Spring 2015

Music and Attention for Children with Developmental Disabilities

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MUSIC AND ATTENTION FOR CHILDREN WITH DEVELOPMENTAL DISABILITIES

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by

Mallory Mishell Bentley

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ABSTRACT

MUSIC AND ATTENTION FOR CHILDREN WITH

DEVELOPMENTAL DISABILITIES

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The purpose of this study was to measure the effects of the use of music in the form of a song with instructional lyrics on the attention of children with developmental disabilities. The study took place in a self-contained special education classroom, which served third through fifth grade students. A single-subject with ABA or reversal design (Creswell, 2012) was utilized, including five days of baseline, 15 days of intervention, and five days of reversal data collection. During the intervention phase, the teacher sang a cappella an original song with instructional lyrics that explain the type of attentive behaviors that students should be displaying. Measures included momentary time sampling on five attentive behaviors: appropriate vocalizations, visual focus, appropriate hand movement, sitting upright, and appropriate foot movement. All students made gains in their overall attentive behaviors score, while analysis of individual attentive behaviors had varying results.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Continued)

Figure Page

CHAPTER I

INTRODUCTION

Neurodevelopmental Disorders, or developmental disabilities, are a group of conditions that manifest in early development and can impair personal, social, academic, and/or occupational functioning (American Psychiatric Association [APA], 2013). Developmental disabilities often co-occur, meaning that an individual can have characteristics from multiple diagnoses. One of the disorders that co-occur most commonly with developmental disability is attention-deficit/hyperactivity disorder. A common problem for children with developmental disabilities is that many of the children are not able to maintain attention in order to gain information and/or complete a task. Many students with developmental disabilities are capable of completing tasks that are both academic and non-academic, but their lack of attention when given direction or instruction on a topic often leads them to failure. Children with developmental disabilities should be taught using strategies that will maintain their attention so that they can gain information in order to complete tasks and advance their skills (Deutsch, Dube, & McIlvane, 2008).

Although strategies have been established for increasing attention in children, these strategies do not work for many children with developmental disabilities due to their requiring higher levels of cognitive processing. Some of these strategies include: visual materials, using schedules to promote predictability, the use of delayed reinforcement, music, teaching self-reliance, Applied Behavior Analysis, and physician-prescribed medication (Carnahan, Musti-Rao, & Bailey, 2009; Gardner-Neblett,

DeCoster, & Hamre, 2014; Deutsch, et al., 2008). This could also be due to their inability to retain information that has previously been taught to them. Delays in visual processing, language processing, or understanding of basic functions of the English possibly contribute to the inability of many children with developmental disabilities to sustain attention.

Context

Problem

Children with developmental disabilities face a variety of challenges in the school setting, from academic, to social, to behavioral regulation. Academic difficulties vary from student to student, with successes occurring in some subjects more than others. For example, one student could excel in rote counting but struggle to identify the letters of the alphabet. A specific problem that occurs within the population of children with developmental disabilities is a lack of attention to academic instruction or to directions given. Attention in individuals with developmental disabilities can be assessed based on either the individual's chronological age or their mental age (Deutsch et al., 2008). When assessing attention based on an individual's mental age, people with developmental disabilities have shown to be similar or superior to individuals of the same mental age who do not have a developmental disability.

Children with developmental disabilities struggled to sustain attention in the researcher's self-contained special education classroom. Despite this highly structured environment, children failed to retain information across all subject areas.

Background and Need

According to Erbay (2013), attention is a person's skill to focus their perception and thought on a particular moment, disregarding extraneous stimuli. A number of studies have indicated that a child's ability to attend is directly related to success in academic areas. Attention difficulties can also be linked to poor executive functions and poor impulse and behavioral control, causing children to engage in off-task and/or disruptive behaviors in school (Commodari, 2012; Gardner-Neblett et al., 2014). Problems related to attention have been related to learning disorders, or can be accompanied by them. Because of the co-morbidity of developmental disabilities and Attention Deficit Hyperactivity Disorder (ADHD), there is a need for additional information on attention in individuals with developmental disabilities (APA, 2013).

To help facilitate the development of attention, an alerting cue can be used (Hedges, Adolph, Amso, Bavelier, Fiez, Krubitzer, McAuley, Newcombe, Fitzpatrick, & Ghajar, 2013). The alerting cue helps the child to process information more quickly, allowing them to focus their attention where it is needed. The use of an alerting cue to increase attention in individuals with developmental disabilities should be studied to determine its effectiveness. Additionally, because music has been documented to increase motivation for students with disabilities, the use of music as an alerting or orienting cue should be evaluated for effectiveness with individuals with disabilities (Sze, 2006; Iwasaki, Rasinski, Yildirim, & Zimmerman, 2013; Hines, 2010; Simpson & Keen, 2010). The following research questions were evaluated: What is the effect of music on the attention span of children with developmental disabilities? Does the use of a song with

instructional lyrics as an alerting cue increase attention in children with developmental disabilities?

Purpose of the Study

Teachers of students with developmental disabilities must work to constantly adapt their teaching methods to meet the needs of their specific students. Research has shown that using music as a teaching method is effective with a variety of different subject areas, and participant groups (Iwasaki, Rasinski, Yildrium, & Zimmerman, 2013). The purpose of this study was to examine the use of music as a tool for increasing attention for students with developmental disabilities, by giving a musical alerting cue to begin reading instruction. To do this, the researcher sang a song with instructional lyrics at the start of a reading lesson as an alerting cue for students to engage in attentive behaviors.

This instruction took place in an urban self-contained special education classroom within a public elementary school. The school is in Tacoma, WA, which has a population of approximately 203,000. The elementary school used for the study is a small school within the Tacoma Public School District. School enrollment was just under 300 students, with 25% of those students receiving special education services. The classroom being used for the study was a self-contained special education classroom for students with developmental disabilities. The classroom served 9 students with a variety of developmental disabilities. There was one certificated classroom teacher, one classroom paraeducator, and four one-to-one paraeducators. The musical strategies were put into effect along with the existing classroom curricula and strategies already in place.

If the researcher's plan has positive outcomes, students would have increased their ability to sustain attention. This newly acquired skill will then be able to transfer to all academic areas, as well as social situations. Potential obstacles might arise as a result of implementing music as a teaching strategy. First, some students are sensitive to noises and may therefore have adverse reactions to the use of music in the classroom. Second, students who are deaf or hard of hearing may not receive the same benefits of the music due to an inability to properly hear the music. Finally, due to the research being conducted in a public special education classroom setting, scheduling and availability of participants and qualified personnel may be inconsistent.

Research Process & Timeline

The current study involved the use of music to increase sustained attention in students with developmental disabilities. The research was conducted at Mishell Elementary School, a small, urban elementary school within the Tacoma School District Number 10 in Tacoma, Washington. The specific classroom used for the research was a self-contained special education classroom, labeled as a "Developmental/Multi-Orthopedic" classroom. This classroom served 9 students with one certificated classroom teacher, one classroom paraeducator, and four one-to-one paraeducators who worked directly with specific students. The students served in this classroom were in grades three through five (ages 8-12).

All student participants had been diagnosed with a developmental disability. According to the American Psychiatric Association (APA), developmental disabilities (or intellectual disabilities) impair general mental abilities, which impact adaptive

functioning in conceptual skills, social skills, and/or practical skills (Intellectual Disability, 2013). Developmental disabilities often co-occur with other mental conditions. Methods of communication used by the participants included verbal language, sign language, the use of a picture communication system, or a combination of those listed. Third, fourth, and fifth grade students with developmental disabilities were taught, using music, skills to increase their attention.

Participants engaged in musical alerting cues during daily whole-group (9:5 student to adult ratio) instructional blocks. The strategy was reinforced throughout the day as necessary to remind students of skills they have acquired. Research took place in the 27th week of school and ended after 7 weeks (including 1 week without instruction for the school district's spring break).

Working in a public school and with students with disabilities poses many opportunities for interference. Non-school days, changes in routines due to assemblies, participant absences, staff absences, and student behavior all present as potential interferences in the research process. In order to avoid these obstacles, the researcher planned lessons in accordance to schedule changes to maintain consistency in instruction and followed student behavior plans in order to avoid behaviors acting as interference. Only minor changes to the existing classroom routine were required, including training of all classroom staff to explicitly instruct on the attention strategies and accurately collect data.

Many students struggle with sustaining attention, especially students with disabilities. Various strategies have been used to teach students to sustain attention,

including the use of high-interest materials, frequent assessment of student ability levels to ensure correct placement within the curriculum, as well as frequent verbal and non-verbal reminders for students to pay attention. The use of song(s) to focus student attention prior to the initiation of lessons could assist students in their ability to sustain attention.

The research questions are focused on the implementation of music to increase attention, which is possible in the classroom setting. The following research questions were evaluated: What is the effect of music on the attention span of children with developmental disabilities? Does the use of a song with instructional lyrics as an alerting cue increase attention in children with developmental disabilities? The use of music is controllable by the researcher. The plan includes ways to overcome obstacles, including pre-planning for changes in school schedules and individualized student behavior plans.

Definitions

- Alerting Cue: A signal to achieve a state of readiness (Hedges, et al., 2013).
- Attention: A person's skill to focus their perception and thought on a particular moment, disregarding extraneous stimuli (Erbay, 2013).
- Attention Deficit Hyperactivity Disorder (ADHD): "A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development, as characterized by [inattention] and/or [hyperactivity and impulsivity]" (ADA, 2013, p. 59-60).
- Comorbid: Co-occurring conditions/diagnoses (ADA, 2013).

- Developmental Disability: “A diagnosed condition of intellectual disability, cerebral palsy, epilepsy, autism, or another neurological or other condition found. . . to be closely related to intellectual disability or requiring treatment similar to that required for individuals with intellectual disability which: (a) Originates prior to age eighteen; (b) Is expected to continue indefinitely; and (c) Results in substantial limitations” (How Does the State. . . , 2014).
- Joint Attention: Joint engagement where individuals interact with the same objects or events (Kim, Wigram, & Gold, 2008).
- Neurodevelopmental Disorder: “A group of conditions with onset in the developmental period. The disorders typically manifest during early development, often before the child enters grade school, and are characterized by developmental deficits that produce impairments of personal, social, academic, or occupational functioning” (APA, 2013, p. 31).
- Orienting Cue: A signal to select information from sensory input (Hedges, et al., 2013).
- Paraeducator: “These professionals are hired to work either 1:1 with a student or in a small group to assist and teach children with disabilities” (Columna, Lieberman, Lytle, & Arndt, 2014, p. 42).
- Predictive Timing: “[The ability to] predict when relevant sensory events that are necessary for appropriate behavior will occur” (Hedges, et al., 2013 p. 2).

- Self-Contained: “A self-contained class is a class where children with disabilities may benefit most in a small-group setting with other children with disabilities” (Columna et al., 2014, p. 42).
- Sustained Attention: “A state of concentration or focus on a selected event (s) to the exclusion of other simultaneously occurring events that must be maintained over time” (Wolfe & Noguchi, 2009, p. 70).

Limitations

One limitation of this study was the small sample size. Future studies should include a larger number of participants. Another limitation was the lack of a control group. For this reason, a single-subject design was used that included a baseline, intervention, and return to baseline. With the limited number of participants available, all participants engaged in both baseline and intervention phases of the study. Conducting research in a school setting was also a limitation due to the unpredictability of a variety of factors. These factors include: student absences, staff absences, student behavior (behaviors can at times be distracting to other students as well as remove staff from the academic setting to handle behaviors), scheduled days off of school, and new student and staff additions to the classroom setting who did not know the procedures and expectations.

CHAPTER II

LITERATURE REVIEW

Attention in Educational Contexts

According to Erbay (2013), attention is a person's skill to focus their perception and thought on a particular moment, disregarding extraneous stimuli. Attention skills are particularly important for school-aged children, as active engagement (on-task and on-schedule behavior) with academic tasks results in better educational outcomes (Carnahan, Musti-Rao, & Bailey, 2009). A number of studies have indicated that a child's ability to attend is directly related to success in academic areas. Attention difficulties can also be linked to poor executive functions and poor impulse and behavioral control, causing children to engage in off-task and/or disruptive behaviors in school (Commodari, 2012; Gardner-Neblett, DeCoster, & Hamre, 2014). Problems related to attention have been linked to learning disorders, or can be accompanied by them. A study conducted by Commodari (2012) found that children's level of attention functionality had a relationship to the risk of developing learning difficulties in academic settings. Additionally, attention skills showed a relationship to a child's overall achievement later in life (Commodari, 2012; Gardner-Neblett, et al., 2014).

Gardner-Neblett et al. (2014) examined the sustained attention skills of preschool-aged children, and found that those who are lacking in sustained attention have a more difficult or problematic transition into the classroom environment. The age of these children places them at a developmental stage in which they are just beginning to experience demands to attend to tasks and situations that are not intrinsically engaging or

interesting. To help facilitate the development of attention, an alerting or orienting cue can be used (Hedges, Adolph, Amso, Bavelier, Fiez, Krubitzer, McAuley, Newcombe, Fitzpatrick, & Ghajar, 2013). The alerting or orienting cue helps the child to process information more quickly, allowing them to focus their attention where it is needed. Additionally, attention is related to predictive timing, or anticipating the occurrence of an expected outcome. Predictive timing is an important skill for children and attention, as they must be able to predict sensory information in order to attend to it.

Educational and Therapeutic Uses of Music

Many researchers have documented positive effects of music as a tool in a variety of different formats. Music used to increase motivation has been well documented for students with and without disabilities. Sze (2006) argued that music could be integrated into literature to help increase engagement with the content and help children relate to and participate in the activities. The idea of music as motivation was taken farther by Iwasaki, Rasinski, Yildirim, and Zimmerman (2013), who found that songs are a natural attention-grabber for children due to their rhyme and fun nature.

Research from a wide variety of studies point to the use of music to teach children with and without disabilities. Kern, Wolery, and Aldridge (2007) found that music can be used to effectively teach children with autism to follow a classroom routine. In their study, individualized songs were paired with structure and predictable routines and visual cues. Due to the repetitive nature of songs, they can be effectively utilized as instructional tools when developing reading fluency (Iwasaki et al., 2013). Music includes many

parallel skills to reading including phonological awareness, phonemic awareness, sight identification, orthographic awareness, cueing systems awareness, and fluency (Register et al., 2007). When one reads music, reading happens from left to right in the same way that text is read; this parallel contributes to students studying music having higher scores on standardized reading tests (Butzlaff, 2000). Additionally, when students are reading song lyrics they are reading text just as they would in a book. Sze (2006) explained that music lends itself to cognitive development due to its organization being predictable. Additionally, according to Sze, "music integration provides children with concrete, hands-on experiences that are essential to developing each child's ability to reason, think, solve problems, analyze, evaluate, and enhance creativity" (2006, p 2).

Much of the available research on the use of music with children is based in music therapy rather than in an educational setting. Music therapy has been found to address psychosocial, emotional, cognitive, and communication needs (Baker, Wigram, Scott, & McFerran, 2008). A well-known type of music therapy is Nordoff-Robbins Music Therapy. In this type of music therapy, therapists make up songs through improvisation to help people work through what they are feeling at the time (Sorel, 2010). Sorel's (2010) research in this area determined that involving families in the music therapy of children with developmental disabilities resulted in additional positive results from the Nordoff-Robbins Music Therapy. For children with developmental disabilities, music therapy can be used to solicit spontaneous nonverbal communication as well as teach specific skills, such as reading skills (Markworth; Register, Darrow, Standley, &

Swedberg, 2007). Music therapy is often an excellent starting point when attempting to teach routines to children with disabilities (Kern, Wolery, & Aldridge, 2007). This is due to most music therapy sessions beginning with a "hello" song and ending with a "good-bye" song, which establish routines and communicate a welcome.

Music has been shown to promote communication in children with developmental disabilities (Markworth). For these children, musical experiences can even increase appropriate communication (Register et al., 2007). The communication gains with the use of music are particularly evident in children with autism. Simpson and Keen (2010) found that children with autism had increased imitated words and signs when paired with music.

Hines (2010) explored the idea of music as motivation for students with disabilities. Their research found that adolescents with reading difficulties required a program that is highly motivating, which could be achieved through using lyrics from their favorite songs in a decoding program. Additionally, Simpson and Keen (2010) determined that music was motivating and engaging for children with autism. Through the use of music, children with autism were motivated to increase their imitation of words.

Music and Attention

Various studies have found that musical elements can be used to increase and maintain attention toward a musical stimulus (Sussman, 2009). Additionally, researchers have shown that attention to a task can be increased with musical stimuli exposure prior to the task. Music has also been shown to increase joint attention to an object or task, as

well as facilitate attention toward a general task. Kim, Wigram, and Gold's (2008) study evaluated the effects of music therapy on joint attention in children with autism. The authors indicated that joint attention is a skill that is important for early development, as it contributes to the development of communication, social interaction, and language skills. Kimet al.'s (2008) study found that improvisational music therapy increased the participants' joint attention behaviors (specifically, eye contact and turn-taking) over a play condition.

According to Carnahan, Rao, and Bailey (2009), music may be effective in increasing engagement, abilities to process and recall information, and may improve student attitudes toward learning. In their own study, Carnahan, Rao, and Bailey (2009) examined the effects of visual materials paired with music on the engagement of students with autism during small group instruction. The results of this study indicated an increase in student engagement when the teacher utilized visual materials combined with music.

Music can also be used to increase students' attention toward non-academic stimuli, as evidenced by a study conducted by Sussman (2009). This study indicated that preschool aged children with developmental disabilities had an increase in peer attention when they participated in an activity with a musical context or object. Due to the limited availability of research in this area, it is evident that further research must be conducted on the effects of music on the attention of individuals with developmental disabilities. Rickson (2006) discussed the attention of adolescents with Attention Deficit Hyperactivity Disorder (ADHD). Individuals with ADHD exhibit inattention, impulsivity, and hyperactivity, which contribute to poor organization of incoming

stimuli. Music therapists have indicated that individuals with ADHD may have decreased ability to sustain a steady beat or rhythm due to their poor impulse control. Rickson (2006) aimed to evaluate this observation through her study, which used computerized beats for study participants to replicate after participating in either instructional or improvisational music therapy. The findings of this study indicated only a marginal increase in scores in favor of the instructional phase of music therapy.

A preliminary study conducted by Jeong and Lesiuk (2011) aimed to develop an assessment that can be used to accurately rate the attention of individuals with traumatic brain injury (TBI) through the use of music. The assessment evaluated sustained attention, selective attention, and divided attention. This preliminary study found that item difficulty included an appropriately-designed, wide range of questions, as well as appropriate item discrimination. Although the study indicated positive results for use with patients with TBI, the size of the study requires additional information to be gathered before a recommendation can be made.

CHAPTER III

EFFECTS OF SONG AS ALERTING CUE ON ATTENTION IN CHILDREN WITH DEVELOPMENTAL DISABILITIES IN A SELF-CONTAINED SPECIAL EDUCATION SETTING

Effects of Song as Alerting Cue on Attention in Children with Developmental Disabilities in a Self-Contained Special Education Setting

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Abstract

The purpose of this study was to measure the effects of the use of music in the form of a song with instructional lyrics on the attention of children with developmental disabilities. The study took place in a self-contained special education classroom, which served third through fifth grade students. A single-subject with ABA or reversal design (Creswell, 2012) was utilized, including five days of baseline, 15 days of intervention, and five days of reversal data collection. During the intervention phase, the teacher sang a cappella an original song with instructional lyrics that explain the type of attentive behaviors that students should be displaying. Measures included momentary time sampling on five attentive behaviors: appropriate vocalizations, visual focus, appropriate hand movement, sitting upright, and appropriate foot movement. All students made gains in their overall attentive behaviors score, while analysis of individual attentive behaviors had varying results.

Introduction

As our society becomes more accepting of individuals with disabilities, expectations of learning in the special education setting are becoming increasingly rigorous. These expectations result in a higher level of student learning, and subsequently a higher cognitive demand placed on the student. With a higher cognitive demand in place, students are expected to overcome learning challenges, such as slower processing and cognitive delays, in order to succeed.

A common problem for children with developmental disabilities is that many of the children are not able to maintain attention in order to gain information and/or complete a task. The American Psychiatric Association (APA) defines developmental disabilities (or intellectual disabilities) as disabilities that impair general mental abilities, which impact adaptive functioning in conceptual skills, social skills, and/or practical skills (Intellectual Disability, 2013). Because of the co-morbidity of developmental disabilities and Attention Deficit Hyperactivity Disorder (ADHD), there is a need for additional information on attention in individuals with developmental disabilities (APA, 2013).

According to Erbay (2013), attention is a person's skill to focus their perception and thought on a particular moment, disregarding extraneous stimuli. Many students with developmental disabilities are capable of completing tasks that are both academic and non-academic, but their lack of attention when given direction or instruction on a topic often leads them to failure. Children with developmental disabilities should be taught

using strategies that will maintain their attention so that they can gain information in order to complete tasks and advance their skills (Deutsch, Dube, & McIlvane, 2008).

Although strategies have been established for increasing attention in children, these strategies do not work for many children with developmental disabilities because they may require higher levels of cognitive ability. Some of these strategies teachers use to target increased attention include the use of visual materials, schedules to promote predictability, the use of delayed reinforcement, music, teaching self-reliance, Applied Behavior Analysis, and physician-prescribed medication (Carnahan, Musti-Rao, & Bailey, 2009; Gardner-Neblett, DeCoster, & Hamre, 2014; Deutsch et al., 2008). Delays in visual processing, language processing, or understanding of basic functions of the English language are possible contributing factors to the inability to sustain attention for many children with developmental disabilities' inability to sustain attention.

Sussman (2009) found that musical elements can be used to increase and maintain attention toward a musical stimulus. Additionally, researchers have shown that attention to a task can be increased with musical stimuli exposure prior to the task. Music has also been shown to increase joint attention to an object or task, as well as facilitate attention toward a general task. According to Carnahan, Rao, and Bailey (2009), music may be effective in increasing engagement, increasing the ability to process and recall information, and in improving student attitudes toward learning. In their own study, Carnahanet al. (2009) worked in examining the effects of visual materials paired with music on the engagement of students with autism during small group instruction. The

results of this study show an increase in student engagement when the teacher utilizes visual materials combined with music.

Music has also been used to increase students' attention toward non-academic stimuli, as evidenced by a study conducted by Sussman (2009). This study indicated that preschool-aged children with developmental disabilities had an increase in peer attention when they participated in an activity with a musical context or object. Due to the limited availability of research in this area, further research must be conducted on the effects of music on the attention of individuals with developmental disabilities.

A number of studies have indicated that a child's ability to attend is directly related to success in academic areas. Attention difficulties can also be linked to poor executive functions and poor impulse and behavioral control, causing children to engage in off-task and/or disruptive behaviors in school (Commodari, 2012; Gardner-Neblett, et. al, 2014). Problems related to attention have been linked to learning disorders, or can be accompanied by them. Because of the co-morbidity of developmental disabilities and ADHD, there is a need for additional information on attention in individuals with developmental disabilities (APA, 2013).

To help facilitate the development of attention, an alerting cue can be used (Hedges, Adolph, Amso, Bavelier, Fiez, Krubitzer, McAuley, Newcombe, Fitzpatrick, & Ghajar, 2013). The alerting cue helps the child to process information more quickly, allowing the child to focus attention where it is needed. Due to a lack of existing research, the use of an alerting cue to increase attention in individuals with developmental disabilities should be studied to determine its effectiveness. Additionally,

because music has been documented to increase motivation for students with disabilities, the use of music as an alerting cue should be evaluated for effectiveness with these individuals (Sze, 2006; Iwasaki, Rasinski, Yildirim, & Zimmerman, 2013; Hines, 2010; Simpson & Keen, 2010).

Based on current research focused on interventions that are effective for gaining and sustaining students' attention, questions were generated for the purpose of analyzing the effect of music on the attention span of children with developmental disabilities. These questions included: (1) What is the effect of music on the attention span of children with developmental disabilities? Attentive behaviors will be evaluated before and after the implementation of a musical intervention. (2) Does the use of a song with instructional lyrics as an alerting cue increase attention in children with developmental disabilities? An original song with lyrics that instruct students how to engage in attentive behaviors will be used prior to the initiation of a whole-group reading lesson.

Method

Setting

This study took place in a small urban elementary school located in Tacoma, Washington. 86.4% of students at the school qualified for free or reduced lunch (Washington State Report Card, 2014). Ethnicities represented at the school included Black/African American, 43.4%; White, 28.1%; Hispanic/Latino, 13.5%; two or more races, 9.1%; Asian/Pacific Islander, 3.6%; Native Hawaiian/Other Pacific Islander, 2.6%; American Indian/Alaska Native, 2.2%; and Asian, 1.1%.

The specific classroom used for the study was a self-contained special education classroom with the label of "Developmental/Multi-Orthopedic" for students in third through fifth grade (ages 8-13). The classroom served 9 students with a variety of developmental disabilities. The classroom also had one certificated classroom teacher, one program paraeducator, and four one-on-one paraeducators, who worked directly with specific students.

The intervention was conducted during daily whole-group reading lessons. During these lessons, the teacher addressed the whole group and the paraeducators supported individual students as needed throughout the lesson. The existing curriculum was continued with the addition of the intervention, allowing for the continuation of a recognizable routine.

Participants

The sampling procedure used by the researcher was convenience sampling. The participants were restricted to those enrolled in the researcher's classroom and present for at least 80% of study. Participants included 4 elementary school students, ages 8-13 (grades 3-5) who have been diagnosed with a developmental disability and receive special education services. The participants were also selected because they were from diverse cultural backgrounds and part of the same classroom environment where they have had multiple opportunities to display and observe attentive behaviors (the focus of the study).

The participants in the study were from diverse ethnic backgrounds. There were four elementary school students. Two were African American, one was Hispanic, and one

was Caucasian; three were female and one was male. Of the two African American students, one was a fifth-grade student, and the other a third-grade student. The Hispanic student was a fifth-grade student, and the Caucasian student was a fourth-grade student. All of the students were enrolled in a self-contained special education classroom and received all of their academic instruction in the self-contained setting. All of the students were previously diagnosed with a developmental disability.

Intervention & Materials

The independent variable measured by this study was the initiation of a song with instructional lyrics as an alerting cue (See Figures 1 and 2). The song was sung a cappella by the teacher at the start of each reading lesson and included lyrics that explained to students what attentive behaviors were expected (appropriate vocalizations, eyes on speaker/materials, appropriate hand movement, sitting upright, still feet). All of the expected behaviors were taught previously in the school year; therefore no additional training was required. Also, all participants were physically capable of engaging in the expected behaviors.

The dependent variable was the students' engagement in the following attentive behaviors: appropriate vocalizations (spoke/vocalized in response to a question, after being called upon to speak, or when engaging in a choral response); eyes on speaker/materials (visual focus on the teacher or reading materials [book, worksheet, word wall, or projected materials]); appropriate hand movement (hands still when not engaged in a writing task or raising a hand to be called upon); sitting upright (sat with posture that would allow for full engagement with materials located on the desk surface;

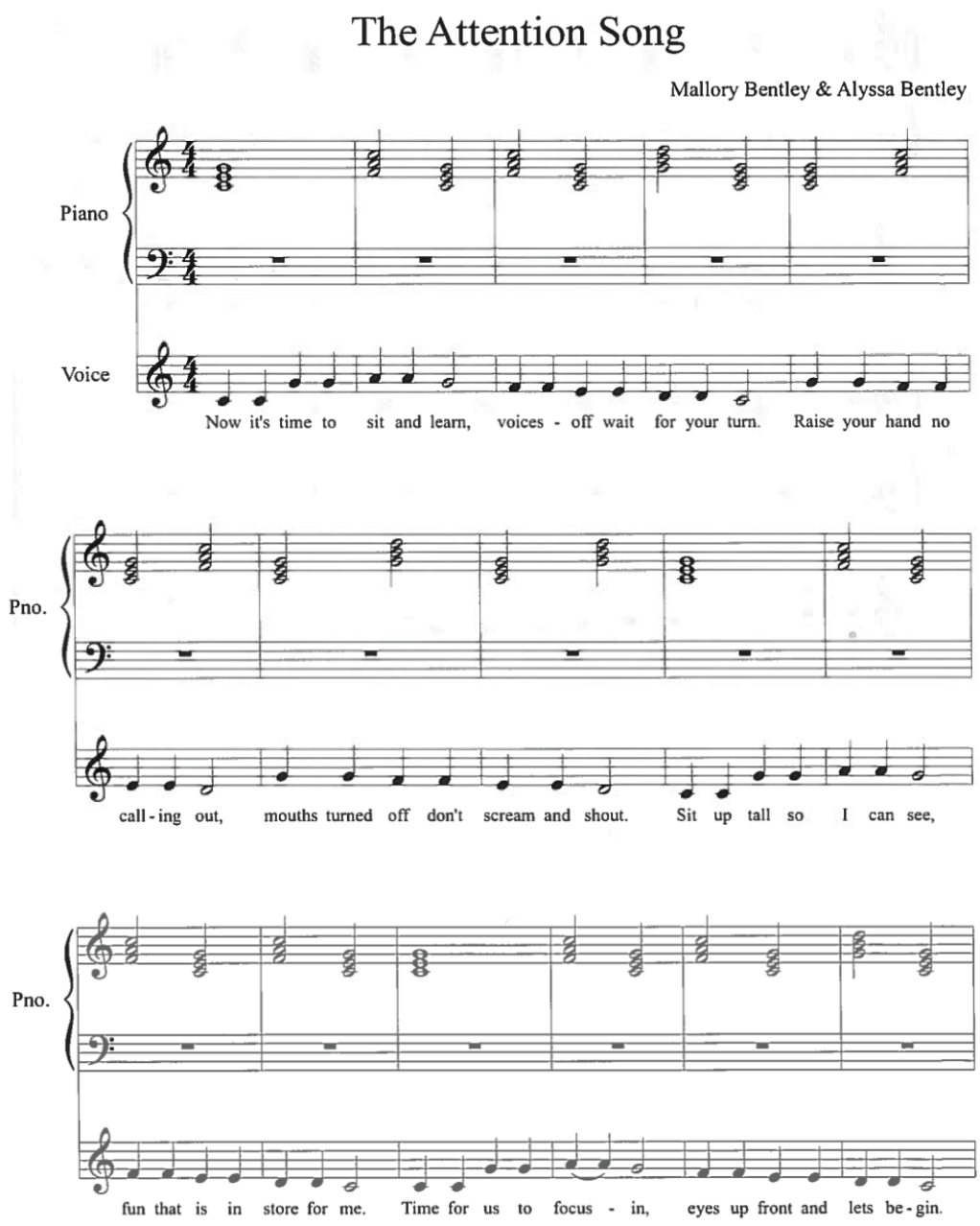

Figure 1—The attention song

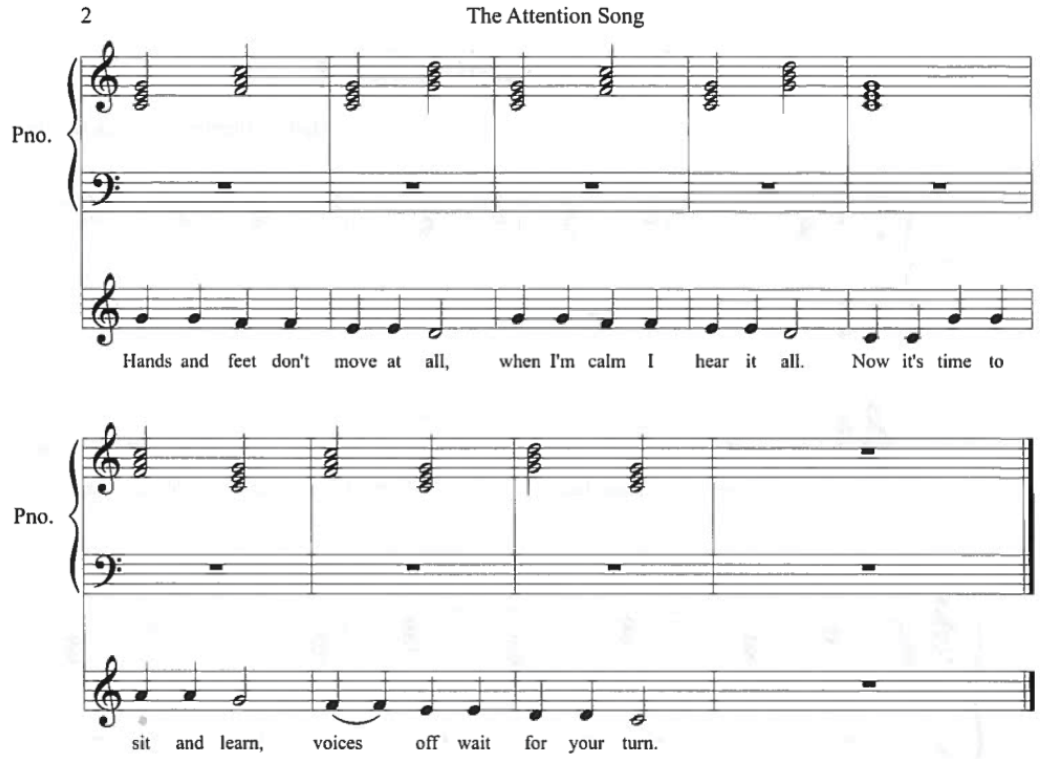

Figure 2—The attention song 2

held head up without resting it on desk or hands); and still feet (no repeated movement of the feet while seated).

Measurement Instruments

An observer checklist was used to collect data using momentary time sampling. The purpose of the checklist was to document behaviors that indicated that students were paying attention to the reading lesson being presented. The behaviors that were documented included: appropriate vocalizations (spoke/vocalized in response to a question, after being called upon to speak, or when engaging in a choral response); eyes on speaker/materials (visual focus on the teacher or reading materials [book, worksheet, word wall, or projected materials]); appropriate hand movement (hands still when not engaged in a writing task or raising a hand to be called upon); sitting upright (sat with posture that would allow for full engagement with materials located on the desk surface; held head up without resting it on desk or hands); and still feet (no repeated movement of the feet while seated). The observations were conducted every five minutes throughout the 20-minute reading lesson. A separate data collection sheet was used for each student, each day (Figure 3). The observer marked an "X" in the box for corresponding time and behavior when the student was engaging in the behavior. The data collected by the observer produced a frequency count of each of the observed behaviors in order to show a relationship between the independent and dependent variables.

Validity and Reliability

The validity of the observation checklist was evaluated using a pilot prior to the initiation of the study. The pilot was conducted in the same classroom as the study,

Student Initials: _____ Date: _____ Observer Initials: _____

5 min. Interval (time)	Appropriate Vocalizations (5)	Eyes on speaker/ materials (4)	Appropriate hand movement (3)	Sitting Upright (2)	Still Feet (1)
1. (___:___)					
2. (___:___)					
3. (___:___)					
4. (___:___)					

Every five minutes, the data-collector will observe the targeted student to determine whether or not they were engaging in the above behaviors.

Indicate the time that each five minute interval begins in the first column.

For each five minute interval, mark an "X" in each box for behaviors in which the targeted student engaged at the time of observation.

Figure 3—Data collection sheet

during non-reading lessons (reading lessons were used during the study). The observation checklist went through two revisions before it was clear enough to produce consistent, valid results.

During the pilot, observers were trained in order to ensure reliability. The researcher and classroom paraeducator were chosen as observers. The paraeducator was chosen as an observer based on her background in momentary time sampling and a history of accurate data collection. The researcher trained the paraeducator by giving her a copy of the observation checklist and models of various student behaviors with instruction on how those particular behaviors were to be marked on the checklist. The researcher then had the paraeducator practice scoring behaviors during the pilot period. The researcher and paraeducator had high inter-rater reliability based on a point-by-point analysis.

Procedure

Baseline

Baseline data collection took place during the classroom's daily reading lesson, which occurred in the afternoon after the students had been given a 15-minute break (lights down, quiet music playing, students relaxing at their desks with books). To initiate the start of the reading lesson, the teacher gave students a verbal cue to, "clean up your desks and get ready for reading." Once students were situated at their desks, the teacher led the students in singing two alphabet songs from the Read Well Kindergarten curriculum (Jones, 2008; Sprick, Jones, & Dunn, 2008a, 2008b).

After the completion of the song, the teacher handed each student a hard copy of the weekly article from the News-2-You curriculum and prompted them to put their names on their articles ("Connecting Students to", 2015). All students were given the "regular" version of the article, with the exception of one student who received the "higher" version of the article. The "higher" version had the same text as the "regular" version, but with less picture support. Once each student had put their names on their papers, the teacher projected the "regular" version of the article on the board and began reading aloud. At this time, the observer recorded data for the first time sample.

The observer set a silent timer to go off every 5 minutes. When the timer went off, she momentarily looked at the students and recorded whether or not they were engaged in the indicated behaviors. The observer recorded data on students in the same order for each 5-minute interval. Students followed along as the teacher read the article aloud. The teacher provided prompts to turn pages once the end of a page had been reached. At the

end of the article, the teacher led the students through a different activity from the News-2-You curriculum for each day of the week (Monday: "Game Page"; Tuesday: "Sentence Completion"; Wednesday: "Review Page"; Thursday: "Think Page"; Friday: "Webbing").

Once the activity was completed, the reading lesson was concluded with reading the words from the "word wall." The "word wall" was a large display of the alphabet with vocabulary words from past News-2-You articles arranged alphabetically. The teacher pointed to and read aloud each word, and the students chorally repeated each word. Due to the nature of the News-2-You curriculum, a new article was read each week, with one article spanning a 5-day school week. Throughout the reading lesson, students were given physical and verbal prompting as necessary to complete tasks, but were not prompted to engage in attentive behaviors.

Intervention

Intervention data collection took place during the classroom's daily reading lesson, which occurred in the afternoon, after the students had been given a 15-minute break (lights down, quiet music playing, students relaxing at their desks with books), under the same circumstances as baseline data collection. To initiate the start of the reading lesson, the teacher gave students a verbal cue to, "clean up your desks and get ready for reading." Once students were situated at their desks, the teacher led the students in singing two alphabet songs from the Read Well Kindergarten curriculum (Jones, 2008; Sprick, Jones, & Dunn, 2008a, 2008b).

At the conclusion of the Read Well songs, the teacher sang "The Attention Song" (Figures 1 and 2) a cappella to the students. At the start of the intervention phase, students only listened to "The Attention Song"; however, as the intervention phase progressed, students spontaneously began singing and gesturing along with the song (i.e. adjusted their posture when "sit up tall so I can see…" was sung). After the completion of the song, the teacher handed each student a hard copy of the weekly article from the News-2-You curriculum and prompted them to put their names on their articles ("Connecting Students to", 2015).

All students were given the "regular" version of the article, with the exception of one student who received the "higher" version of the article. The "higher" version has the same text as the "regular" version, but with less picture support. Once each student had put their names on their papers, the teacher projected the "regular" version of the article on the board and began reading aloud. At this time, the observer recorded data for the first time sample. The observer set a silent timer to go off every 5 minutes. When the timer went off, she momentarily looked at the students and recorded whether or not they were engaged in the indicated behaviors. The observer recorded data on students in the same order for each 5-minute interval. The remainder of the intervention phase mirrored that of the baseline phase.

Reversal

The reversal was a return to baseline in which the same procedures were used without singing the attention song. A detailed explanation of the procedure may be found in the *Baseline* section under the Procedures heading.

Results

The overall score was calculated for each student for the baseline, intervention, and reversal data collection periods by adding the total points scored for each attentive behavior (one point for the presence of the behavior, and zero points for no presence of the behavior) and dividing that by the total possible points (total opportunities to engage in the behavior) to determine the percentage of attentive behaviors in each data collection period. The results of this data indicated an increase in overall attentive behaviors during the intervention period for all participants (See Figure 4). When results are viewed based on each attentive behavior on its own, the majority of behaviors increased during the invervention phase, while each participant had one (one participant had two) attentive behaviors that decreased between the baseline and intervention phases by 1-6 percentage points (See Table 1).

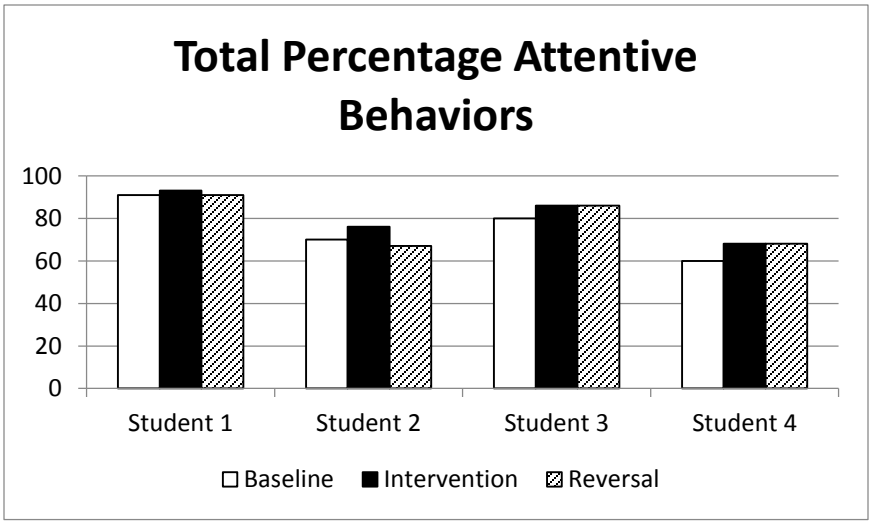

Figure 4—Total percentage attentive behaviors

Table 1—Overall scores

	Vocalizations %			Visual Focus %			Hand Movement %			Sitting Upright %			Foot Movement %		
Student	Baseline	Intervention	Reversal	Baseline	Intervention	Reversal	Baseline	Intervention	Reversal	Baseline	Intervention	Reversal	Baseline	Intervention	Reversal
1	95	98.07	83.25	90	84.61	90	90	90.38	85	80	100	100	100	98.07	100
2	90	94.23	70	50	51.92	55	45	67.3	60	85	84.61	90	95	100	85
3	93.75	92.85	87.5	50	66.07	75	87.5	89.28	35	93.75	100	100	93.75	100	100
4	90	85.41	85	35	41.66	40	25	58.33	55	70	77.08	85	100	97.91	100

Vocalizations

Use of appropriate vocalizations was evaluated during each time sampling, with participants receiving a score of one if the behavior was observed, and zero if the behavior was not observed. Appropriate vocalizations were defined as: participant spoke/vocalized in response to a question, after being called upon to speak, or when engaging in a choral response. The largest growth in this area was made by Student 2, who increased his score by 4.23 percentage points (See Figure 6). Student 1 increased her score by 3.07 percentage points, while students 3 and 4 showed decreases in this area (See Figures 5, 7, & 8).

Visual focus

Participants' visual focus was also evaluated during each time sampling, with participants receiving a score of one if the behavior was observed, and zero if the behavior was not observed. Visual focus was defined as: participants' eyes were on the teacher or reading materials (book, worksheet, word wall, or projected materials). The largest growth in this area was made by Student 3, who increased her score by 16.07 percentage points (See Figure 11). Student 4 increased her score in this area by 6.66 percentage points, and Student 2 increased his score by 1.92 percentage points (See Figures 12 and 10). Student 1 had a decrease of 5.39 percentage points in this area (See Figure 9).

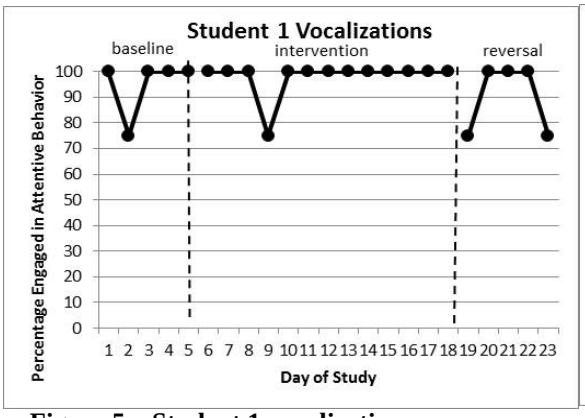

Figure 5—Student 1 vocalizations

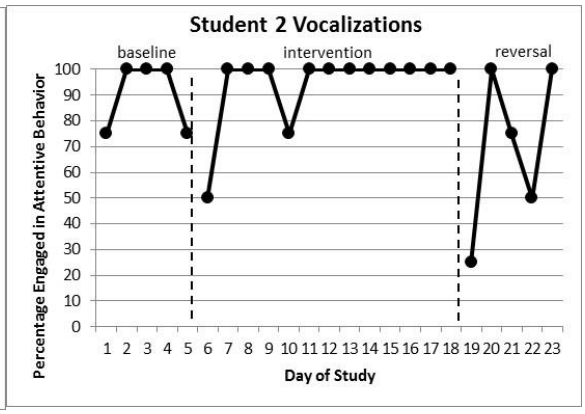

Figure 6—Student 2 vocalizations

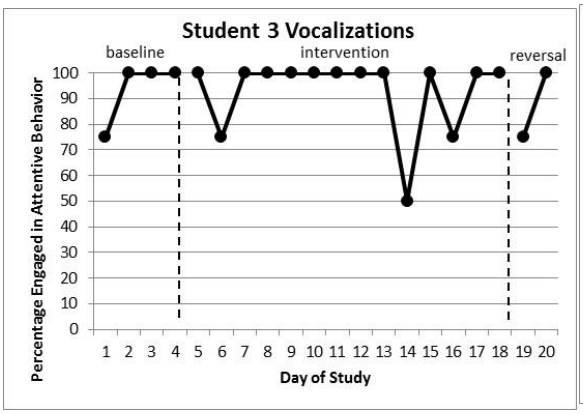

Figure 7—Student 3 vocalizations

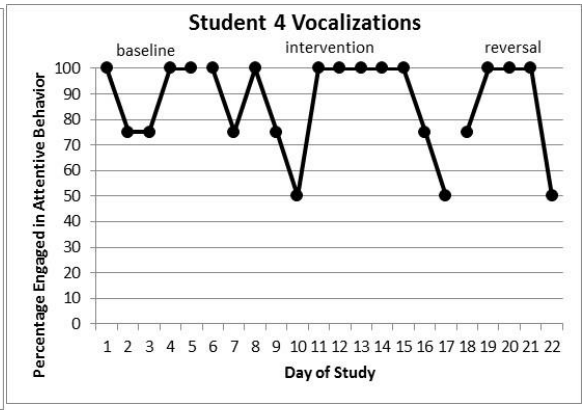

Figure 8—Student 4 vocalizations

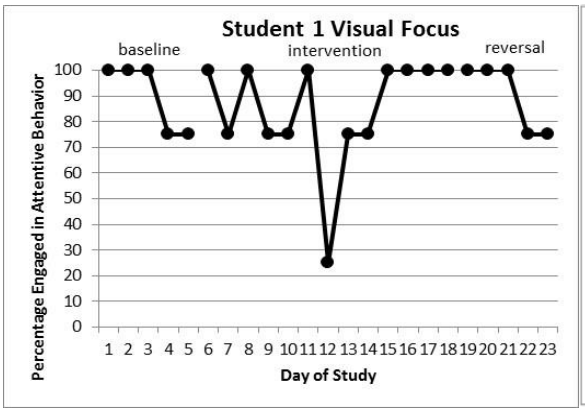

Figure 9—Student 1 visual focus

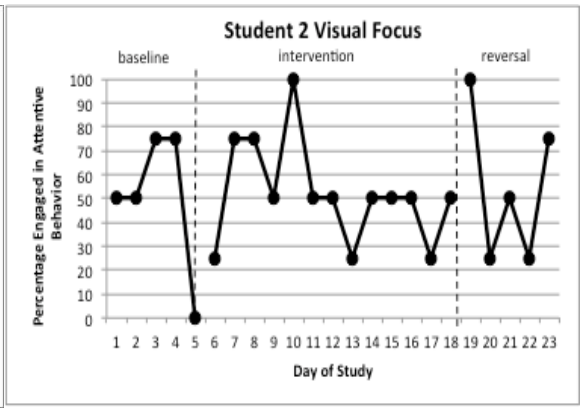

Figure 10—Student 2 visual focus

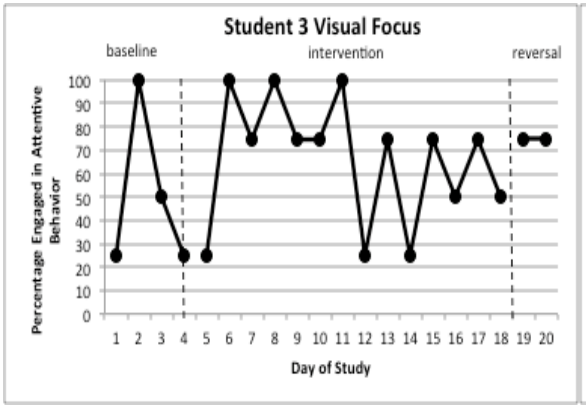

Figure 11—Student 3 visual focus

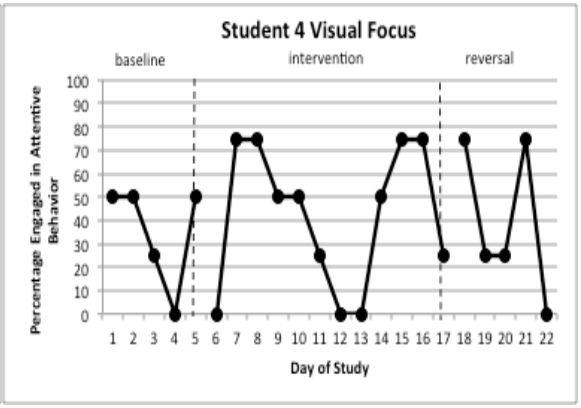

Figure 12—Student 4 visual focus

Hand movement

Appropriate hand movement was also evaluated during each time sampling, with participants receiving a score of one if the behavior was observed, and zero if the behavior was not observed. Hand movement was defined as: participants' hands were still when not engaged in a writing task or raising a hand to be called upon. Student 4 made the most growth in this area, with an increase of 33.33 percentage points (See Figure 16). In this area, all participants made gains; Student 1 had an increase of .38 percentage points, Student 3 had an increase of 1.78 percentage points, and Student 2 had an increase of 22.3 percentage points (See Figures 13-15).

Sitting upright

Participants were evaluated on whether or not they were sitting upright during each time sampling, with participants receiving a score of one if the behavior was observed, and zero if the behavior was not observed. Sitting upright was defined as: participants sat with posture that would allow for full engagement with materials located on the desk surface; held head up without resting it on desk or hands. Student 1 showed the largest growth in this area, with an increase of 20 percentage points (See Figure 17). Student 3 had an increase of 6.25 percentage points, and Student 4 had an increase of 7.08 percentage points, while Student 2 had a decrease of .39 percentage points (See Figures 18-20).

Foot movement

Appropriate foot movement was also evaluated during each time sampling, with participants receiving a score of one if the behavior was observed, and zero if the

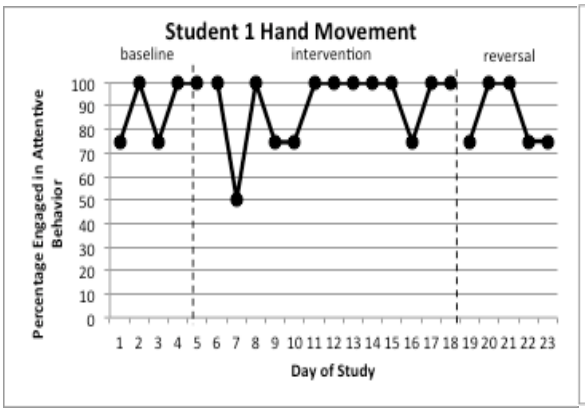

Figure 13—Student 1 hand movement

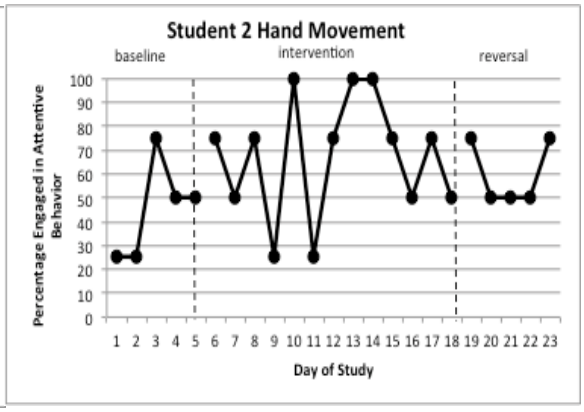

Figure 14—Student 2 hand movement

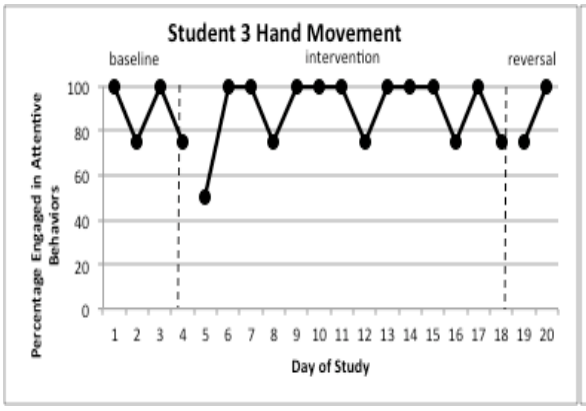

Figure 15—Student 3 hand movement

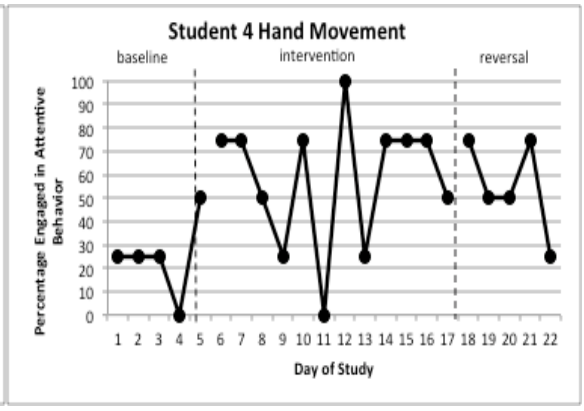

Figure 16—Student 4 hand movement

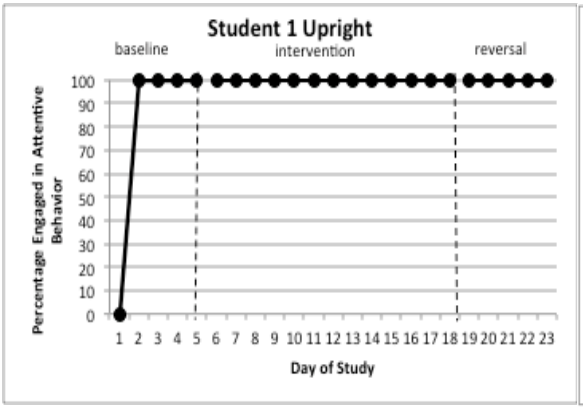

Figure 17—Student 1 upright

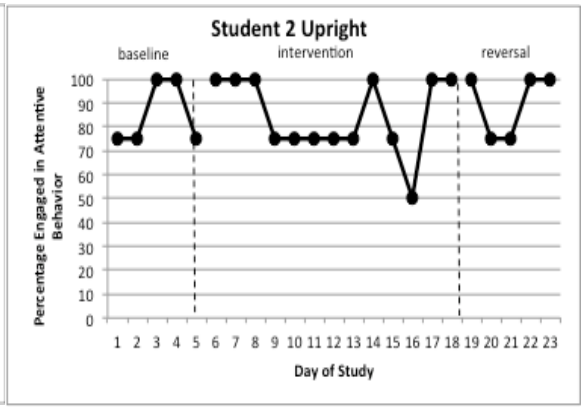

Figure 18—Student 2 upright

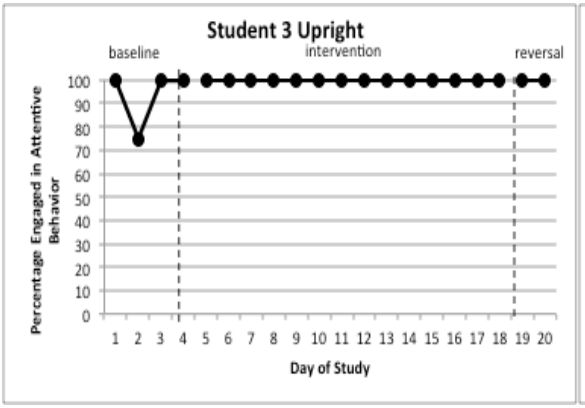

Figure 19—Student 3 upright

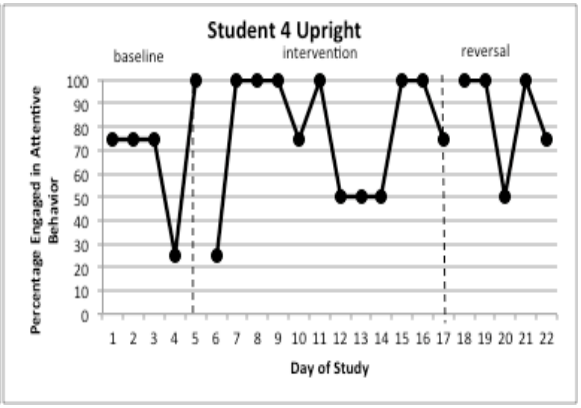

Figure 20—Student 4 upright

behavior was not observed. Foot movement was defined as: no repeated movement of the feet while seated. Student 3 had the largest gain in this area, with an increase of 6.25 percentage points (See Figure 23). Student 2 also had growth, with an increase of five percentage points (See Figure 22). Student 1 had a decrease of 1.93 percentage points, and Student 4 had a decrease of 2.09 percentage points (See Figures 21 & 24).

Discussion

A common problem for children with developmental disabilities is that many of the children are not able to maintain attention in order to gain information and/or complete a task. Children with developmental disabilities should be taught using strategies that will maintain their attention so that they can gain information in order to complete tasks and advance their skills (Deutsch, Dube, & McIlvane, 2008). To help facilitate the development of attention, an alerting cue can be used (Hedges et al., 2013). The alerting cue helps the child to process information more quickly, allowing them to focus their attention where it is needed. Additionally, because music has been documented to increase motivation for students with disabilities, the use of music as an alerting cue should be evaluated for effectiveness with individuals with disabilities (Sze, 2006; Iwasaki, Rasinski, Yildirim, & Zimmerman, 2013; Hines, 2010; Simpson & Keen, 2010).

This study assessed the effect of a song with instructional lyrics as an alerting cue on the attention of children with developmental disabilities. The data supports the use of this alerting cue for increasing appropriate vocalizations, visual focus, appropriate hand

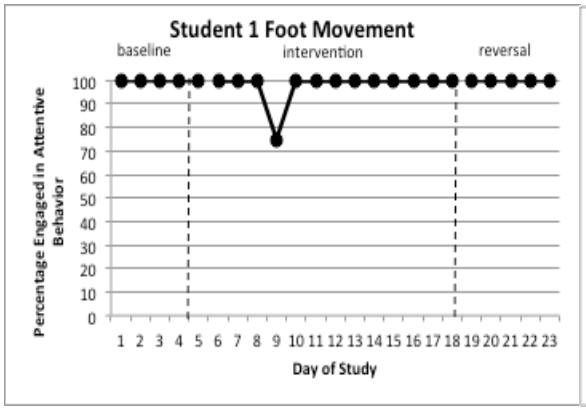

Figure 21—Student 1 foot movement

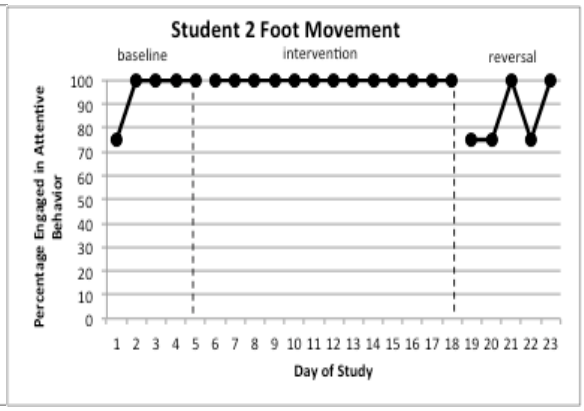

Figure 22—Student 2 foot movement

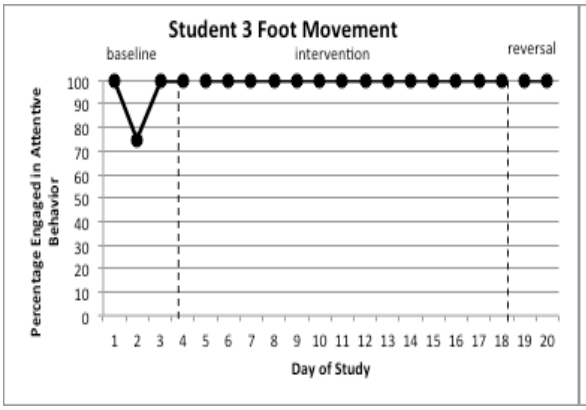

Figure 23—Student 3 foot movement

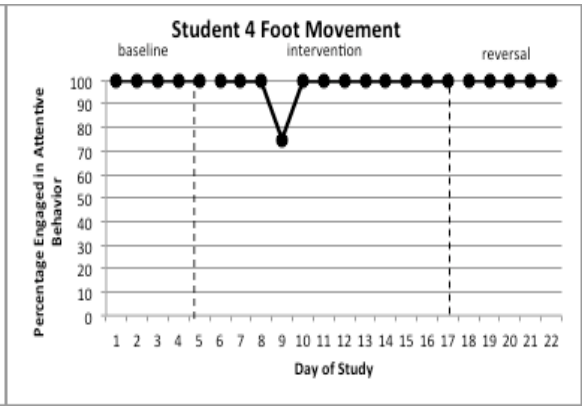

Figure 24—Student 3 foot movement

movement, sitting upright, and appropriate foot movement during whole-group reading instruction in a self-contained special education classroom. This study extended previous research by expanding upon research on attention, children with developmental disabilities, and the use of music in the classroom (Carnahan, Rao, & Bailey, 2009; Deutsch et al., 2008; Wolfe & Noguchi, 2009). Overall, the results of this study show an increase in attentive behaviors for students with developmental disabilities.

The results showed different outcomes for each student. For example, when data is analyzed based on total scores, all students showed an increase in attentive behaviors during the musical intervention phase; however, when the attentive behaviors were analyzed individually, the results showed some variance. When analyzing the data on appropriate vocalizations, Student 1 had a growth of 3.07 percentage points and Student 2 had a growth of 4.23 percentage points. Student 3 showed a decrease of .9 percentage points. While the data does show a decrease in total percentage of appropriate vocalizations, the student's score during intervention is still above 90%, indicating that it may not be an area of relative concern regarding overall attention. Additionally, upon removal of the musical intervention Student 3's score decreased by an additional 5.35 percentage points. This could suggest that the intervention was beneficial for this student.

Student 4 showed the largest decrease in appropriate vocalizations, with a loss of 4.59 percentage points. For this particular student, the researcher observed informally that her behavior seemed to have an effect on their attentiveness during the reading lesson. It is unknown whether external factors such as lack of sleep, hunger, or hormonal fluctuations influenced her scores. Data on visual focus showed an increase in scores for

all participants, with the exception of Student 1, who showed a decrease of 5.39 percentage points. Student 2 showed an increase of 1.92 percentage points, Student 3 showed the largest growth with an increase of 16.07 percentage points, and Student 4 had an increase of 6.66 percentage points. With the exception of Student 4, all students showed continued growth upon returning to baseline conditions. This could be due to uncontrollable variables during the intervention phase, or due to these students learning how to engage in appropriate visual focus through the intervention phase.

In the area of appropriate hand movement, all participants made growth during the intervention phase, then reduced their score upon returning to baseline conditions. This shows a relationship between the use of the musical intervention and the increase in appropriate hand movement. Student 1 showed an increase of 0.38 percentage points, Student 2 showed an increase of 22.3 percentage points, Student 3 showed an increase of 1.78 percentage points, and Student 4 showed an increase of 33.33 percentage points.

The data on sitting upright showed an increase from baseline to the intervention phase for all students, with the exception of Student 2, who had a decrease of 0.39 percentage points. Student 1 had a growth of 20 percentage points, Student 3 had an increase of 6.25 percentage points, and Student 4 had a growth of 7.08 percentage points.After returning to baseline conditions after the intervention phase, all students either maintained a score equal to that of the intervention phase, or had an increase in percentage points. Again, this could be due to uncontrollable variables during the intervention phase, or due to these students learning how to engage in appropriate visual focus through the intervention phase.

Data on appropriate foot movement shows that although the original group of participants showed a need for improvement in this area, the final group of participants was relatively strong. All participants maintained a score of 85% or above throughout all phases of the study. Student 1 and Student 4 maintained a score of 100% throughout the baseline phase and showed minor decreases in percentage points in the intervention phase.

Limitations

Although the use of the musical intervention was successful in increasing participants' attentive behaviors, there are several limitations to the study. The first limitation involves the sample size. The sample size was small from the start, with access to only nine students enrolled in a self-contained special education classroom; however, the sample size decreased to only four students by the end of the study due to student absences resulting in attendance for less than 80% of the study. A second limitation was the lack of control over environmental distractors. Due to the nature of the classroom, students frequently make unpredictable noises and movements, and demonstrate other disruptive behaviors. Both of these limitations have an impact on external validity and make the results difficult to generalize to students in other settings. Another limitation involved environmental factors, such as fluctuation in staff availability. Frequent staff absences resulted in the presence of substitute paraeducators or the classroom being short-staffed, resulting in the postponement of lessons. A final limitation was the overall nature of the reading curriculum used in the classroom. Because the curriculum involves

reading an article on a different topic each week, student attention could be affected based on their level of interest in the article topic.

Recommendations for Future Research

Based on the results of this study, there are several recommendations for future research. The limitations outlined in this study should be minimized in future studies, particularly the small sample size. Future studies should include a larger sample size, while still including children with developmental disabilities. Additionally, future studies should consider more frequent time sampling, as the restrictions of the current studies only allowed for time sampling every five minutes. Another recommendation is to employ a musical intervention that includes the use of a live instrument or recorded music, rather than a cappella singing. Finally, future research should expand upon the current study by assessing attention outside of whole-group reading lessons.

Conclusion

Three major conclusions can be made from the results of this study. The first conclusion is that the use of music may increase attentive behaviors in children with developmental disabilities. The second conclusion is that songs with instructive lyrics may increase attentive behaviors in children with developmental disabilities. The third conclusion is that children with developmental disabilities benefit from the use of alerting cues prior to reading instruction. Previous studies have shown a relationship between the use of music and an increase in attention; however, there is very little research in this area with children with developmental disabilities. Alerting cues have also been shown to increase attentive behaviors in previous studies, but there is a lack of research in this area

involving children with developmental disabilities. Finally, there is a lack of research regarding the use of songs with instructive lyrics on the effect of attentive behaviors, particularly as they relate to children with developmental disabilities. The conclusions made from this study can help to bridge the gaps between the existing research in order to provide effective teaching strategies for the unique population of children with developmental disabilities.

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CHAPTER IV

CONCLUSION

According to Erbay (2013), attention is a person's skill to focus their perception and thought on a particular moment, disregarding extraneous stimuli. Attention skills are particularly important for school-aged children, as active engagement (on-task and on-schedule behavior) with academic tasks results in better educational outcomes (Carnahan, Musti-Rao, & Bailey, 2009). Various studies have found that musical elements can be used to increase and maintain attention toward a musical stimulus (Sussman, 2009).

The current study was initiated to address the lack of research of the use of music as an alerting cue to increase attention in children with developmental disabilities. This study took place in a self-contained urban public elementary school. All participants were diagnosed with a developmental disability and were physically capable of engaging in attentive behaviors. During the intervention phase of the study, the classroom teacher sang a capella a song with instructional lyrics, which told students what attentive behaviors were expected of them. This took place prior to daily reading lessons and acted as an alerting cue to attentive behaviors necessary for the reading task. Data was collected on the following attentive behaviors: appropriate vocalizations, visual focus, appropriate hand movement, sitting upright, and appropriate foot movement. Momentary time sampling was used to collect data on each attentive behavior every five minutes during each 20-minute lesson.

The results of the study demonstrated that all participants showed growth in total attentive behaviors from the baseline to intervention phases. When attentive behaviors

were assessed individually, growth varied by participant and by attentive behavior. Three out of the four participants showed growth in four out of the five attentive behaviors, while the remaining participant showed growth in three out of the five attentive behaviors. Results indicated that the use of a musical alerting cue with instructional lyrics had a positive effect on the attention of children with developmental disabilities. This was shown in the data with an increase in attentive behaviors from the baseline phase to the intervention phase. In many attentive behaviors and across participants, there was a decrease in attentive behaviors when the intervention (song) was removed; this shows a relationship between the change in behavior and the introduction of the independent variable (Creswell, 2012).

Due to the small sample size, environmental distractors, and other uncontrollable variables, additional research should be conducted on this topic. The sample size was small from the start, with only nine students enrolled in the researcher's classroom; however, the sample size decreased to only four students by the end of the study due to student absences resulting in attendance for less than 80% of the study. Due to the nature of the classroom, students frequently make unpredictable noises and movements, and demonstrate other disruptive behaviors. Another limitation involved fluctuation in staff availability. Frequent staff absences resulted in the presence of substitute paraeducators or the classroom being short-staffed, resulting in the postponement of lessons. A final limitation was the overall nature of the reading curriculum used in the classroom, which addressed a different topic each week. Student attention could be affected based on their level of interest in the article topic.

The limitations outlined in this study should be minimized in future studies, particularly the small sample size. Future studies should include a larger sample size, while still including children with developmental disabilities. Additionally, future studies should consider more frequent time sampling, as the restrictions of the current studies only allowed for time sampling every five minutes. Future research could also include the use of a musical intervention that includes the use of a live instrument or recorded music, and/or evaluate the use of a musical alerting cue outside of a whole-group reading lesson.

The results of this study should be used as a foundation for future research on increasing attention through the use of music as an alerting cue. Future research in an academic setting will work toward continuing to validate the information gathered in this study. Additionally, similar research could be conducted in a clinical setting in order to eliminate uncontrollable variables. Research in the area of attention in individuals with developmental disabilities should continue to be conducted in order to compile a more substantial list of research-based strategies for use with children with developmental disabilities. Having these strategies will help teachers to provide quality, research-based instruction in a way in which students with developmental disabilities can learn and retain information. As with students without disabilities, students with developmental disabilities must gain information and strategies that they can retain so that they can progress academically and increase independence in order to have a better quality of life.

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