The Relationship Between Music and Language Acquisition:

Causes of Increased Comprehension of Language and Communication Within Music Therapy

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Author Note

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Introduction

Individuals with disorders or disabilities battle a range of limitations. These limitations may call for additional support in areas including behavior/emotion, communication, gross and fine motor movement, or cognition. When a child is diagnosed at birth or a very young age with a disorder or disability of any kind, it is crucial that interventions target problem areas as soon as possible to reduce the likelihood of a more severe diagnosis as the child continues to age.

When language-based milestones are not met, for example, it can create a "domino effect" which can impact the rest of the developing mind and body. Language- or communication-based delays can make an individual with complexities more susceptible to intellectual, learning and social interaction difficulties. When thinking of therapists whose job it is to help individuals achieve language- or communication-based goals, what often first comes to mind is the profession of speech pathology. However, speech pathologists are not the only health care professionals who are trained to provide clinical treatment to those with language and communication goals; music therapists also work with individuals on similar goals. Music is a strong and unique tool being used more and more in therapeutic settings because clinicians are starting to see the value music has when used to target areas such as language comprehension and acquisition.

Individuals in special education programs are not always provided all the resources that may be beneficial for them due to financial burdens on their family or the institution in which they attend. When music therapy is used, both alone and in collaboration with other therapists such as speech pathologists, research suggests that individuals become more engaged, use more

parts of their brain, and store information with greater accuracy. This begs the question: is there a relationship to be found between music and language?

Many music therapists and speech pathologists would answer, yes. When it can be afforded, a music therapy/speech pathology co-treatment can greatly benefit an individual who is seeking to achieve language- or communication-based goals. In schools, students who receive holistic treatment have been found to display more academic and personal growth than those who receive only one form of therapy (American Music Therapy Association, 2015).

Unfortunately, many music therapy programs do not receive the funding necessary to enable them to reach out to those in need because in some areas of the country, it is still considered "experimental treatment." Experimental treatment is often not covered by insurance, thus, making this form of therapy difficult to afford for both families and schools. With the continued publishing of evidence-based music therapy, therapists may be able to sway the minds of insurance companies to prove that music therapy is so much more than experimental treatment. When used both alone and within co-treatment practices, there is a positive correlation between its use and client growth.

Statement of the Problem

This study seeks to contribute the evidence of the relationship found between music and language acquisition. Due to lack of research caused by the newness of the field, music therapists are often excluded from the treatment teams found on a student's Individualized Education Program (IEP). This means a student who may greatly benefit from music therapy alone or within co-treatment will not receive due in part that many schools do not receive the financial support needed to include these additional services. This study aims to review older and more

recent studies regarding services received in special education programs to see what is needed to better qualify music therapy as the evidenced-based practice that it is.

This study also seeks to look into the various models of music therapy to see how each can be beneficial for a client who does not seem to be meeting language milestones at his or her typical age. Methods used in speech therapy sessions will also be evaluated to see how goals are reached within a setting where music is not the main tool. This analysis intends to suggest that the clinical use of music to help an individual achieve language- and communication-based goals, can prove to be more engaging and provide better retention than speech therapy alone.

This study does not intend to prove that music therapy is the best way to reach clinical goals; instead, this study focuses on how co-treatment can provide a unique and effective way to reach an individual's specific goals. The collaboration between music therapists and speech pathologists will be the main focus of this study as both professions can aim to treat similar goals within traditional sessions.

As previously stated, both older and more recent research continues to suggest similar ideas: there is a relationship between music and language. This study seeks to further prove this claim. Music therapists use music in a clinical fashion to help individuals reach a variety of goals; this study focuses on goals related to language comprehension and acquisition. It is believed that music therapy in collaboration with speech therapy can help clients reach their goals with greater accuracy and retention. Providing more evidence for this theory may help advocate for the use of music therapy on IEP plans for students in special education programs.

Background and Need

What is music therapy?

According to the American Music Therapy Association (AMTA), music therapy can be defined as the "clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program" (AMTA, 2019). Clinicians in this field address an individual's physical, emotional, cognitive, social, and spiritual needs. Music therapists work in a variety of populations and can be found on treatment teams with other healthcare professionals such as speech pathologists, physical therapists, and occupational therapists.

What is speech therapy?

According to the American Speech-Language-Hearing Association (ASHA), speech-language pathologists treat "many types of communication and swallowing problems" (ASHA, 2019). These professionals work in a variety of populations and come across issues involving speech sounds, language, social communication, vocal, fluency, feeding and swallowing (ASHA, 2019).

Is there a relationship between music and language?

Traditionally, music and language have not been connected. Jancke (2012) reminds us that old theories localized speech functions in the left-hemisphere of the brain and music functions in the right-hemisphere. This idea has been challenged in more recent years. Researchers learned that music functions could actually be found in both hemispheres due to the mathematical and creative elements needed to produce different sounds in a rhythmic manner. Emerging evidence suggests that "speech functions can benefit from music functions and vice

versa" (Jancke, 2012). As research continues to be published, there is a pattern that continues to display itself: music and language are connected.

Summary

It appears as though there is a positive correlation between the use of music to reach speech goals and vice versa. Goals of the AMTA and ASHA are similar; both professionals aim to help individuals with goals that increase that individual's quality of life. Methods may vary between the different modalities due to the nature of the fields; however, it is believed that when music therapists and speech pathologists collaborate within a session, progress will occur with more consistency.

Purpose of Study

The purpose of this study was to analyze the use of music in a clinical setting to reach language- and communication-based goals in students with developmental delays and visual impairments in an elementary school. Many parents opt to have their children receive speech therapy for their language-based needs, but they are not always informed about the benefits of co-treatment. For speech needs in particular, a music therapy/speech pathology co-treatment can prove to be extremely beneficial for clients battling complex diagnoses that effect language.

For this study, my sample group included two students who currently attend an elementary school in Massachusetts. Both students have been diagnosed with a visual impairment and autism. Both students received music therapy and speech therapy both separately and in a combined session. For a period of fifteen weeks, data was collected from all three sessions in order to evaluate differences in progress in each treatment model. Data was collected through quantitative means. Language comprehension and acquisition were analyzed weekly and results from each treatment model were compared to one another. As a result of this study,

students were expected to increase their language comprehension and acquisition in each therapeutic setting. Another goal of the study was to determine whether students would show more progress in sessions that were led in a co-treatment model.

Research Questions

- How to select goals for students using the Individualized Educational Program?
- What interventions do speech pathologists use to work on language-based goals in a session?
- Why is music such a powerful tool within therapy?
- What makes music therapy so unique and useful on a treatment team?
- How does a client benefit from co-treatment?

Significance to the Field

This is important to the field of music therapy because it continues to demonstrate how the power of music, when used clinically, effects and can be helpful to those with additional needs achieve their goals and objectives. Previous studies suggest that music therapy can help individuals reach clinical goals even faster than with traditional therapies alone. This research is important to the field for the population it studies. Many walks of life can benefit through music therapy, including children who have been diagnosed with an array of visual impairments and developmental disabilities. Music instills self-esteem in many of these individuals and makes goals more exciting to complete. Participants benefit from this research by receiving a detailed analysis of their work in speech therapy, music therapy, and a co-treatment involving both modalities.

Definitions

Throughout this study, the following terms will be reviewed:

- **American Music Therapy Association (AMTA):** an association that advocates for the advancement of education, training, professional standards, credentials, and research in support of the music therapy profession
- **American Speech-Language-Hearing Association (ASHA):** the national professional, scientific, and credentialing association for audiologists; speech-language pathologists; speech, language, and hearing scientists; audiology and speech-language pathology support personnel; and students
- **Autism:** a developmental disorder of variable severity that is characterized by difficulty with social interaction and communication and restricted or repetitive patterns of thought and behavior
- **Blindness:** the state or condition of being unable to see due to injury, disease, or a congenital condition
- **Co-treatment:** a setting that offers multiple types of therapy to an individual simultaneously
- **Individualized Educational Program (IEP):** a plan or program developed to ensure that a child who has a disability identified under the law and is attending an elementary or secondary educational institution receives specialized instruction and related services
- **Language acquisition:** the process by which humans acquire the capacity to perceive and comprehend language, as well as to produce and use words and sentences to communicate
- **Music therapist:** credentialed professional who has completed an approved music therapy program

- **Music therapy:** an established health profession in which the clinical and evidence-based use of music interventions address physical, emotional, cognitive, and social needs of individuals within a therapeutic relationship
- **Speech therapy:** therapeutic treatment of impairments and disorders of speech, voice, language, communication, and swallowing
- **Treatment teams:** trained professionals who combine their special skills and hold a unique role in aiding an individual achieve their individual goals
- **Visual impairment:** a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses

Limitations

There were several limitations to this study. The research design was limited due to the manner in which information was collected. The data was based on two participants only. The participants of this study, though of opposite sex, have similar a diagnosis. This means the specific findings may only be relatable to those who fall into a similar population as these subjects. In addition, the data collected only demonstrates information from January to May of this year. This was a short time-span for therapeutic work and may only display some of the possible growth that may occur over a longer period of time. Lastly, the amount of information received only allowed a limited view of their condition, growth, and/or relapses.

Ethical Considerations

The ethical considerations taken for this study include full disclosure to participants' guardians, informed consent from participants' guardians, and confidentiality of subjects. Participants involved in this study are minors and are unable to advocate for themselves as they

do not have the cognitive ability to provide consent at this time. The following message was given to guardians to articulate the purpose of this study:

Dear Parent(s) and/or Guardians:

My name is Mellany Gomez and I am one of the music therapy interns at Perkins School for the Blind. I have the pleasure of working with Student A/B during music therapy this year alongside Lisa Martino. I am completing my undergraduate honors thesis at Anna Maria College on the relationship between music and language. While I understand you have signed release forms at Perkins related to the use of materials for educational purposes, I would like to include some observations on Student A/B's progress in music therapy to highlight the benefits of music therapy when used to work on language- and communication-based goals. I would also like to consult with his/her speech pathologist regarding his/her progress in this area as well. I am writing to ensure you of the care which will be taken regarding this research.

I will change identifying features of the student; specifics will only be used as they apply to the research question. I will gather information through written observations collected from his/her music therapist and speech pathologist as well as my own written observations. In addition, any information used for this thesis will not be used for future projects unless further explicitly requested.

Thank you for reading this letter in its entirety. I appreciate the opportunity to work with Student A/B as I learn so much about him/her, myself, and the fields related to the career I continue to pursue. Please contact me or Lisa Martino questions or concerns you may have.

Mellany Gomez, Music Therapy Student Intern

Lisa Martino, MA, MT-BC, LMHC

Literature Review

Introduction

Individuals with disorders or disabilities may call for additional support in areas such as behavior/emotion, communication, gross and fine motor movement, or cognition. When eligibility is approved, school-aged children are often enrolled into a program called the Individualized Education Program (IEP). This federally funded special education program is a national requirement for all schools due to the Individuals with Disabilities Education Act (IDEA); this program allows those with disabilities to receive the additional help they need in academic and related services (Bennett & Frank, 2009). While speech-language pathology (SLP) is usually a desired service for children with language difficulties or delays, many families are unaware of the advantages of music therapy (MT) – SLP co-treatment. This is often due to the fact that MT is not always listed as a related service. This thesis aims to strengthen the evidence for MT as an effective therapeutic method, specifically in the context of language and communication, in order to demonstrate to clinicians, families, school faculty and administrators, and insurance companies of MT's beneficial presence.

This literature review will address the following three areas: special education, the relationship between music and language, and MT/SLP co-treatment models. In the first section, information regarding the IEP will be given. It is important to understand the process of obtaining an IEP for a student in order to see how related services are selected. The second section will discuss the ways in which music and language are both similar and different. It is crucial to showcase both strengths and limitations of both functions in order to grasp the ways in which these functions can be used in a clinical setting. The last section will focus on the benefits and limitations that have already been found in MT/SLP models. This information will then be

used to demonstrate the need for more research within the area of MT regarding language and communication goals.

Special Education: Understanding the Individualized Education Program

The process in which a student obtains an IEP is not a short one. The University of the State of New York's document, "Continuum of Special Education Services for School-Age Students with Disabilities," has been written to act as a general guide to resources provided within special education for school-aged students with disabilities. Special educational can be defined as a "specially designed individualized or group instruction or special services or programs and special transportation, provided at no cost to the parent, to meet the unique needs of students with disabilities" (University of the State of New York, 2013, p 3). To qualify for an IEP, a student must be between the ages of 3 and 21 and demonstrate a difficulty learning and/or functioning that is identifiable as a special need (University of the State of New York, 2013, p 3). Some conditions covered by IDEA include specific learning disabilities, health impairments, autism spectrum disorder, speech or language impairments, visual impairments, and hearing impairments (Lee, 2019).

Alongside educational assistance, students with an IEP also have access to related services. According to the University of the State of New York (2013), related services are professionals who "assist a student in benefiting from other special educational services or assist the student in accessing the general curriculum" and provide "developmental, corrective, and other supportive services" that aide a student with a disability (p 18). Related services mentioned in this document include speech-language pathology, audiology services, interpreting services, psychological services, physical therapy, occupational therapy, counseling services, and orientation and mobility, but please note that these are not the only services available for students

(University of the State of New York, 2013, p 18). Another important note is that not all districts have all of the previously mentioned resources available due to financial restrictions. Data from this document suggests that the most growth occurs in students when services are integrated, however, this action is not a national requirement (University of the State of New York, 2013, p 18).

While this document is well-written, there are some implications. This document discusses the continuum of special education services; however, this document was written in Albany, New York. Some of the rules and regulations in this document may only apply to New York State school districts, thus, would be less helpful for an individual searching for national list of services. Also, MT was not provided as an example of a related service anywhere in the text. Because of the field's newness, it is often difficult to add MT to the range of related services due to the financial stress it presents to institutions.

Another document titled, "IEP: Benefits, Challenges, and Future Directions" focuses on the origins of the IEP; a review of research and studies regarding benefits and challenges of IEP planning and implementation; and considerations for future administration that will allow them to enhance IEP's value. Important information to gather from this document includes the emphasis of frequent monitoring of student progress, the requirement of nationwide implementation of unique special education services, and the call of a multi-disciplinary team approach. On-going assessments of students who have an IEP allows for consistent data collection on growth or regression (Schrag, J. A., 1996, p 7). According to Schrag, both the Senate and House require state education agencies to assure statewide implementation or individual, special education services (Schrag, J. A., 1996, p 8). This means nationwide, every student should be provided with the services in which he or she needs to be academically and

functionally successful. Lastly, a multi-disciplinary team approach means all professionals who work with a specific child as well as the child's parent, meet often to discuss goals, progress, and future steps to best help the child (Schrag, J. A., 1996, p 21). This approach can be very beneficial as both educators and clinicians can work together to create goals that can be implemented in both the classroom and related services; this integration of services gives a student a better opportunity for growth.

One limitation found in this text is the extent of related services options given to families for their child(ren). Schrag (1996) states, "IEP committees tend to recommend only those resources that are available within a school or school district" (p 21). This implies that full options are not given to students and their families. Because contracts are often made for music therapists, it is likely that they often remain separated from the list of related services because school districts have difficulty affording one or more full-time music therapist for a district. This is unfortunate because more and more research is demonstrating the power MT has when used within a multi-disciplinary team.

The research indicates that students with disabilities are more successful academically and functionally when given an IEP. Data also suggests that students succeed when an integrated approach is used. It is important that all members of an approach are connected by the goals created by educators, clinicians, and parents. It is also important that state and federal governments provide the necessary funding to allow students to have access to any form of assistance needed to be successful. Language acquisition and comprehension is an important skill needed for holistic growth. When a student is having difficulty in this area, he or she should have access to all related services, including a MT/SLP co-treatment, to help him- or herself advance.

The Relationship Between Music and Language

Music? A therapeutic tool for language? How? Jancke, the author of "The Relationship Between Music and Language," explains the connections between music and language and describes how one function strengthens the other. Emerging evidence suggests that "speech functions can benefit from music functions and vice versa" (Jancke, 2012, p 2). A pattern continues to be found within the research cited in this article: music and language, though originally thought to be localized on opposite sides of the brain, are actually closely connected. Within music, an individual can become proficient in selectively engaging and sustaining auditory attention to language; this represents a potential benefit for auditory training (Jancke, 2012, p 4). For those with sensory processing disorders, music not only becomes stimulus they are able to receive without feeling overwhelmed, but also provides the opportunity to focus on lyrics that can become effective tools for listening activities, turn taking, direction giving, or procedure sequencing. According to Jancke (2012), singing links frontal and temporal brain regions together more tightly; these regions are also involved in the control of many speech functions (p 5). The text later states, "…literature concerning normal singing and poor-pitch singing and suggest that pitch imitation may be selectively inaccurate in the music domain without being affected in speech" (Jancke, 2012, p 6). This means one does not need to be a great singer to benefit from music tools to increase language acquisition or comprehension.

Jancke explores and showcases the strong relationship between music and language functions. This text also provides a brief summary of music's ability to aid in prevention, rehabilitation, and remediation of a wide range of language, listening, and learning impairments (Jancke, 2012, p 7). Unfortunately, the text does not include any examples of application nor does it mention any facts about MT. This only slightly weakens the points made in this work.

This text is important because it demonstrates why a MT/SLP co-treatment model can be extremely beneficial for some individuals without specifically mentioning the clinical perspective.

Another work, "Parallels and Non-parallels Between Language and Music," by Ray Jackendoff, takes a different approach to analyzing music and language. He asks this fundamental question: "what does music share with language that makes them distinct from other human activities?" (Jackendoff, 2009, p 195). According to Jackendoff (2009), the only way to explore the relationship between music and language is to identify the similarities and differences between them (p 195). Language, on one hand, "conveys propositional thought," music, on the other hand, "enhances affect" or emotion (Jackendoff, 2009, p 197). There are several similarities to be found between music and language. Jackendoff (2009) writes that both language and music involve sound production, requires an ability to achieve "fine-scale voluntary control of vocal production," and involves creating expectations of what is to come (p 196). Each of these similarities demonstrate an opportunity in which one may assist in the teaching of language concepts in conjunction with the presence of music.

It was interesting to read that in conclusion, Jancke (2009) suggests using "caution in drawing strong connections between language and music" (p 203). Limitations of this text include the lack of musical experience by the author. It is believed that more similarities could have been found between the two functions had the author had a more musical background. This work is still valuable as it showcases the ways in which language and music are different. This is important because it allows one to understand why a student could benefit greatly from integrated MT and SLP sessions.

The research in this section suggests that there is a strong relationship between language and music. Both the cohesiveness and separation of the two functions is important because it is important to dissect and understand what makes each function their own. This information can be used to develop more valuable co-treatment sessions between a MT and a SLP. It is clear that music and language are very unique functions of the body; it is suggested to use these functions to reinforce both academic and daily living goals for students in special education programs.

The Effects of Music Therapy / Speech Pathology Co-Treatment

There are many ways in which MT can be used to assist students with the achievement of individualized goals. This thesis focuses on how MT's and SLP's can collaborate to work on language- and communication-based goals. Authors of "Integrating Music Therapy Services and Speech-Language Therapy Services for Children with Severe Communication Impairments: A Co-Treatment Model" document the integration of MT and SLP services for children. These services focus on promoting language and communication and includes interventions that use Augmentative and Alternative Communication (AAC). AAC allows individuals to share their ideas and feelings without using verbal language (ASHA, 2019). Through the results reported for the case studies discussed in this paper, findings suggest that "musical activities stress nonverbal forms of communication and often surpass physical, cultural, intellectual and emotional limitations (Geist, McCarthy, Rodgers-Smith, & Porter, 2008, p 312). Authors also found that MT and SLP treatment strategies positively correlated with increased classroom engagement.

Limitations to this study include the lack of participants. Because this work only focused on a few individuals, results found in these children may not be duplicated when working with another population or disorder. Also, because of the time limit for this research paper, short-term

therapeutic outcomes are presented. If their experiment was extended, there may have been more promising information on the benefits of MT/SLP collaboration.

Another paper that discussed the ways in which MT can be used to target language and communication goals is titled, "Using Music Technology in Music Therapy with Populations Across the Life Span in Medical and Educational Programs." This further demonstrates how AAC's including switches, sensors, or Musical Instrument Digital Interface (MIDI) devices allow students to participate in music-making even if physical disabilities prevent them from playing acoustic instruments (Magee et al, 2011, p 146). Authors also explain how devices called Voice Output Communication Aids (VOCA) are typically used in with individuals who cannot communicate using speech; VOCA's are activated when touched and express a single word or short phrase that has been recorded onto the aid (Magee et al, 2011, p 147). The research gathered includes a case study where results suggest that the participant became more engaged during activities in which "switch-use was embedded within the music" (Magee et al, 2011, p 149). Because of this, the participant was taught concepts using "sung phrases on the VOCA as a motivator;" results found a positive correlation between the student's comprehension of language and use of MT/SLP treatment strategies (Magee et al, 2011, p 149).

Again, this work's results are limited by the number of participants. Because MT/SLP work is so unique depending on a student's individual needs, it appears to be difficult to standardize this form of therapy. Nonetheless, this research concluded that MT/SLP co-treatment strategies do increase a student's engagement and comprehension of language than does SLP services alone.

Summary

In order to provide students with disorders or disabilities with the resources they need to succeed, it is important to understand what can be provided by special education programs. Although MT is not always listed as a related service, it is important that parents or guardians ask for all possible services available to the child in need because the federal and state governments are required to fund any student in need of additional academic assistance. The relationship between music and language continues to reveal itself as more research is completed; it is hoped that this enlightenment will strengthen the advocacy for MT/SLP collaboration in all school districts. Although the sample size for many of the case studies described in the previous sections is small, the same conclusion is found in each study: music can be used as a clinical tool to target language acquisition and comprehension.

Methods

Introduction

In this study, the resources provided to individuals with disorders or disabilities in schools are discussed. More specifically, this study aims to identify the relationship between music and language and their effect on a student's increased acquisition or comprehension. Often, atypical development in students calls for additional support in areas such as behavior/emotion, communication, gross and fine motor movement, or cognition. While speech-language pathology (SLP) is usually a desired service for children with language difficulties or delays, many families are unaware of the advantages of music therapy (MT) – SLP co-treatment. The method provided aims to strengthen the evidence for MT as an effective therapeutic method, specifically in the context of language and communication.

The following research questions were addressed in this study:

- Why is music such a powerful tool within therapy?
- What makes music therapy so unique and useful on a treatment team?
- How does a client benefit from co-treatment?

The observation of participants in MT and SLP was used to gain insight into the benefits found in co-treatment. Progress notes and professional inferences were also used to identify whether MT-SLP co-treatment was an effective technique to increase language comprehension and acquisition in students with disorders. Data on student progress was collected by the researcher and professional clinicians from January 2019 to April 2019. Both qualitative and quantitative measurements were analyzed to conclude results from this study.

Setting

This study was conducted at Perkins School for the Blind in Watertown, Massachusetts. Data collected was only gathered from MT, SLP, and MT-SLP co-treatment sessions. These sessions took place in either the MT room or the SLP room.

Participants

The subjects selected for this study were selected because they demonstrated active participation within their music therapy sessions. There was a total of two participants; one student was a male and the other was female. The male student shall be referred to as "Student A;" the female student shall be referred to as "Student B." When this study took place, Student A was thirteen and Student B was eight. Student A had been diagnosed with total blindness and Autism Spectrum Disorder. His native language is English, but his language was restricted to some echolalic speech as well as three- or four-word phrases. Physically, he did not demonstrate any limitations, but appeared to have some sensory regulation difficulties. Student B had been diagnosed with Autism Spectrum Disorder and demonstrates an ability to discriminate light from dark without determining the source. The language spoken most often in her home is English, but Student B had only been observed to vocalize. Physically, she did not demonstrate any limitations, but she also appeared to have some sensory regulation difficulties. Both students appeared to have been highly motivated by music.

Intervention and Materials

The main goal of this study was to observe the benefits students receive when provided with a MT-SLP co-treatment model. In order to see measurable differences between sessions that do and do not incorporate music, the researcher had to observe both SLP sessions as well as MT sessions that included at SLP. The independent variable was the SLP only sessions versus the

MT sessions which incorporated a SLP. The dependent variable was the measurement of progress in SLP sessions versus the progress reported in sessions run by a MT with the help of a SLP to target language and communication goals. Data gathered from both participants was collected for four months, from January 2019 to April 2019. While the same MT worked with both subjects for this study, some variables were left to chance. Students A and B worked with different SLP's, were provided a different setting for co-treatment, and received services at different times of the day.

In both trials, SLP's used techniques to help students increase his or her language comprehension and acquisition. MT's used music-based interventions to work on each subject's specific language/communication objectives as well. Each clinician used the student's IEP to understand what goals were in place for each participant. They used progress notes to share both quantitative and qualitative information regarding each student's progress in each session. Data was collected from two traditional SLP sessions and two MT-SLP co-treatment models. SLP sessions included one clinician and one student. Co-treatment sessions held a MT, SLP, the subject, and two-three other students.

Measurement Instruments and Procedures

The most important tool used to measure data within this study were progress notes. Music therapists, Speech-language pathologists, and many other health care professionals use some form of progress notes to consistently assess the progress or regression of their clients with statistics from each session. Regarding this specific thesis, both quantitative and qualitative information was documented in progress notes for the students participating in this study. Quantitative data included how many trials a goal was targeted and how many times the student was successful within a session. Qualitative information included any subjective data that helped

describe students' behavior, affect, and overall participation. Qualitative data used in this study was documented by the researcher as well as by the clinicians working with the students.

In order to decide what techniques were to be used, clinicians reviewed each students' IEP and created treatment plans that aligned with the goals targeted in each participant's educational plan. Student A's communication goals included the following *using total communication, student A will make a choice from a field of two tangible symbols given a verbal review of the choices in 80% of observed opportunities; given tangible symbol supports and a verbal review of the symbols, student A will request continuance or termination of an activity using total communication in 80% of observed opportunities; and using total communication, student A will request a preferred activity using an "I want" statement given a sentence starter ("I…") in 80% of observed opportunities*. Student B's communication goals included the following: *given a speech generating device, student B will answer yes/no questions given one verbal cue in 3 out of 4 opportunities* and *utilizing a total communication approach (e.g. adapted signs, speech generating devices, tangible symbols, etc.), student B will state a need (e.g. break, bathroom) given verbal cues in 3 out of 4 opportunities*. SLP objectives were met through verbal and tactile prompting. MT objectives were addressed through filling-in-the-blanks during familiar songs; instrument choices; and therapeutic instrumental and vocal play.

Data Analysis

To analyze the data collected, several steps were taken. Quantitative data retrieved from progress notes from January to April were calculated by finding the averages of success for each objective addressed in therapy. The means were then compared from month to month to track any patterns that arose from the data. Means from each therapeutic model were also compared to see which had the greatest increase in success for both participants. Subjective information from

progress notes was used to further explain important topics that could not be quantified. From this analysis, this researcher concluded, with the supervision of a certified music therapist, which techniques and treatment models were most effective in this study.

Results

Introduction

The results of this study were very interesting. An abundance of information was found through the observation of participants in traditional speech-language pathology (SLP) sessions and a co-treatment model which included both music therapy (MT) and speech therapy. This experiment was created with the intention of finding measurable differences between the benefits students gain in a co-treatment setting versus a traditional setting. The data gathered included a mixture of quantitative and qualitative information.

Quantitative Data

According to student A's IEP, objectives in both MT and SLP included the following: *using total communication, student A will make a choice from a field of two tangible symbols given a verbal review of the choices in 80% of observed opportunities; given tangible symbol supports and a verbal review of the symbols, student A will request continuance or termination of an activity using total communication in 80% of observed opportunities; and using total communication, student A will request a preferred activity using an "I want" statement given a sentence starter ("I…") in 80% of observed opportunities*. To analyze the information collected, data from January to April was placed in the table below. The mean of this participant's success was produced from both traditional SLP and MT/SLP co-treatment sessions.

Data	Objective 1 SLP / MT-SLP	Objective 2 SLP / MT-SLP	Objective 3 SLP / MT-SLP
1/16/19	2/5 / 3/5	4/5 / 4/5	2/5 / 2/5
1/23/19	2/5 / 3/5	3/5 / 4/5	2/5 / 3/5
2/6/19	2/5 / 2/5	2/5 / 3/5	1/5 / 3/5
2/13/19	2/5 / 3/5	4/5 / 4/5	3/5 / 4/5
2/27/19	3/5 / 5/5	3/5 / 4/5	2/5 / 3/5
3/6/19	3/5 / 3/5	2/5 / 2/5	3/5 / 2/5
3/13/19	4/5 / 5/5	4/5 / 5/5	4/5 / 4/5
3/20/19	3/5 / 4/5	3/5 / 4/5	3/5 / 3/5
3/27/19	4/5 / 5/5	4/5 / 5/5	3/5 / 4/5
4/3/19	4/5 / 4/5	4/5 / 4/5	3/5 / 3/5
Average	58% / 74%	66% / 78%	52% / 62%

According to student B's IEP, objectives in both MT and SLP included the following: *given a speech generating device, student B will answer yes/no questions given one verbal cue in 3 out 4 opportunities* and *utilizing a total communication approach (e.g. adapted signs, speech generating devices, tangible symbols, etc.), student B will state a need (e.g. break, bathroom) given verbal cues in 3 out of 4 opportunities*. A table was also used to organize this information. Data is presented below:

Data	Objective 1 SLP / MT-SLP	Objective 2 SLP / MT-SLP
1/16/19	2/4 / 2/4	2/4 / 2/4
1/23/19	2/4 / 2/4	2/4 / 2/4
2/6/19	3/4 / 2/4	3/4 / 3/4
2/13/19	3/4 / 3/4	2/4 / 1/4
2/27/19	2/4 / 2/4	2/4 / 3/4
3/6/19	3/4 / 3/4	2/4 / 2/4
3/13/19	2/4 / 2/4	3/4 / 3/4
3/20/19	2/4 / 3/4	2/4 / 3/4
3/27/19	3/4 / 3/4	3/4 / 3/4
4/3/19	3/4 / 3/4	3/4 / 3/4
Average	62% / 62%	60% / 62%

The data above suggests that student A was, at minimum, 10% more successful in an MT/SLP co-treatment model than in traditional speech therapy. Regarding objectives 1, 2, and 3 for student A, there was a 16%, 12%, and 10% increase in success when music was used clinically in addition to SLP services. The qualitative data also provided some insight on how student A reacted to music and why a co-treatment model was so beneficial for him. As explained by one SLP, students who received MT had the opportunity to work on educational goals in a more natural context; his results provided strength for this claim as he demonstrated success on the goals addressed in this co-treatment model.

The data from student B also showed a more stagnant pattern when both traditional SLP and MT/SLP co-treatment was used to address language- and communication-based goals within a co-treatment model. Regarding objectives 1 and 2, there was a no difference found in the first objective between traditional SLP and SLP/MT co-treatment and only a 2% increase in success for the second objective. One SLP explained that music is very motivating for student B and appeared to bring her joy as evidenced by the student becoming more vocal and displaying positive facial affect when music was presented to her. Although student B's success didn't appear to be significantly different between the co-treatment model than the traditional SLP model, she demonstrated an increase in positive mood and increased vocalization more so in the co-treatment model than in the traditional SLP model.

Qualitative Data

Three questions were asked to the SLPs who participated in this study. These questions would allow the researcher to compare the progress in traditional SLP to the MT/SLP co-treatment model. The questions included the following:

1. Why did you choose to provide student A with a MT/SLP co-treat?
2. In what ways do you think MT benefits student A's language/communication skills?
3. Is there any specific area in which you've seen improvement/regression in student A this year?

It was found that neither SLP had selected their student's service delivery, but both clinicians imagined it was selected for several reasons. One reason was that the co-treat was provided in a group setting. According to one SLP, this allows for "communication skills to be generalized from an individual speech session to interacting with peers socially in a group." Both SLPs believe their students "need a lot of support to generalize skills across settings, classes, and

people." Lastly, both SLPs believe music is a great motivator for the participants in this experiment and encourages them to communicate to their therapists and peers.

For question two, one SLP wrote the following statement:

I think MT helps student A in a few ways. One way would be that student A is really motivated by music, so it's something that motivates this student to communicate. Another way MT helps student A is it helps him to learn turn-taking, a technique I see used in MT to promote social interactions. I also think he is just very musical and can sometimes communicate more through music. Lastly, I think music incorporates a lot of concept knowledge that student A is working on in traditional SLP, but in a more natural context (e.g. fast & slow, feelings, loud & quiet, etc.).

The information provided suggested that using music as a form of therapy can help provide a more natural context for skills learned in traditional SLP to be further developed. In addition, co-treatment provided in groups appeared to provide students with the opportunity to socialize with their peers with the facilitation of a MT and SLP, rather than being limited to one clinician to work on goals and objectives.

The last question provoked interesting responses. The SLPs explained that although some progress can be found within data gathered, both students demonstrate inconsistent day-to-day behavior dependent on his or her sensory regulation status. One SLP claimed to observe improvement in student's A ability to "fill-in-the-blank" at the end of familiar phrases and increased use of appropriate, short sentences. The other SLP claimed to observe increased receptive and expressive responses with the addition of MT in comparison to the events that occur in student B's traditional speech therapy sessions.

Discussion

Individuals with disorders or disabilities may call for additional support in areas including behavior/emotion, language/communication, gross and fine motor movement, or cognition. Language- or communication-based delays can negatively affect the rest of a child's developing mind. Although many guardians search for SLPs, these clinicians are not the only therapists trained to provide clinical treatment that addresses those goals. MT is another evidence-based practice that consists of therapists who may work towards language development goals. The relationship between language and music is strong, and it has been proven that music can be used as a unique, clinical tool to target areas such as language comprehension and acquisition.

Although data collected from both older and more recent MT case studies suggest many benefits to this therapeutic model, due to financial limits, many students, including those with an IEP, are not provided with this resource. Compared to traditional SLP, a co-treatment model that used both SLP and MT appeared to provide an additional, more engaging and stimulating environment (Monas, 2013, p. 19-20). Both SLPs and MTs agree that music was one of the main factors that allow for increased productivity within a session. It is believed that this collaboration works so well because of the relationship between music and language.

This study sought to strengthen the evidence of the positive relationship between music and language. MTs who work with students in an educational setting may use music to address goals related to language and communication. For example, for those with sensory processing disorders, music not only becomes stimulus they are able to receive without feeling overwhelmed, but also provides the opportunity to focus on lyrics that can become effective tools for listening activities, turn taking, direction giving, or procedure sequencing. More

specifically, this study provided an opportunity to analyze music's effect on language comprehension and acquisition. This was completed through the observation of two elementary-school-aged participants in both traditional SLP and in a SLP/MT co-treatment model.

After analyzing the first table, results suggest that the co-treatment model was more effective for student A. In each category there is a clear difference between the effectiveness of each therapeutic model when compared. This idea suggests that co-treatment models that include MT allows an individual's brain to make stronger, more retainable connections within music than those connections made without music.

The second table's results were intriguing. Although the researcher observed more active engagement in the co-treatment model than in the traditional SLP model, the data suggests a small difference between the effectiveness of traditional SLP and the co-treatment model. Although student B demonstrated progress on both objectives, the qualitative data presented suggests that a co-treatment model was equal to or more enjoyable than traditional SLP alone.

Limitations and Future Considerations

There were several limitations within this study. Due to time frame restraints of three months, the results used in this paper showcase a small portion of a larger pattern that could better describe each student's progress within this academic year. In the future, the researcher suggests the use of a longer study period as results may demonstrate larger or smaller differences between traditional SLP and a MT/SLP co-treatment model. For example, IEPs are often reviewed every one-three years; information gathered within that time frame should suggest which methods or modalities appear be more beneficial for students than others (Morin, 2019). Another limitation in this study was the sample size. This study carefully analyzed two participants who were a) elementary school students, b) diagnosed with autism spectrum

disorder, and c) visually impaired. The results from this experiment may not be easily replicated in other populations due to the differences in participants studied. In the future, it is advised that a researcher compare results using a larger sample size which includes, but would not be limited to, children who are in either primary and secondary school, represent different ethnicities, and have various diagnoses. A diverse group of participants can provide more inclusive results.

Conclusion

Three critical items were concluded from the information gathered from this study's results. The first was that the relationship between music and language is very strong. Although their functions can be different, many elements of each domain can be found in the other. This allows students with speech or language delays to bypass their limitations to sing a word or phrase. A collaboration between a MT and SLP has proven to be beneficial as both students demonstrated increased language comprehension or acquisition as described by SLPs. Another claim concluded by these results include benefits of music as therapy. As explained in the qualitative section, for both participants, music acted as a motivator and provided a natural context in which they could work on specific social- and communication-based objectives. Lastly, the results of this study appear to suggest that a student's interest in music should be a factor for considering a referral for a MT/SLP co-treatment. Both participants of this study were diagnosed with autism spectrum disorder (ASD). According to AMTA, "People with ASD often show heightened interest and response to music" (AMTA, 2012, p. 1). Both students received music therapy services because they demonstrated that music was an effective therapeutic tool that could be used to assist them in reaching their specific language and communication goals. With that being said, student A had also been recognized as a student who not only enjoyed music, but who also displayed musical talent. It is believed that this factor was one reason why

his results were so substantial compared to student B. Student B also demonstrated music enjoyment, but did not yet appear to demonstrate the same level of musicality as student A.

While MT can be beneficial for many individuals, there are some individuals who do not show improvement while in MT. It is important to continue assessments to gather as much information as possible regarding a client's progress. Collaboration between a SLP and MT appears to demonstrate positive results in the participants involved, but continued and lengthier studies must be completed to further prove this claim. With strengthened evidence, MTs may be provided with more opportunities to work in schools with SLPs to address language comprehension and acquisition through music.

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