general domain categories, each connected with arrows.
- Therapists' scopes of practice were described using key words and represented visually based on how they related to patient needs in physical rehabilitation.
- The efficacy of co-treatment was described based on the relationship between co-treatment, patient needs in physical rehabilitation, and the contributing therapists' scopes of practice.
- During model assembly, potential limitations of the model were identified. These limitations, along with strategies for future refinement of the theoretical model, were described following the completion of the model.

Chapter 4: Results

The purpose of this study was to identify a theoretical model that explores co-treatment between music therapy and physical therapy in pediatric rehabilitation. Development of the theoretical model requires conceptualization of the boundaries and propositions, identification of the potential constructs and related variables (supported by the literature) and articulation of the connections between the constructs and variables to explain the phenomenon. As a theoretical model, results are hypothetical in nature due to limitations in the literature and clinical documentation of the co-treatment. However, it provides a way to identify the relationships between co-treatment and patient outcomes. Further exploration of the relationships and operationalization will help the model shift to a theoretical framework.

Boundaries and Propositions

This theoretical model focuses on co-treatment intervention between music and physical therapists in the pediatric physical rehabilitation setting for young children. This population and setting were initially identified for study based upon the researcher's clinical experience and interest in the area of music therapy in physical rehabilitation utilizing co-treatment intervention. Examination of existing co-treatment literature for settings, populations, and method of study, the researcher's reflections of clinical experience in co-treatment, and identification of gaps in the foundation of knowledge framed the selection of defining a theoretical model. Although the co-treatment literature has been published with focus on a variety of settings, physical rehabilitation and pediatric populations were the most frequently used settings and therefore allowed for the greatest amount of evidence-based literature to be incorporated into the construction of the model.

The *Music Therapy-Physical Therapy Co-Treatment Model for Pediatric Physical Rehabilitati*on identifies factors and variables specific to music and physical therapy co-treating relationships; it is not necessarily transferable as a whole to therapist co-treating relationships within different disciplines in its current hypothetical format. There exist unique attributes that make up both music and physical therapy professions, and the intricacies of how their trainings and professional capabilities may overlap. Similarly, this model was created for the physical rehabilitation setting with pediatric patients. Physical rehabilitation emphasizes physical needs as the primary domain for treatment intervention, where as other sub-settings within the medical setting may identify a variety of types of patient goals as primary needs. Although some aspects of this model may be applicable to different settings or patient populations, it was created for the purpose of outlining these factors within the boundaries of music and physical therapy co-treating relationships in pediatric physical rehabilitation.

Propositions describe the logic for the inclusion of variables in the model and provide clarification as to why the variable is included (Swanson & Chermack, 2013). The propositions for this theoretical framework include:

- If psychosocial needs are addressed simultaneously to physical needs in pediatric physical rehabilitation, then treatment outcomes will be optimized and hospital stays will decrease in length.
- If physical therapists can address physical needs but not psychosocial needs, then another professional who is an expert on this domain area should be included in a co-treatment model of care.
- If music and physical therapists' scopes of practice are better outlined and communicated, then role conflict during co-treatment can be avoided.

- If music and physical therapists participate more frequently in collaborative work with distinct, yet more integrated roles (defined by professional scopes of practice), then that will lead to more effective co-treatment intervention practice and research.

Music Therapy-Physical Therapy Co-Treatment Model for Pediatric Physical Rehabilitation

Figure 1 illustrates the theoretical model and is followed by a description of each of the constructs and associated variables.

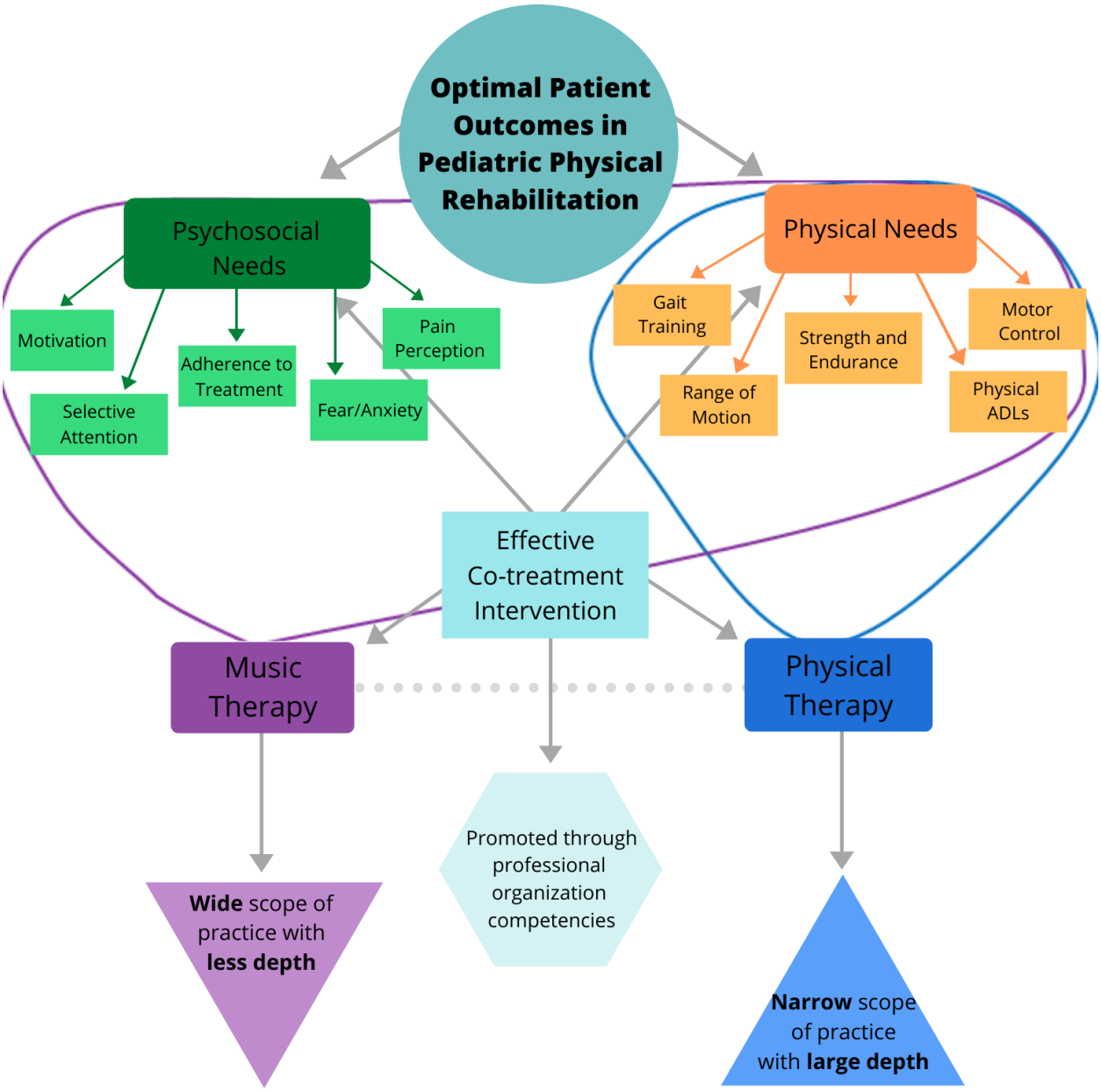

Figure 1: Music Therapy-Physical Therapy Co-Treatment Model for Pediatric Physical Rehabilitation

Patient Needs in Pediatric Physical Rehabilitation

Based on the literature regarding referral reasons, targeted goal areas, and patient outcomes, patient needs were disseminated into two overarching domain areas, physical needs (American Academy of Physical Medicine and Rehabilitation, n.d.; American Physical Therapy Association, 2014; Bryanton et al., 2006; Damiano & DeJong, 2009; Latham et al., 2005; Smania et al., 2011; Suman et al., 2001; Taylor-Schroeder et al., 2011; Thaut et al., 1997) and psychosocial needs (Bayón et al., 2018; Blumberg, 1978; Chen et al., 2004; Karageorghis, & Priest, 2012; Linton, & Shaw, 2011; McDonnell, 1983; Patenaude & Kupst, 2005; Perrin & Gerrity, 1984; Swiggum et al., 2010; Vaudreuil et al., 2019; Wohlheiter & Dahlquist, 2013). These needs encompassed both primary reasons for therapeutic intervention and secondary goal areas of inhibiting factors or behaviors that are disrupting overall progress. Primary and secondary goals are used in physical rehabilitation to maximize independence in daily living and improve quality of life (American Academy of Physical Medicine and Rehabilitation, n.d.).

Physical Needs

Gait Training. Patients who suffer from a stroke or other spinal cord injuries may display inconsistencies and varied difficulties with walking ability (Latham et al., 2005). Additionally, gait limitation is a major impairment in young children with cerebral palsy and maximizations of gait training may lead to enhancement of independence and improvement of quality of life (Bayón et al., 2018; Smania et al., 2011). Physical rehabilitation is frequently used as a treatment intervention to rehabilitate gait and promote efficiency of mobility through velocity, stride length and symmetry, endurance, and distance (Thaut et al., 1997).

Range of Motion. Range of motion describes the amount of mobility a joint or group of joints' has in movement capacity achieved through active muscle contraction (known as dynamic

flexibility) or passive joint movement due to an external force such as gravity (Roberts & Wilson, 1999). Injuries and neurologic disorders can leave a patient with decreased active and passive range of motion that inhibit the functional use of limbs and mobility (Yasukawa et al., 2006). Range of motion may be impacted in upper or lower extremities within both fine and gross motor movements. Physical rehabilitation is utilized in order to improve mobility and range of motion through stretching and strength training, among other intervention strategies (Taylor-Schroeder et al., 2011).

Strength and Endurance. Patients with chronic motor disorders may experience deteriorated strength and muscle tone that requires treatment through strength and endurance training (Damiano & DeJong, 2009; Smania et al., 2011). Additionally, traumatic injuries such as severe burn often result in extensive and persistent muscle breakdown and weakness (Suman et al., 2001). Promotion of strength though increasing intensity of physical activity will aid in the promotion of general health for these patients and allow for improved independence and functional gains. Additionally, endurance and fatigue are often addressed in order to maximize gains in physical rehabilitation by increasing repetitions and sustained effort in various aerobic exercises and gait training (Damiano & DeJong, 2009). Young patients may display difficulties in repetitive or sustained tasks due to limited development in attention and therefore may display lower abilities in strength and endurance for therapeutic tasks (Akshoomoff, 2002).

Motor Control. Controlling and coordinating muscle movements may be difficult for pediatric patients recovering from injuries or living with chronic disorders and may lead to overall decreased selective control in motor movements (Bryanton et al., 2006; Suman et al., 2001). Limited active range of motion can inhibit a patient's functional use of their limbs (Yasukawa et al., 2006). Young children, who may not yet have mastered functional use of

extremities, may encounter greater difficulties in rehabilitating functional skills than older children (Chen et al., 2004). Improving control in motor movements through physical rehabilitation may lead to improved autonomy and overall quality of life (Bayón et al., 2018).

Activities of Daily Living (ADLs). Activities of daily living, or ADLs, encompass a variety of tasks that require mastery in order to function within daily life. There are two types of ADLs, self-care tasks and domestic life tasks. Self-care ADLs include bed mobility, grooming, eating, dressing, bathing, and transfers in/out of wheelchairs or other walk-assisting devices. Domestic life ADLs are more complex tasks that may consist of caring for dependents, performing housework or yard work, or shopping (American Physical Therapy Association, 2014). Addressment of ADLs may consist of training and education related to environmental factors such as physical barriers (built or natural) assistive technology and devices, transportation, and information and technology access (Hammel et al., 2015). ADLs encompass a variety of tasks that may require multiple steps for completion. Pediatric patients may display difficulties in completing tasks depending upon their cognitive development, as completion of two to three step directions is a skill typically being developed in three to four-year-old children (Centers for Disease Control and Prevention, 2019). Therefore, pediatric patients and their caregivers may require enhanced education and training in ADLs depending on the patient's developmental level and difficulty of the ADL tasks.

Psychosocial Needs

In addition to the physical needs that rationalize the need for physical rehabilitation, there is an additional set of needs that often require addressing for pediatric patients. The psychosocial set of patient needs encompasses social, emotional, and autonomous factors. In pediatric physical rehabilitation, patients are young children with brains that are still undergoing development

(Perrin & Gerrity, 1984). Without a fully developed brain, children may be unable to comprehend the importance of completing therapeutic tasks and understand the purpose of the tasks they are being asked to complete. Children display shorter attention spans, underdeveloped impulse control, and may be unable to sustain attention on therapeutic tasks that may be characterized as painful, tedious, or boring (Perrin & Gerrity, 1984). Additionally, children who did not make self-care gains may have substantially longer rehabilitation stays, despite receiving extensive treatment (Chen et al., 2004). Pairing various psychosocial needs with physical needs during pediatric rehabilitation can support treatment of the whole child, and may result in improved overall outcomes.

Motivation. Repetitive and endurance based therapeutic tasks can be tedious in nature as they are asking the patient to do the same movement or task numerous amounts of time, or sustain one movement or task for a desired length of time. The stagnant repetitiveness of this process can be seen as "boring," especially by pediatric patients who may not fully grasp the purpose of why they are completing these tasks (Perrin & Gerrity, 1984). By addressing and promoting patient motivation, they can engage at a higher level, which will in turn promote improved outcomes.

Selective Attention. During tasks that are uncomfortable, scary, or difficult for the patient, it can be challenging to focus on anything other than the task at the present moment. Pain demands patient attention; developing selective attention for alternate engagement and cognitive shifting are skills that can be used as strategies to address pain (Linton & Shaw, 2011). Improvement in selective attention skills will promote distraction from unpleasant tasks or procedures while engaging in activities that allow for independent decision making and positive

social interaction, which are frequently inhibited during hospitalization (Beckett & Taylor, 2010, p. 151; Meijer et al., 2000).

Adherence to Therapy. Pediatric patients who experience disruption in their social/emotional development may struggle with impulse control and multi-step direction (Perrin & Gerrity, 1984). Additionally, attention and engagement are generally difficult for children under 4.5 years old which can inhibit a young patient's ability to adhere to therapeutic tasks or regimen that has been prescribed for them (Akshoomoff, 2002; Centers for Disease Control and Prevention, 2019). Improving adherence to therapy will support completion of therapeutic tasks and the therapy regimen. By adhering to treatment, patients will be more likely to achieve physical outcomes, which may lead to improved independence and quality of life (Bayón et al., 2018).

Fear/Anxiety. Pediatric patients in the medical setting may develop depression, anxiety, or fear related to treatment due to family separation or increased number or strangers now present in their lives (Blumberg, 1978; Perrin & Gerrity, 1984). Fear and anxiety may also be a result of patient difficulties in coping or posttraumatic stress symptoms (Patenaude & Kupst, 2005). Addressment of fear, anxiety, or other negative emotions related to treatment may relate to improvements in order need areas such as motivation, attention control and adherence to treatment (Linton & Shaw, 2011).

Pain Perception. Pain, although a subjective experience, is generally known to be an unpleasant sensory or emotional experience that, following prolonged or repeated exposure, can augment responses to future stimuli, both painful and not (Merskey, 1986). Addressing psychosocial pain management is necessary due to the potential pain that a patient may endure

during a variety of physical therapy exercises, including assisted stretching, assisted walking, and independent standing (Swiggum et al., 2010).

Efficacy of Co-Treatment Intervention

Therapist Scope of Practice

The scope of practice of participating therapists is a crucial component to the visual model of co-treatment. By articulating facets of capabilities by the contributing therapists within the boundaries of this model, this can positively affect the perception of roles, improve seamlessness of co-treating intervention, and promote mutual respect within therapists' relationships (Darsie, 2009).

Physical Therapy. The physical therapy scope of practice outlines the therapists' capability to treat patients in order to decrease pain, promote/restore movement and function, and utilize fitness and wellness programs in order to prevent disability and loss of mobility (American Physical Therapy Association, 2019a). Their scope is narrower in its domain focus, emphasizing physical, physiological, and motor goal areas. This focus can be seen through the general training curriculum that physical therapy students take part in. Physical therapy training programs generally include classes pertaining to topics such as biology, anatomy, physiology, exercise science, neuroscience, biomechanics, kinesiology, and the cardiovascular system (American Physical Therapy Association, 2019c). This training positions physical therapists as extremely knowledgeable in treating physical needs, but does not suggest that they would be as knowledgeable in treating other goal areas. For these reasons, physical therapy's scope of practice was characterized as narrow but deep. Therefore, within the therapeutic relationship between physical and music therapists co-treating in pediatric physical rehabilitation, the physical therapist would be the expert in treating physical goals.

Music Therapy. Within the theoretical model, the music therapy scope of practice is characterized as engaging with a wide scope of domains, but with less depth. Music therapists are given training that allows professionals to address a variety of goals in order to assist in development, rehabilitation, medical, mental health, preventative, wellness care, and educational services (American Music Therapy Association, 2015). This variety of settings and services allows music therapists to address patient needs in any domain area, including physical, cognitive, psychosocial, developmental, and communication (American Music Therapy Association, 2013a, 2013b, 2015). Throughout training, music therapists become competent musicians who have the capabilities to adapt music in diverse ways for a variety of reasons, while also becoming competent therapists with the knowledge to address goals in any domain area. This breadth hinders the ability to become experts in every area, leaving it up to the training program to choose areas for further training. Although knowledgeable in treating physical goals, music therapists would not be deemed experts in addressing physical goals. On the other hand, music therapist undergo training that enhances their knowledge and expertise in addressing psychosocial goals from the social and emotional domain areas. Music therapy has been found to improve outcomes in many of the outlined psychosocial needs in pediatric physical rehabilitation including motivation (Karageorghis, & Priest, 2012; Vaudreuil et al., 2019), selective attention/cognitive shifting during painful experiences (Vaudreuil et al., 2019; Wohlheiter & Dahlquist, 2013), and treatment-related fear/anxiety (McDonnell, 1983). Therefore, music therapists would be more knowledgeable in addressing psychosocial goals in the therapeutic relationship between music and physical co-treating therapists. Despite not being positioned as the expert in addressing physical goals, already possessing training and knowledge related to physical goals situates music therapists to be ideal collaborators; they have baseline knowledge

of goal areas across the spectrum of domains, and are knowledgeable as to how music experiences may play a specific role in improvement within those domains.

Promotion by Professional Organizations

Within music and physical therapy professions, co-treatment is promoted as an intervention and a collaborative opportunity within governing organizations. The American Music Therapy Association (AMTA) lists interdisciplinary collaboration within its *Professional Competencies*; it also highlights developing working relationships with other therapeutic professionals and collaborating with team members in order to design interdisciplinary treatment plans (American Music Therapy Association, 2013b). Additionally, the *Scope of Music Therapy Practice* further defines music therapists as members of interdisciplinary treatment teams and that they support treatment goals by co-treating with other members of the interdisciplinary team (American Music Therapy Association, 2015). Within the American Physical Therapy Association's (APTA) *Vision Statement for the Physical Therapy Profession and Guiding Principles to Achieve the Vision*, guiding principles are listed that should be strived for in order to demonstrate how to achieve the organization's mission. One of APTA's guiding principles is collaboration; the above vision statement notes that physical therapists should demonstrate the value of collaboration with other health professionals, practice collaborating across the continuum of care, and participate in interdisciplinary clinical and research work (American Physical Therapy Association, 2019b). Therefore, these professional organizations support the practice of collaboration, interdisciplinary and transdisciplinary treatment models, and the practice of co-treating intervention.

Chapter 5: Discussion

Treatment planning for medically complex children in physical rehabilitation requires collaboration from service providers in the pediatric medical setting. This includes coordination between doctors, nurses, family, and therapy services such as physical therapy, occupational therapy, speech therapy, and music therapy. Collaborative treatment is necessary to provide well rounded care for all of the patient's needs (Cohen et al., 2011). Music therapists and other allied health professionals are actively seeking collaborative intervention strategies, such as co-treatment, to utilize within patient care. Moreover, there is a desire for music therapists to participate in additional training to hone skills related to collaborative treatment strategies (Register, 2002; Wilhem, 2017). In pediatric physical rehabilitation, patient needs may be centered around physical needs, but may also encompass psychosocial needs in relation to their hospitalization, diagnoses (Chmielewski et al., 2011) and development (Diepeveen et al., 2018; Flensborg-Madsen & Mortensen, 2018; Meijer et al., 2000; Murray et al., 2007; Perrin & Gerrity, 1984).

Unlike other therapeutic professions in physical rehabilitation, music therapists have the scope of practice capacity to fill the treatment gap in patients' psychosocial needs that other therapeutic professionals are unable to treat (American Music Therapy Association, 2015; McDonnell, 1983). Music therapists utilize music as a way to help patients distract, motivate, endure, and/or cope with various aspects of treatment. Due to the limited research literature available on music therapy co-treatment, there is a gap in the foundational knowledge supporting the efficacy and scope of practice guidelines that are currently being utilized by therapists in a collaborative setting. Additionally, despite this collaborative role that music therapists fill, they, and other therapeutic professionals, are not always receiving training that prepares them for these

roles. By outlining music and physical therapists' scope of practice and roles during co-treatment intervention, therapists can optimize their treatment to promote patient outcomes and build interprofessional relationships through collaboration and mutual understanding of one another.

The purpose of this study was to identify patient needs and prominent variables within the use of co-treatment intervention in pediatric physical rehabilitation by synthesizing relevant literature and researcher's clinical experiences into a theoretical model. The research aim was to articulate a model that outlines the functionality and therapists' scopes of practice for co-treatment intervention between music and physical therapists in pediatric physical rehabilitation. Creation of the theoretical model answered the four research questions by highlighting primary variables, therapists' scope of practice, and the relationship between variables as primary facets of the visual representation. The propositions of this model were utilized in the creation of the theoretical model and were addressed in the following ways:

If psychosocial needs are addressed simultaneously to physical needs in pediatric physical rehabilitation, then treatment outcomes will be optimized and hospital stays will decrease in length.

Previous research has highlighted that patient needs in physical rehabilitation are not limited to the physical impairments and diagnoses that lead to therapeutic intervention (Blumberg, 1978; Linton & Shaw, 2011; McDonnell, 1983; Patenaude & Kupst, 2005; Vaudreuil et al., 2019). By addressing both physical and psychosocial patient needs within physical rehabilitation, patient outcomes can be improved, which can lead to quicker recovery and shorter hospital stays (Karageorghis, & Priest, 2012; Monas, 2013; Wohlheiter & Dahlquist, 2013). Treatment of the whole child encompasses all contributing domain areas in order anticipate and

combat psychosocial needs that are often prevalent within hospitalized children (Blumberg, 1978; Meijer et al., 2000; Perrin & Gerrity, 1984).

If physical therapists can address physical needs but not psychosocial needs, then another professional who is an expert on this domain area should be included in a co-treatment model of care.

Physical therapists receive thorough training that allows them to address patient needs within the physical domain of physical rehabilitation. Physical needs are the dominant domain area of pediatric physical rehabilitation; however, psychosocial needs were identified as an additional subset of patient needs in pediatric physical rehabilitation that require attention to optimize patient care. Music therapists receive pre-professional training that provides them with the capacity to address psychosocial needs, encompassing social, emotional, and communication skill areas. As highlighted in the theoretical model, music and physical therapy co-treatment can address needs of the whole patient that encompass both physical and psychosocial goals in pediatric physical rehabilitation.

If music and physical therapists' scopes of practice are better outlined and communicated, then role conflict during co-treatment can be avoided.

The respective scopes of practice for music and physical therapists were outlined and described within the theoretical model, both with general descriptors and visual indication of how it related to the identified patient needs in pediatric physical rehabilitation. Although an overlap was highlighted – that both music and physical therapists receive training and have the professional capabilities to address physical goals – physical therapists receive more in-depth training on physical goals, making them the expert in addressing physical goals within the therapeutic relationship. Additionally, music therapists receive training on addressing

psychosocial goals that physical therapists may not, making music therapists the expert in addressing psychosocial patient needs within this therapeutic relationship. This distinction provides clear roles for domain specific goal areas for co-treatment lessening confusion and defining how music therapist and physical therapists can simultaneously compliment the rehabilitation needs of the young child in pediatric rehabilitation.

If music and physical therapists participate more frequently in collaborative work with distinct, yet more integrated roles (defined by professional scopes of practice), then that will lead to more effective co-treatment intervention practice and research.

Although not specifically addressed within the creation of this theoretical model, the articulation of defined guidelines and variables for consideration in co-treatment intervention may lead to increasing willingness to participate in this intervention strategy by music and physical therapists. This willingness to collaborate in clinical practice may then lead to increasing interest in the topic of co-treatment intervention, therefore spurring further development of practice guidelines and research on the intervention strategy. Further development of co-treatment and other collaborative treatment strategies will continue to promote a transdisciplinary treatment model that allows for the addressment of the whole child throughout hospitalization.

Strengths of the Theoretical Model

The *Music Therapy-Physical Therapy Co-Treatment Model for Pediatric Physical Rehabilitation* was created to identify patient needs in pediatric physical rehabilitation, outline the scopes of practice for the two contributing professions, and outline the relationships between different variables within the model. The model identified and encompassed patient needs commonly found within related literature and categorized them into two domain areas (physical

and psychosocial) and then related need categories across the two domains. These needs allow for specific considerations during treatment to streamline the rehabilitation process and emphasize the examination of needs that have been previously overlooked, thus optimizing pediatric rehabilitation in young children.

Additionally, the theoretical model was created through the lens of the researcher, who is a music therapist clinician with experience participating in co-treatment intervention with physical therapists in pediatric physical rehabilitation. This perspective provides valuable insight for the music therapist's role in the co-treating relationship from not only the current literature, but the researcher's clinical experience as a co-treating therapist. This lens not only assisted in the preliminary identification of needs and shaping of the model, but provided a baseline of knowledge that served as a starting point prior to integrating the related literature on co-treatment.

Limitations of the Theoretical Model

This model is informed through a particular researcher's lens: a therapist with clinical experience in co-treatment between physical therapy and music therapy. This experience does not incorporate the clinical lens of the physical therapist. Without a physical therapist's clinical perspective, the theoretical model is limited by conclusions that can only be drawn from the researcher's interpretations of sparse extant research. Therefore, researcher bias may be present within the study. Readers are therefore cautioned to consider this theoretical model with a conservative mindset.

The therapeutic relationship between music and physical therapists was found to be a contributing variable within co-treating intervention, but limited existing literature prevented solid conclusions from being drawn on the implications this relationship has on the efficacy of

co-treatment. Research has highlighted the varied complexities in the individual relationship between therapists and patients in the physical rehabilitation, highlighting conclusions that the therapeutic alliance can impact patient outcomes (Hall et al., 2010). Moreover, ambiguity and misalignment of role expectations have been found to negatively affect job performance (Darsie, 2009). The relationship between treating therapists should be further studied through multiple case studies in order to identify necessary interpersonal and intrapersonal skills necessary to be a successful co-treating therapist and discern effects of strong and weak therapeutic relationships on patient outcomes.

Another limitation to this model is the exclusion of billing as a contributing variable for the study. Previous literature has highlighted the role that insurance billing plays in whether or not patients are able to receive necessary services (Monas, 2013). Insurance billing can also contribute to the identification of lead and support roles in collaborative intervention (American Speech-Language-Hearing Association, 2012). Music therapy is frequently a non-billable service for patients in the pediatric medical setting; however, physical therapy is a billable service. Although billing is a contributing factor for coordinated treatment, the purpose of this model was to examine patient needs as it relates to therapeutic resources without the constraints of billing. By focusing on the addressment of patient needs without the limitations of billing as a factor, this model can first articulate the optimal therapeutic avenues to address patient needs in pediatric physical rehabilitation.

Implications for Practice

Co-treatment in pediatric physical rehabilitation allows for addressing not only the physical needs that rationalize therapeutic intervention; it also promotes treatment of the whole child by addressing additional psychosocial patient needs that may impede patient progress.

Previous research has highlighted the prevalence of co-treatment (Register, 2002; Sylvester et al., 2017; Wilhelm, 2017), but few studies have outlined specific guidelines or identified important variables that can be generalized to various treatment settings. This model articulates ten categories of patient needs that are organized into two domain areas. The clear articulation of the prominent patient needs based on researcher experience and the synthesis of related literature provides clarity for clinicians assessing patients for co-treatment intervention and the distinct roles the music and physical therapists have in addressing the needs of the whole child.

Additionally, the theoretical model highlights the existing overlap in therapists' scope of practice for music therapists and physical therapists in physical rehabilitation. This overlap may cause tension and role conflict within the therapeutic relationship when considering lead and support roles during treatment. Without a clear understanding of the training the other professional participates in and the breadth and depth of their knowledge, there can be difficulties in communication and ease within the therapeutic relationship. Both professions have the training to address physical goals; however, physical therapy has greater depth in physical domain goals whereas music therapy has greater breadth across multiple domains, including the psychosocial domain. This model provides an overview of both music and physical therapists' scope of practice from pre-professional training in order to recommend suggested expert roles for addressing a patient's physical and psychosocial needs in a collaborative treatment model.

Implications for Advocacy

This theoretical model has implications for advocacy in music therapy, physical therapy, and any profession that utilizes co-treatment. The articulation of a model that outlines scope of practice and provides suggestions for expert roles may improve communication between therapists as information is clearly organized in a way that highlights best approaches to

addressing patient needs. In addition to improving communication, the illustration of therapists' scopes of practice can improve understanding and awareness of other professionals' skills and capabilities in a treatment setting. As communication and clarity of roles improves, this may lead to increasing opportunities for co-treatment practice and collaborative research experiences. Participation in these opportunities will aid in the continued refinement and examination of co-treatment as an intervention practice.

Recommendations for Future Research/Development

As the limitations of the model have highlighted, the next phase of this model will benefit from research collaboration, encompassing both music and physical therapists. Including members from both contributing professions will allow for further development of the intricacies of the related variables and uncover additional facets that were not yet considered. Furthermore, contributing research on this topic should continue to utilize music and physical therapists who have first-hand clinical experience providing co-treatment intervention either as researchers or consultants in future studies. By including clinicians with firsthand experience co-treating, researchers will be able to weave clinical experiences and knowledge along with relevant literature into well-defined studies that address the current gaps in the literature while being cognizant of current practices in co-treatment.

Further research should also investigate the role relationships play within the efficacy of co-treatment intervention and how it can impact patient outcomes. Important relationships to consider would be the relationship between the co-treating therapists, the patient-therapist relationship, and also the triadic relationship between the two therapists and the patient. Examination of these different relationships may illuminate the impact that the strength of the

relationship can effect patient outcomes and also identify necessary interpersonal and intrapersonal skills for supporting these therapeutic relationship.

Conclusions

This study synthesized relevant music therapy, physical therapy, and other extant literature in order to articulate a theoretical model of contributing variables for co-treatment intervention in pediatric rehabilitation. This model highlights patient needs along with each therapists' scope of practice; it also connects related variables that contribute to the efficacy of co-treating intervention such as the therapists' relationship and the promotion from professional organizations. By visually articulating a model for practice, guidelines for specific procedures within this intervention strategy can continue to be refined in order to fine tune co-treating practice. Standardization of co-treatment intervention will reduce the amount of personal interpretation within roles, responsibilities, and procedural actions between therapists, resulting in research that is more likely to be generalized, as well as more likely to be translated into clinical practice. Efficacious co-treatment in pediatric rehabilitation has the potential to expedite patient outcomes and reduce the length of hospital stays, ultimately improving developmental outcomes for young children requiring pediatric physical rehabilitation.

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