2008

Comparing the Effects of Sung versus Spoken Lyrics on Speech and Language Acquisition in Late-Talking Toddlers

Chelsea Ki Sook Clock Bell

COMPARING THE EFFECTS OF SUNG VERSUS SPOKEN LYRICS ON SPEECH

AND LANGUAGE ACQUISITION IN LATE-TALKING TODDLERS

An Abstract of a Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

Chelsea Ki Sook Clock Bell

University of Northern Iowa

May 2008

ABSTRACT

The purpose of this study was to explore the use of two intervention approaches with children who are delayed in their development of expressive language (i.e. "late talkers"). Identification and intervention for late talkers is often controversial. This study examined whether music therapy has an equal or greater effect on speech and language acquisition in two toddlers with late-developing speech and expressive language when compared to a literacy-based intervention involving storybook reading. The use of storybook reading in speech and language therapy has been examined and found successful when used with children with communication disorders. However additional research is needed to determine the most appropriate method and population for whom it is most useful. Music therapy is another approach to intervention that has been used with persons who have communication disorders. While there has been success using music in speech and language therapy, additional information about music therapy is still needed, particularly for late talkers.

This study was a single-subject alternating treatment design with multiple baselines across subjects. Participants NA, a 22-month-old female, and BA, a 24-month-old male, were identified as late talkers by their childcare facility director. The treatment consisted of two cycles, a music-based treatment and a literacy-based treatment, each four weeks in length, totaling eight weeks. Two 30-minute sessions were held each week, with the exception of one week for participant NA, who was ill one day. She received 15 treatment sessions, while participant BA received 16. Total vocabulary production was recorded each session, while baseline sessions (pre-treatment, mid-

treatment, and post-treatment) indicated growth of vocabulary following treatments. Results indicated that while participants benefited from both treatment approaches, neither approach proved more beneficial. Both children increased target word production (5.33 for NA; 12.33 for BA) compared to no-treatment words (.67 for NA; .33 for BA) during baseline sessions following literacy treatment. BA also increased target word production (19) compared to no-treatment probe words (.67) during baseline sessions following music treatment. Progress in lexical inventory and expressive language was seen in both participants; however, participants were still delayed for their age. Clinical implications for further research are discussed.

COMPARING THE EFFECTS OF SUNG VERSUS SPOKEN LYRICS ON SPEECH

AND LANGUAGE ACQUISITION IN LATE-TALKING TODDLERS

A Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

Chelsea Ki Sook Clock Bell

University of Northern Iowa

May 2008

THESIS APPROVAL PAGE

This Study by: Chelsea Ki Sook Clock Bell

Entitled: Comparing the Effects of Sung Versus Spoken Lyrics on Speech and Language

Acquisition in Late-Talking Toddlers

has been approved as meeting the thesis requirement for the

Degree of Master of Arts

2-1-08
Date

Dr. Lauren Nelson, Chair, Thesis Committee

2-1-08
Date

Dr. Theresa Kouri, Thesis Committee Member

2-1-08
Date

Dr. Carlin Hageman, Thesis Committee Member

2-1-08
Date

Dr. Carolyn Hildebrandt, Thesis Committee Member

3|31|08
Date

Dr. Sue A. Joseph, Interim Dean, Graduate College

ACKNOWLEDGMENT

First and foremost, I would like to thank my thesis Chair, Dr. Lauren Nelson, Ph.D., CCC-SLP, for her time, guidance, and support from the very beginning, throughout the treatment protocol, and finally, with the writing of this thesis research project. I would also like to thank the other members of my committee, Dr. Theresa Kouri, Ph.D., CCC-SLP and Dr. Carlin Hageman, PhD., CCC-SLP, both from the Department of Communication Sciences and Disorders, and Dr. Carolyn Hildebrandt, Ph.D., from the Department of Psychology. With the knowledge, input, and expertise of this group, this project was a very beneficial learning experience to me and hopefully to others in the field of speech-language pathology.

In addition, I would like to thank the participants and their families for agreeing to be a part of this research project. I would also like to thank Charlene Heiar, the director of the childcare facility, for helping recruit participants and for providing support throughout the treatment protocol. The extra length Ms. Heiar went to was greatly appreciated and this project would have been much more difficult to complete without her help.

Lastly, I would like to thank my graduate student friends at the University of Northern Iowa in Speech-Language Pathology, my family, and my husband, Jacob. This thesis would have been much more difficult to complete without their constant emotional support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Speech-language pathology is the study of human communication disorders, in which professionals (i.e., speech-language pathologists) assess and treat persons with a variety of speech and language disorders including speech and language delays, hearing impairment, and swallowing disorders (American Speech-Language-Hearing Association [ASHA], 2007; Styba, 1999). One of the populations served by speech-language pathologists is children with expressive language disorders or delays. Expressive language disorder is an impairment or delay in the development of expressive language (verbal output or formulation of words) without other presenting disorders such as receptive language disorder or developmental delay (American Psychological Association [APA], 2000). The *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR* (APA, 2000) characterizes expressive language disorder as interfering with academic, occupational, or social communication and without the presence of mental retardation, speech-motor or sensory deficit, or environmental deprivation.

Late Talkers

Language delay, often with no other developmental deviances, is one of the most common developmental problems found in children (Rescorla, 1989). Children with delays in expressive language acquisition, but with typical development in other areas (e.g. the sensory system or cognitive abilities), are sometimes described as "late talkers" (Robertson & Ellis Weismer, 1999). Toddlers who are late talkers exhibit several

characteristics which may or may not appear right away, and thus can be divided into two general groups. One group consists of late talkers who are merely slower to develop and will "catch up" to their peers by the age of three (Robertson & Ellis Weismer, 1999), while the other group consists of late talkers who will continue to have learning disabilities, such as delayed literacy skills, later in life (Rescorla, 1989). While many believe these groups can be distinguished, others feel it is necessary to implement treatment for all toddlers who are late talkers.

Intervention that has been used in the past for late talking toddlers consists of indirect and direct treatment approaches, as well as a combination of the two types. Paul (1996) describes an indirect approach that involves the monitoring of a late talker's language development. This approach is ideal for those late talkers who appear to be on track for typical development once they "catch up" to their peers. An example of direct therapy is mand-elicited imitation, in which a response is required from the individual in therapy (Kouri, 2005). Particular therapy approaches that have been gaining acknowledgement recently are literacy and music intervention (Kaderavek & Justice, 2002; Whipple, 2004). These types of interventions use specific contexts to present the target objective and/or elicit productions of the target objective.

The purpose of this study is to determine whether certain treatment types (i.e. music intervention and storybook reading) lead to increased vocabulary growth in late talking toddlers, and to compare these treatment types with one another. The results of this study will provide information useful in planning treatment for late talking toddlers.

A list of terms specific to the field of speech-language pathology and their definitions can be found in Appendix A.

CHAPTER 2

REVIEW OF THE LITERATURE

Statement of the Problem

Language acquisition in children can be a somewhat controversial topic, as there are many theories that describe it (Bohannon & Stanowicz, 1988; Kuhl, 2004; Owens, 2005). These theories tend to fall into two general categories of language acquisition theories. One of the aforementioned categories attributes language acquisition to *internal mechanisms* within an individual (i.e. an innate ability to learn language; Marcus, 1993), while the other supports the belief that the importance of language acquisition lies in *external feedback* to an individual (i.e. feedback provided from a parent or something in the environment; Marcus, 1993).

Several theories of language acquisition fall into either one of these categories or the other. For example, Owens (2005) discussed four language-development models which support either the external feedback or the internal mechanism theory of language acquisition. The behavioral theory views language as a learned behavior which is shaped and formed through a process called operant conditioning. Operant conditioning is the use of consequences to modify the occurrence and form of a behavior (Myers, 2002). Behavioral psychologists often described language as a "verbal behavior...modified by the environment" (Owens, 2005, p.34). This indicates that sounds and words produced by children are retained due to reinforcing by parents or caregivers, and that those not

reinforced will eventually be lost. This theory closely fits the general category and theory of external feedback.

Owens (2005) also discussed two models from the psycholinguistic theory which complement the theory of internal mechanisms. These models are the syntactic model and the semantic/cognitive model. Proponents of the syntactic model attribute language development to innate language-specific mechanisms. For example, all languages have some universality such as development and sentence formation that are assumed to be linked to an inborn mechanism. In contrast, proponents of the semantic/cognitive model attribute language development to general cognitive capabilities. For example, early utterances produced by children are reflective of their perception and understanding of semantic relationships, which likewise reflect their cognitive functioning. Owens (2005) explained that early psycholinguists believed language acquisition was innate because of the comparable process of language development across a widespread population of children. This process of language development was attributed to an internal mechanism which "enables each child to process incoming language and to form hypotheses based on the regularities found in that language" (pg. 44). Through this action children are able to determine correct usage of syntactic or semantic rules specific to their language. While both models fall into the internal mechanisms theory of language acquisition, they differ on what linguistic knowledge the internal mechanism actually has.

Finally Owens (2005) described the sociolinguistic theory, which is actually a combination of the external feedback and internal mechanisms theories. Sociolinguistic theory focuses on the underlying reasons for using language or communicative functions

of language. In other words, effective communication is the primary goal of an individual when learning language. This model associates future language abilities with the amount of response a caregiver provides an infant. However, in addition to caregiver response, sociolinguists also believe infants possess an innate means to communicate. The sociolinguistic model combines characteristics from the aforementioned behavioral and psycholinguistic theories; however sociolinguists believe that a combination of these factors (i.e., an innate purpose and caregiver response and interaction) is what leads to language acquisition.

Bohannon and Stanowicz (1988) compared the theory of internal mechanisms with the theory of external feedback by examining adult responses to child language. Bohannon and Stanowicz examined the interaction between non-parents and parents with children to determine types of feedback provided to children. They found that while parents provided more feedback overall, both sets of adults provided sufficient feedback to increase language development. Bohannon and Stanowicz (1988) explained that some believe negative evidence (e.g., pointing out errors in a child's utterance) is superior to any innate knowledge an individual may possess. The authors examined interactions between two sets of adults and children. One set included a group of non-parents and a single child, while the other set included children with their mothers and fathers. Bohannon and Stanowicz found that recasting, or repetition and modification of child utterances, was equal to, if not superior to, negative evidence. Therefore Bohannon and Stanowicz (1988) concluded that the theory of external feedback should be given more credit than the theory of internal mechanisms with regard to the acquisition of language.

Many believe language acquisition results from a combination of the ideas put forward in the different theories. Kuhl (2004) reviewed the phases of language acquisition and what factors are necessary for typical acquisition to occur. Kuhl explained that language acquisition requires the presence of certain innate factors including categorical perception, categorization, and native language discrimination. Categorical perception is the ability to distinguish different sounds from one another, while categorization is the ability to perceptually group different sounds into phonetic categories despite very small differences in talker, rate, and context variability. Native language discrimination is the ability of an individual to distinguish sounds specific to their native language. This ability continues to improve as an infant matures, and this ability becomes very important to language acquisition. While these innate abilities are essential to language acquisition, Kuhl discussed the importance of social interaction with an infant as well. Kuhl explained that instances where children were raised in an isolated environment caused such a detrimental impact on their language development that typical language was never acquired. Kuhl concluded that both internal mechanisms and external feedback are essential to language acquisition.

Although these models and theories of language acquisition differ from one another, each seems to hold valid information relevant to aspects of language acquisition. Taken collectively, these aspects make up a general theory of language acquisition. That is, speech and language acquisition results from a combination of internal mechanisms and external feedback, each with contributing factors pertinent to the development of language.

When the contributions of the aforementioned theories are considered in total, researchers have accounted for many of the general patterns observed in language development. However, many believe language is acquired individually as well, with children having unique patterns that do not generalize to others (Owens, 2005). For example an individual may present with one symptom that is typically characteristic of a disorder, but may not have any other symptoms that lead to that diagnosis. Because this pattern is atypical, complications may arise when determining appropriate intervention. Assessing a child with delayed expressive language is particularly difficult, especially when no concomitant medical involvement is present. However, it is often apparent that treatment is necessary, with or without a concrete diagnosis.

Identification of Expressive Language Disorders

According to Rescorla (1989) the defining characteristics for identifying expressive language delay in young children around 24 months of age are: (1) whether or not the child has an expressive vocabulary of less than 50 words; or (2) demonstrates no multiword utterances in conversational speech. These characteristics can sometimes be difficult to determine and may need to be obtained via parent report. Even then, variability in the rate of development of children so young is generally so great, it can cause indecision as to whether or not the delay will subside or persist, particularly in the absence of differences in biological make-up or environmental factors (Thal, Bates, Goodman, & Jahn-Samilo, 1997). At this age (24 months) parents may express concern that their child is not equal to peers; however, a professional opinion may not be sought

until the age of three or four years, when a delay is a certainty (Rescorla, Roberts & Dahlsgaard, 1997).

Even when parents express concern and seek professional help, there is some difficulty in identifying young children with expressive language disorders. Little research exists indicating the most appropriate age at which to diagnose a child with expressive language delay. Many young children are simply more slowly developing and outgrow any delays they might exhibit; however, waiting until a child is older could limit early intervention that might have benefited the child at a younger age (Rescorla, 1989).

Several studies have attempted to pinpoint predictor variables, or characteristics that could predict whether or not an individual will outgrow his or her delay; however, Rescorla et al. (1997) explained previous studies have been inconsistent in determining predictor variables for expressive language delay. In a study conducted by Williams and Elbert (2003), characteristics of children who were late talking were examined to determine whether or not they predicted future speech and language disorders. These characteristics included quantitative measures such as lexicon, phonological abilities, and syllable structure, and qualitative measures such as sound variability, rate of resolution, and atypical error patterns. Five children identified as late talkers participated in this study, attending observation sessions on a monthly basis. Language samples were obtained each session to determine change in quantitative and qualitative characteristics. These characteristics helped determine whether each individual's language skills were delayed or deviant, whether the child would "catch up" (Robertson & Ellis Weismer, 1999) and whether the child would need intervention. Williams and Elbert (2003)

concluded that while each of these characteristics plays a role in predicting expressive language delay, neither the quantitative nor the qualitative criteria alone were sufficient to predict which children would have persisting expressive language delays.

Another characteristic of late talkers that has been studied to determine whether a child will or will not outgrow their delay is symbolic gesture. Thal and Tobias (1994) examined the symbolic gesture production of a group of late talkers and compared it to skills of age-matched peers and skills of language-matched peers. The authors assessed both spontaneous and imitative gestures of all three groups of children and found that late talkers performed like age-matched peers in the area of gesture production and produced significantly more gestures than language-matched peers. However, late talkers produced significantly fewer words than age-matched peers. Thus, Thal and Tobias concluded that this may be a predictor variable useful in determining whether or not intervention is necessary; however, research supporting this statement is lacking. In another study comparing language production and gestures in symbolic play, Rescorla and Goossens (1992) examined two groups of toddlers, one with specific language impairment – expressive and age-matched peers with typical language skills. The authors looked at the children during free play and also during structured play. Unlike Thal and Tobias, Rescorla and Goossens found that toddlers with delayed expressive language did not have age-appropriate use of symbolic gestures. Rather, Rescorla and Goossens' (1992) results indicated that the group with delayed expressive language also had delayed gestures in symbolic play. This study presents information that suggests gestures and language are linked to symbolic development; therefore if expressive language is delayed, chances are

likely that gestures and symbolic play will also be delayed. This evidence may cause hesitation among parents and professionals regarding the use of symbolic gestures as a criterion for deciding upon a plan of action for late talkers.

Another difficulty in identifying expressive language delay is lack of efficient standardized methods used by various professionals (Rescorla, 1989). Speech-language pathologists use a number of methods to identify children with expressive language disorders or delays (Robertson & Ellis Weismer, 1999). Among these are parental report, formal testing, informal observation, and speech sampling (Rescorla, 1989; Robertson & Ellis Weismer, 1999; Tyler & Tolbert, 2002; see Appendix A for definitions). When a young child presents with expressive language delay and no other concomitant factors, the delay may go unnoticed by parents, pediatricians, and other professionals. If concern does arise, a quick and easy screening tool may not be available. Rescorla (1989) looked at some of the limitations of tests used by professionals, especially physicians, and found time and efficiency to be key factors in creating an accurate screening tool. Parental report of the child's expressive vocabulary was found to be the easiest method when collecting reliable and valid language information regarding young children around the age of 24 months (Rescorla, 1989).

Rescorla (1989) conducted several studies using the *Language Development Survey (LDS)*, a screening tool for identification of expressive language delay in toddlers, which is completed by the parents. The *LDS* consists of a vocabulary checklist which takes about 10 minutes for parents to complete. Rescorla (1989) examined the *LDS* in four studies to determine: its usefulness as a tool for identification of language delay;

how the original compared to a version of the *LDS* containing 100 more words; validity and reliability of the *LDS* in 24 to 30-month-old children; and validity and reliability of the *LDS* across a wider age range. Results of these studies indicated that the *LDS* has excellent validity and reliability and is a practical and efficient identification tool for expressive language delay.

Another tool that uses parental report is the *MacArthur-Bates Communicative Development Inventory – Words and Sentences (CDI – WS;* Fenson et al., 1993). The *CDI–WS* is a parent-report measure used to determine lexical inventory and length of utterance in toddlers. Heilmann, Ellis Weismer, Evans and Hollar (2005) conducted a study in which the *CDI–WS* (Fenson et al., 1993) was used to determine total productive vocabulary of 24 month old late-talking children. The *CDI–WS* was administered a second time to these children at 30 months of age. While at 24 months all participants scored below the 10th percentile, results at 30 months showed an increase in total productive vocabulary for participants, scoring on average at the 15th percentile. Significant correlations were found between results of the *CDI-WS* and results from other direct language measures (e.g. mean length of utterance and *Preschool Language Scale – 3rd edition;* Zimmerman, Steiner, & Pond, 1992) indicating that the *CDI-WS* is a valid measure for assessing language skills (Heilmann et al., 2005).

<u>Language Acquisition Remediation</u>

Providing treatment to late talkers poses some controversy because many speech-language pathologists recommend different approaches toward remediation for this population. One reason for this lack of agreement about treating late talkers is the

challenge speech-language pathologists face in distinguishing those who will catch up

from those who will have persisting problems. Holman (2005) discusses what some refer

to as a "gray period" of language development, when a child is between the ages of 18-24

months and shows difficulty in acquiring expressive language skills. Due to inadequate

research on this period of language development, speech-language pathologists are often

unable to make accurate decisions about whether to intervene or wait for the child to

catch up. As was mentioned previously, several studies have tried to pinpoint predictor

variables to determine whether or not a late talker needs intervention (Rescorla &

Goossens, 1992; Rescorla et al, 1997; Thal & Tobias, 1994; Williams & Elbert, 2003);

however there is limited agreement about predictor variables that correlate with

developmental outcomes and the course of phonological development and related

language abilities in toddlers who are late talkers.

This lack of information leads to substantial controversy regarding the

appropriate management for late talkers (Robertson & Ellis Weismer, 1999). Many

approaches involve an indirect management where a child's language development is

closely monitored but no direct intervention is applied. Paul (1996, p.15) discusses a

"watch and see" approach to toddlers who are average in every aspect aside from

expressive language and come from a functional home. This indirect approach seems to

be sufficient as these toddlers with specific expressive language delay have a 70% chance

of "catching up" by school age (Paul, 1996). Van Kleek, Gillam, and Davis (1997)

expressed concern for this indirect approach and concluded that toddlers with significant

language delays would most likely require future speech and language services, and even

those late talkers within a broad normal range would benefit from early intervention. In a response to Van Kleek et al. (1997), Paul (1997) indicated this approach is merely the most cost-effective, but if resources are available and the parents seem anxious, the child could be enrolled in therapy.

Some approaches may constitute a mixture of indirect and direct treatment, in which a specific objective is targeted, but therapy remains playful and directed by the child. Robertson and Ellis Weismer (1999) discuss several mixed treatment approaches including focused stimulation, a parent-based intervention, and milieu teaching techniques. Focused stimulation is a therapy technique that provides a high frequency of the individual's objective (e.g. the sound or word that individual is working on) within a naturalistic interaction with no attempt to elicit the goal expressively. Parent-based intervention is an approach utilizing a parent or caregiver who provides speech and language intervention following training or education. Milieu teaching is a behavioral method based on naturally occurring environmental events, as well as following the child's lead in interests. More direct approaches, such as those discussed by Ellis Weismer, Murray-Branch, and Miller (1993) and Kouri (2005) include modeling techniques, which involve the parent or speech-language pathologist bombarding the child with the target forms and providing opportunities for imitation, and other approaches involving elicitation procedures. Elicitation procedures are similar to modeling in that opportunities are created for the child, but a response from the child is requested as well. In a study conducted by Kouri (2005), lexical production was measured when two direct approaches were implemented with late-talking preschoolers.

One group participated in a mand-elicited imitation approach which involved "manding," or requesting, a response from a child, while the other group was assigned a modeling with auditory bombardment approach. In the mand-elicited imitation approach, when a child requested an item, the clinician produced a mand (e.g. "What do you want?"). If the response was unsuccessful, the mand was followed by an elicited imitation (e.g. "Tell me ball."). The modeling with auditory bombardment approach consisted of a portion of the session in which each participant listened to a recording of target words and a portion of the session in which repetitive models were produced by the clinician. Kouri (2005) found both approaches to be successful in increasing lexical production; however, the mand-elicited imitation approach was found to be more effective overall.

Determining appropriate treatment for toddlers who are late talkers is a difficult task; however, the importance of expanding early speech and language skills is critical for later academic skills such as literacy. A survey conducted by Casby (1988) revealed a need for involvement of speech and language pathologists in the schools regarding the "identification, assessment, and remediation of developmental reading disorders" (p.352). As was mentioned above, many of these students with reading disorders were once late talking toddlers who may have appeared to "catch up" developmentally in expressive language (Rescorla, 1989), but later evidenced deficits in acquiring literacy. The emergence of late problems in literacy emphasizes the importance for speech and language intervention early in the preschool years. If a speech-language pathologist decides that early intervention for a child with an expressive language delay is warranted, then finding the best approach to intervention is critical.

Music Intervention

In the past many approaches to speech and language therapy have been supplemented with activities and rewards to make it more motivational. Music, for example, has been used in the past as a holistic approach for different purposes in therapy such as a reward system, a method to engage an individual in therapy, a form of relaxation, and simply a presentation tool of the session's target (Zoller, 1991). Music also has been used for a variety of populations other than children with speech and language delays, including persons with aphasia (Belin et al., 1996), apraxia of speech (AOS), childhood apraxia of speech (CAS; Roper, 2003), and autism (Whipple, 2004). Music therapy is described as "intervention wherein the therapist helps the client to promote health, using music experiences" (Kennelly & Brien-Elliot, 2001, p.137). Kennelly and Brien-Elliot (2001) discussed several areas music therapy may benefit including psychosocial health, motor skills, behavioral/cognitive skills, and speech and language skills. The authors found that all of the individuals discussed in their literature review benefited from music therapy, creating reason to argue that it is an effective treatment approach; however, they also concluded research establishing efficacy is needed.

Dworkin, Abkarian, and Johns (1988) discuss Melodic Intonation Therapy (MIT), which is a music and rhythm-based approach developed for patients with nonfluent aphasia. Patients with aphasia may lose the ability to generate and use symbol systems, which can impair speech and language (LaPointe, 2005), but when treated with MIT, parts of the brain not normally used for speech and language respond to the music (Belin

et al., 1996), creating a new way to activate speech and language. In a study conducted by Haneishi (2001), the effects of a Music Therapy Voice Protocol on patients with Parkinson's disease were examined and found to be influential on vocal production, as well as mood of the patients. Patients saw increased intelligibility, vocal intensity, vocal range, and a more positive mood. The effectiveness of music intervention has not only been examined for adult patients, but for children as well. For example, in a meta-analysis conducted by Whipple (2004), studies using music as a variable when treating children with autism were examined, and music therapy was found to be largely beneficial. Some benefits of integrating music into speech and language therapy for children with autism included increased social appropriateness and communicative acts, increased attention to task and engagement, increased vocalizations and verbalizations, increased comprehension, and anxiety reduction. While there has been some success using music in speech and language therapy in the past, additional information about music therapy is still needed, especially for the pediatric population.

Literacy-based Intervention

While there is limited literature regarding music intervention for children with speech and language delays, a more traditional method that continues to gain acknowledgment is literacy-based intervention, in which storybooks and reading are used to present and target objectives (Kaderavek & Justice, 2002; Kouri, Selle, & Riley, 2006). Storybooks and other activities involving reading have held a place in speech and language intervention for quite some time; however, their purpose in intervention has changed as more evidence reveals delayed literacy skills seen in children with prior

developmental delays, specifically delays in language (Kouri et al., 2006). Rather than just a prop in therapy, storybook reading has become its own approach, a context that facilitates speech and language growth (Kaderavek & Justice, 2002). Kouri et al. (2006) examined the use of reading in early speech and language therapy practices targeting areas such as auditory comprehension, lexical learning, and phonemic production in children with specific language impairment (SLI) and found that all areas benefited from the literacy approach. Speech and language assessment and intervention has recently begun focusing on several specific methods targeting literacy skills such as phonological awareness intervention, whole language approach, and story retelling (Culatta, Page & Ellis, 1983; Gillon, 2000). In a study conducted by Culatta et al. (1983) story retelling was examined as a screening tool to identify children with speech and language disorders. The authors found that children who performed poorly on story retelling tasks also performed poorly on some standardized tests. Culatta et al. (1983) also discussed how story retelling performance might provide a more comprehensive look at an individual's capabilities. Gillon (2000) examined the effects of a phonological awareness intervention approach compared to a more traditional speech-language intervention approach and found children participating in the phonological awareness intervention made significant gains in the areas of phonemic awareness, word decoding skills, and spontaneous articulation in single words. The author also noted the children receiving phonological awareness intervention exhibited phonemic awareness skills comparable to "those of children with typical speech and language development" (p.137).

As more evidence regarding future literacy and learning disabilities is revealed in children who are late talkers, the trend of literacy-based intervention continues to grow (Kaderavek & Justice, 2002). Kaderavek and Justice (2002) discuss the growth of the idea that intervention should address skills linked to school success. While advocacy for literacy-based intervention seems to be increasing among professionals, additional research is needed to determine the most appropriate age range for this approach and strategies for facilitating generalization.

Purpose and Research Question

The limited literature addressing the topics of music and literacy-based intervention for late talkers leads to this study which was designed to determine whether music, particularly sung lyrics, has an effect on speech and language acquisition in toddlers with late-developing speech and language. This music-based approach will be compared to a more traditional literacy-based approach involving storybook reading. Therefore, the following questions regarding storybook intervention and music intervention will be the focus of this study.

1. Do sung lyrics in speech and language intervention promote growth of expressive vocabulary in toddlers who are late talking?

2. Does literacy-based speech and language intervention promote growth of expressive vocabulary in toddlers who are late talking?

3. Does a speech and language therapy approach integrating sung lyrics promote a greater increase in growth of expressive vocabulary in toddlers who are late talking compared to a literacy-based speech and language therapy approach?

The results of this study will help determine future treatment for children in this population, and thus provide these children with an increased opportunity for typical development.

CHAPTER 3

METHODOLOGY

The purpose of this investigation was to examine the application of a music-based treatment approach in comparison to a literacy-based treatment approach when applied to late-talking toddlers. This study was a single-subject alternating treatment design with multiple baselines across subjects.

Participants

The selection of participants for this study was based on chronological age, the performance on the *Preschool Language Scale – 4th edition (PLS-4*; Zimmerman, Steiner, & Pond, 2002), complete inventory of words, and an audiometric screening. To be included in the study, participants had to score at least one standard deviation below the mean for their chronological age on the *PLS-4*: Expressive Language subtest (Zimmerman et al., 2002) and score within normal limits for their chronological age on the *PLS-4*: Auditory Comprehension subtest (Zimmerman et al., 2002). Selection was also based on a legal guardian's report of the participants' status of language acquisition, as measured by the *MacArthur Communicative Development Inventories (CDI): Words and Sentences* (Fenson et al., 1993). Each participant needed to have at least 10 words within their vocabulary that were regularly used, but no more than 50 words to fit the description of expressive delay. Finally, each participant needed to pass an audiometric screening of at least 35 dB at 500, 1000, and 2000 Hz. In addition, participants needed to have no known anatomical or neurological deficiencies as reported by the legal guardian.

This study involved two individuals, one female (NA) age 22 months and one male (BA) age 24 months. Written permission for each individual to participate in this study was obtained by parents of the individuals prior to the study.

Participant NA

NA was identified as a late talker by the director of her childcare facility. Prior to this study a parental report of NA's status for language acquisition was obtained via the *MacArthur Communicative Development Inventories (CDI): Words and Sentences* (Fenson et al., 1993). NA also participated in an observation session in which her inventory of words was verified and transcribed. See Tables 1 and 2 for NA's lexical and phonetic inventory. NA was found to have 19 words in her lexical inventory and spoke with a mean length utterance (MLU) of 1 word. According to the *CDI: Words and Sentences*, NA's expressive language had a percentile ranking of less than 5. See Table 3.

Preliminary testing was also conducted to obtain standardized scores from the *PLS-4*: Expressive Language subtest and Auditory Comprehension subtest. NA scored within one standard deviation below the mean for her chronological age on the *PLS-4*: Expressive Language subtest with a percentile rank of 39 (Zimmerman et al., 2002) and scored within one standard deviation above the mean for her chronological age on the *PLS-4*: Auditory Comprehension subtest with a percentile rank of 39 (Zimmerman et al., 2002). See Table 4.

Table 1

NA's Lexical Inventory

Uh-oh (V-V)	Hi (C-V)
Grrr (C-V)	Bye (C-V)
Woof (C-V-C)	No (C-V)
Dog (C-V-C)	Please (C-V-C)
Baby (C-V-C-V)	Yes (C-V-C)
Mommy (C-V-C-V)	Shh (C)
Daddy (C-V-C-V)	Up (V-C)
Grandma (C-V-C-V)	Ball (C-V-C)
Grandpa (C-V-C-V)	Milk (C-V-C)

Note. V = vowel; C = consonant

Table 2

NA's Phonetic Inventory

Initial	Medial	Final
/b/	/b/	/g/
/p/	/p/	/k/
/d/	/d/	/d/
/g/	/k/	/f/
/k/	/m/	/s/
/m/	/n/	
/n/	/w/	
"sh"		
/w/		
"y"		
/h/		

Note. Sounds in forward slashes (/) are phonetic symbols as well as representative of English sounds. Sounds in quotation marks (") are representative of English orthography and English sounds.

Table 3

Pre-Treatment Test Results on the MacArthur Communicative Development Inventories
(CDI): Words and Sentences for NA

	Vocabulary Inventory	Use of Words	Word Endings	Word Forms	MLU	Complexity
Raw Score	19 words	3	0	0	1	0
Score Interpretation	$<5^{th}$ percentile	Below Avg to Avg	Below Average	5th to 15th percentile	Below Average	5th to 20th percentile

Table 4

Pre-Treatment Test Results on the Preschool Language Scale – 4th Edition (PLS-4) for
NA

	Raw Score	Standard Score	SS Confidence Band (90% Level)	Percentile Rank	Age Equivalent
PLS-4: Expressive	25	96	89 to 103	39th	20 months
PLS-4: Receptive	25	102	94 to 110	55th	21 months

Note. SS = Standard Score

Participant BA

BA, a 24 month old male was also identified as a late talker by the director of his

childcare facility. Prior to this study a parental report of BA's status for language

acquisition was obtained via the *MacArthur Communicative Development Inventories (CDI): Words and Sentences* (Fenson et al., 1993). BA also participated in an observation session in which his inventory of words was verified and transcribed. See Tables 5 and 6 for BA's lexical and phonetic inventory. BA was found to have 17 words in his lexical inventory and spoke with a mean length utterance (MLU) of 1 word. According to the *CDI: Words and Sentences*, BA's expressive language had a percentile ranking of less than 5. See Table 7.

Preliminary testing was also conducted to obtain standardized scores from the *PLS-4*: Expressive Language subtest and Auditory Comprehension subtest. BA scored within one standard deviation below the mean for his chronological age on the *PLS-4*: Expressive Language subtest (Zimmerman et al., 2002) and scored one standard deviation above the mean for his chronological age on the *PLS-4*: Auditory Comprehension subtest (Zimmerman et al., 2002). See Table 8.

Table 5

BA's Lexical Inventory

Uh-oh (V-V)	Outside (V-C, C-V-C)
Bark (C-V-C)	Park (C-V-C)
Duck (C-V-C)	Bye (C-V)
Truck (C-V-C)	Hi (C-V)
Juice (C-V-C)	Shoe (C-V)
No (C-V)	Please (C-V-C)
Walk (C-V-C)	Out (V-C)
Hot (C-V-C)	Up (V-C)
Yucky (C-V-C-V)	

Note. V = vowel; C = consonant

Table 6

BA's Phonetic Inventory

Initial	Medial	Final
/b/	/b/	/p/
/p/	/k/	/k/
/d/	/s/	/t/
/t/	/w/	/n/
/n/		/s/
/s/		
"sh"		
/w/		
"y"		
/h/		
"j"		

Note. Sounds in forward slashes (/) are phonetic symbols as well as representative of English sounds. Sounds in quotation marks (") are representative of English orthography and English sounds.

Table 7

Pre-Treatment Test Results on the MacArthur Communicative Development Inventories (CDI): Words and Sentences for BA

	Vocabulary Inventory	Use of Words	Word Endings	Word Forms	MLU	Complexity
Raw Score	17 words	2	1	0	1	0
Score Interpretation	$<5^{th}$ percentile	Below Average	Below Avg to Avg	5th percentile	Below Average	5th to 10th percentile

Table 8

Pre-Treatment Test Results on the Preschool Language Scale – 4th Edition (PLS-4) for BA

	Raw Score	Standard Score	SS Confidence Band (90% Level)	Percentile Rank	Age Equivalent
PLS-4: Expressive	24	92	85 to 99	30th	19 months
PLS-4: Receptive	29	115	107 to 123	84th	26 months

Note. SS = Standard Score

Procedures

Screening of participants included administration of the *PLS-4* (Zimmerman et al.,

2002), a legal guardian's report of the participants' status for language acquisition (i.e.

MacArthur Communicative Development Inventories (CDI): Words and Sentences;

Fenson et al., 1993), and an audiometric screening. Upon meeting the inclusion criteria,

an observation session was held to verify parent report and also note any other words or

sounds not previously recorded for each participant. Also during this observation

session, a conversational speech sample was recorded, and words produced during

conversational speech were transcribed both orthographically and phonetically. A

phonetic inventory was constructed from the phonetically transcribed words as well as

the lexical inventory provided by the parents, and also the average number of syllables in

words was taken into account to help determine participants' word lists. Fifteen words

were selected for each participant based on their phonetic make-up, syllabic make-up,

and their absence within the participant's lexical inventory. Five words randomly

selected from the list of fifteen were used as target words in therapy during the first cycle,

while another set of five words randomly selected served as target words in therapy

during the second cycle. The third set of five randomly selected words made up an

alternate word list of non-targeted words used as a no treatment probe to exhibit change

in untreated words over the course of the study. See Table 9.

Table 9

Treatment Word Lists for Participants

	NA	BA
Music Treatment Word List	Duck	Bus
	Bunny	Cat
	Park	Key
	Cup	Park
	Water	Pig
Literacy Treatment Word List	Potty	Boat
	Pig	Cup
	Book	Home
	Home	Moon
	Bed	Potty
No Treatment Probe Word List	Kitty	Door
	Hat	Hat
	Shoe	Bike
	Apple	Phone
	Phone	Wagon

During each training session, probes were presented to elicit words from the alternate list in the same manner the training words were elicited; however, the alternate words were not used in training activities and served as no-treatment probes to monitor changes in production of trained words compared to untrained words over the course of the study. The list of five no-treatment probes was used during both cycles for each individual.

Following the observation session, a cycle approach specific to each participant was implemented beginning with baseline sessions. The participants completed separate baseline session schedules over approximately a five day time frame. Each baseline session consisted of a period of approximately 30 minutes in which the target words (i.e. training words and no treatment probe words) were elicited by a visual context (e.g. book, photos, or other two-dimensional item or object with pictures) in a child-directed, open-ended elicitation approach. The open-ended elicitation approach consisted of open-ended questions and statements to facilitate production of target words (e.g. "What do you see here?" "Tell me about this."). The number of productions of each word was recorded, the number of productions per baseline session was determined, and an average of the productions from three baseline sessions was obtained. Measures of participants' word productions were collected and recorded via audio recording during a 30-minute time period within the session. This baseline session format was repeated three times over the course of the study (i.e. prior to the first treatment, in between cycles, and following completion of the final treatment session).

Following the baseline sessions, participants were randomly assigned to begin either the music treatment approach or the literacy treatment approach. In this case, NA was assigned to the music treatment approach first and BA was assigned to the literacy treatment approach. Each treatment approach consisted of bombardment of training words, child-directed therapy in a pre-set environment, probing for generalization, and informal play, all presented in a similar manner. During the bombardment portion for each session, training words were presented 8 to 10 times via visual context, as described

previously for the baseline sessions. However, during this presentation of the visual context, the training words were sung or read according to the particular treatment cycle in which the participant was partaking. Child-directed therapy included a pre-set environment from which the child selected items. Different training words were assigned to each item, so as the participants took particular interest in an item, the training word was elicited and treated. Occasionally participants took no interest in a particular item on a given day, so in that instance, the clinician attempted to engage the participant with the item. This occurred frequently with participant NA as she would sometimes perseverate on an item or word. Attempts were made until the training word was elicited at least 5 times or until the participant was unable to further tolerate the task. The probing portion of each session was similar to the baseline session, where treatment probes were presented using a visual context and an open-ended elicitation approach (e.g. "What do you see here?" "Tell me about this."). During the informal play, participants' spontaneous productions of training words and treatment probes were recorded and tallied. No training occurred during this portion of the session.

The music treatment approach and the literacy treatment approach sessions followed a similar format consisting of all the aforementioned portions. The music treatment approach utilized singing of melodic lines as the approach to bombardment and training. In other words, during the bombardment portion of the music treatment cycle, lyrics, or short sung phrases, presented the training words. During the child-directed therapy portion, a short song was assigned to each item in the environment. Each training word was elicited through a short song. The treatment probing in the music

treatment approach was presented as the training words were during the baseline session, in an open-ended elicitation approach. The informal play did not involve any training, but allowed for spontaneous productions of the training words and treatment probes, whether sung or spoken. (For the layout of this treatment approach, see Appendix B: Music Treatment Session Protocol.)

The literacy treatment approach consisted of reading short stories as a procedure for bombardment and training. During the bombardment portion of the session, stories relating to each training word were read, also being presented with a visual context. The child-directed therapy portion was conducted in the same manner as the music treatment approach; however different stories were assigned to each item and read to elicit the training words. The treatment probing and informal play were unchanged from the music treatment approach. (For the layout of this treatment approach, see Appendix C: Literacy Treatment Session Protocol.)

Audio recordings were collected and stored for data analysis purposes, and phonetic and orthographic transcription of words spoken during the middle 20 minutes of each session were transcribed to document changes in each participant's lexical inventory. Upon completion of the eighth session (10/03/07), the first cycle ended and mid-treatment baseline sessions were conducted (10/05/07 – 10/11/07), recording changes that occurred in each participant's expressive language. Participants then switched therapy approaches and begin the second cycle on 10/15/07. NA began with the literacy treatment approach, while BA began with the music treatment approach. Following the final session of the second cycle (11/07/07), post-treatment baseline

sessions were conducted, as well as administration of the *PLS-4* (Zimmerman et al., 2002). Sessions ran on average approximately 30-minutes in length, two days a week, depending on participant tolerance and availability. Each cycle extended four weeks in length, resulting in eight weeks of total training.

CHAPTER 4

RESULTS

The purpose of this investigation was to determine whether music, particularly sung lyrics, has an equal or greater effect on speech and language acquisition in toddlers with late-developing speech and language when compared to a more traditional literacy-based intervention involving storybook reading. A cycles approach was implemented in which participants completed a total of eight weeks of training, four weeks of each cycle. Formal and informal measures were used to obtain pre- and post-treatment results.

Baseline Results

Baseline measures of total vocabulary production were obtained prior to the study, between cycles, and upon completion of the study to determine growth of each participant's lexical inventory. Three baseline sessions were completed at each point in the study (i.e. three pre-treatment baseline sessions, three mid-treatment baseline sessions, and three post-treatment baseline sessions) and averaged for a consistent sample. (See Tables 10 and 11.) Audio recordings of the baseline sessions were reviewed to validate what was recorded during each session.

During the pre-treatment baseline sessions NA produced none of the words assigned to the music or literacy treatments and an average of one word assigned to the no treatment probe list over a period of 3 baseline sessions. (NA produced "apple" during baseline session 1 and "shoe" and "phone" during baseline session 3.) BA produced none of the words assigned to the literacy treatment or the no treatment probe

list during the pre-treatment baseline sessions. He produced one word ("cat") from the music treatment list during the pre-treatment baseline sessions.

Cycle 1 Results

NA participated in the music treatment during the first treatment cycle. At mid-treatment, she produced an average of 1.67 words from the music treatment word list ("bunny" x 2, "duck" x 2, "water"), none of the words from the literacy treatment word list, but an average of 2.67 words from the no treatment probe list ("apple" x 5, "shoe" x 3). Thus at mid-treatment NA did not appear to benefit from the music therapy. She actually produced more of the no treatment probe words than the words assigned to the music treatment.

BA participated in the literacy treatment during the first treatment cycle. At mid-treatment, he produced an average of 12.33 words from the literacy treatment word list ("boat" x 8, "cup" x 6, "home" x 8, "moon" x 8, "potty" x 4), an average of 1.33 words from the music treatment word list ("cat" x 3, "bus" x 2), and an average of .33 words from the no treatment probe list ("bike"). At mid-treatment BA demonstrated progress during the literacy-based treatment as his production of words from the literacy treatment was much higher than that from the music treatment or the no treatment probe word lists.

Cycle 2 Results

During the second treatment cycle, NA participated in the literacy-based treatment. At the post-treatment baseline sessions, she produced an average of 5.33 words from the literacy treatment word list ("potty" x 5, "pig" x 2, "book" x 5, "home" x 3, "bed" x 1), an average of 1.33 words from the music treatment word list ("duck" x 3,

"park" x 1), and an average of .67 words from the no treatment probe ("apple" x 2). At post-treatment NA appeared to benefit from the literacy-based treatment, as her pattern of post-treatment production of words showed a definite advantage. Her production of the words associated with the literacy treatment was much higher than that of the words associated with the music treatment or the no treatment probe.

BA participated in the music treatment during the second treatment cycle. At the post-treatment baseline sessions, he produced an average of 19 words from the music treatment word list ("bus" x 14, "cat" x 18, "keys" x 6, "park" x 14, "pig" x 5), an average of 19.67 words from the literacy treatment word list ("boat" x 12, "cup" x 10, "home" x 16, "moon" x 12, "potty" x 9), and an average of .67 words from the no treatment probe ("hat" x 2). At post-treatment, BA progressed on both the literacy-based treatment words and the music treatment words while production of no treatment probe words remained low. Thus both approaches worked for him.

Throughout treatment, while NA's word production was much lower than BA's, an overall increase was still seen in word production from the treated word lists in the post-treatment baseline session when compared to the pre-treatment baseline session. Figures 1 and 2 show a visual representation of the progress each participant made.

Table 10

Average Word Production Across Baseline Sessions for NA

	Pre-treatment Baseline	Mid-treatment Baseline	Post-treatment Baseline
Music Treatment Words	0	1.67	1.33
Literacy Treatment Words	0	0	5.33
No Treatment Probe Words	1	2.67	0.67

Table 11

Average Word Production Across Baseline Sessions for BA

	Pre-treatment Baseline	Mid-treatment Baseline	Post-treatment Baseline
Literacy Treatment Words	0	12.33	19.67
Music Treatment Words	0.33	1.33	19
No Treatment Probe Words	0	.33	0.67

NA Multiple Baseline Word Production

Figure 1. Average word production for NA during pre-treatment, mid-treatment, and post-treatment baseline sessions.

BA Multiple Baseline Word Production

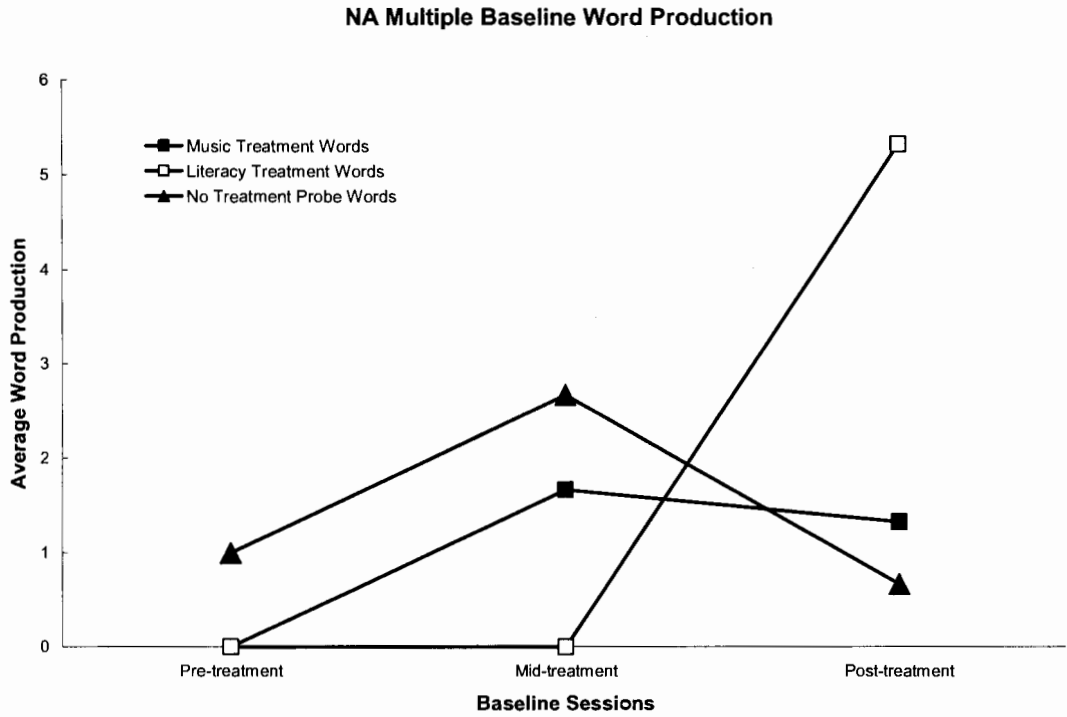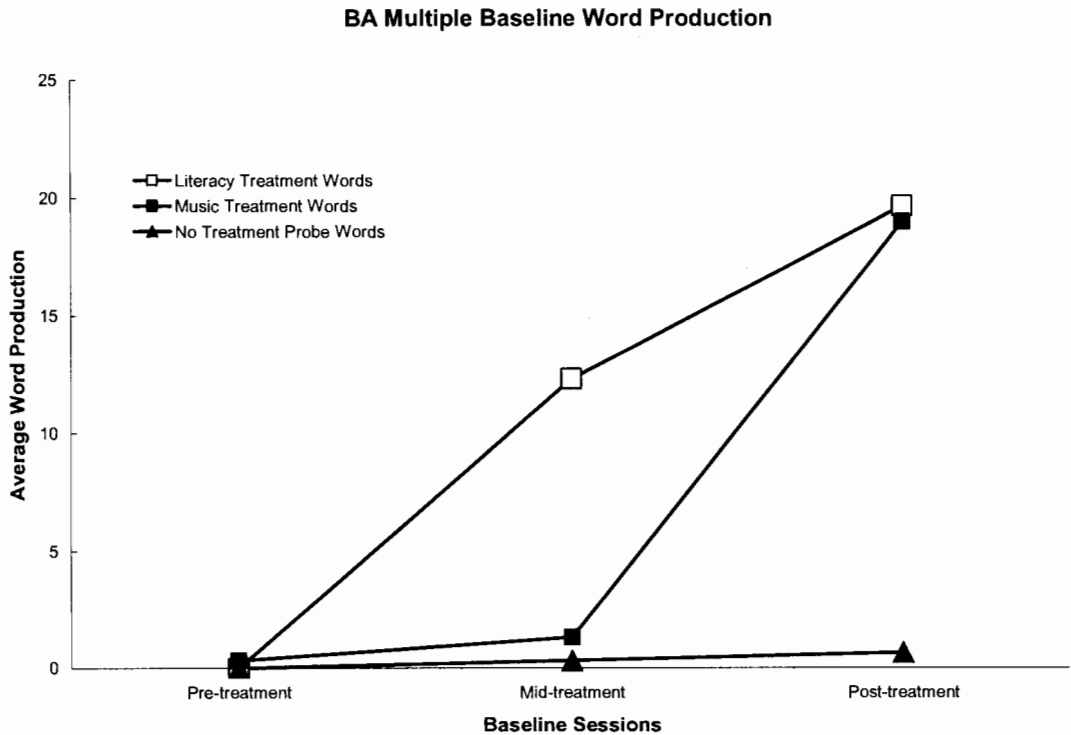*Figure 2.* Average word production for BA during pre-treatment, mid-treatment, and post-treatment baseline sessions.

Over the course of treatment, total word production increased for both participants. BA made the most gains, while NA made smaller gains. Total word production was recorded each session via audio recording and orthographically. Results from the music treatment approach were noticeably different between participants. NA was very inconsistent in her word productions from treatment session to treatment session while participating in the music treatment. It appeared her total word production declined from a high of 8 words produced during the first treatment session. However, when looking from the pre-treatment baseline session to the mid-treatment baseline session,

following her music treatment cycle, NA made slight gains, although these gains could not be clearly tied to the music treatment. She tended to produce treated words more often then untreated words, but during the last music treatment session before the mid-treatment baseline session, she actually produced the no treatment probe words 6 times as compared to 3 music treatment words. (See Figure 3.) BA made clear gains from treatment session to treatment session during the music treatment cycle which occurred during his second cycle. His progress was steady at first, producing 18-28 words each session in the first 6 sessions, and then progress increased to over twice the productions of the earlier sessions with 47 words in session 7 and 57 words in session 8. BA also made gains from the pre-treatment baseline session to the post-treatment baseline session, following his music treatment cycle. (See Figure 4.) Further, BA's productions of the no treatment probe words remained low across all sessions.
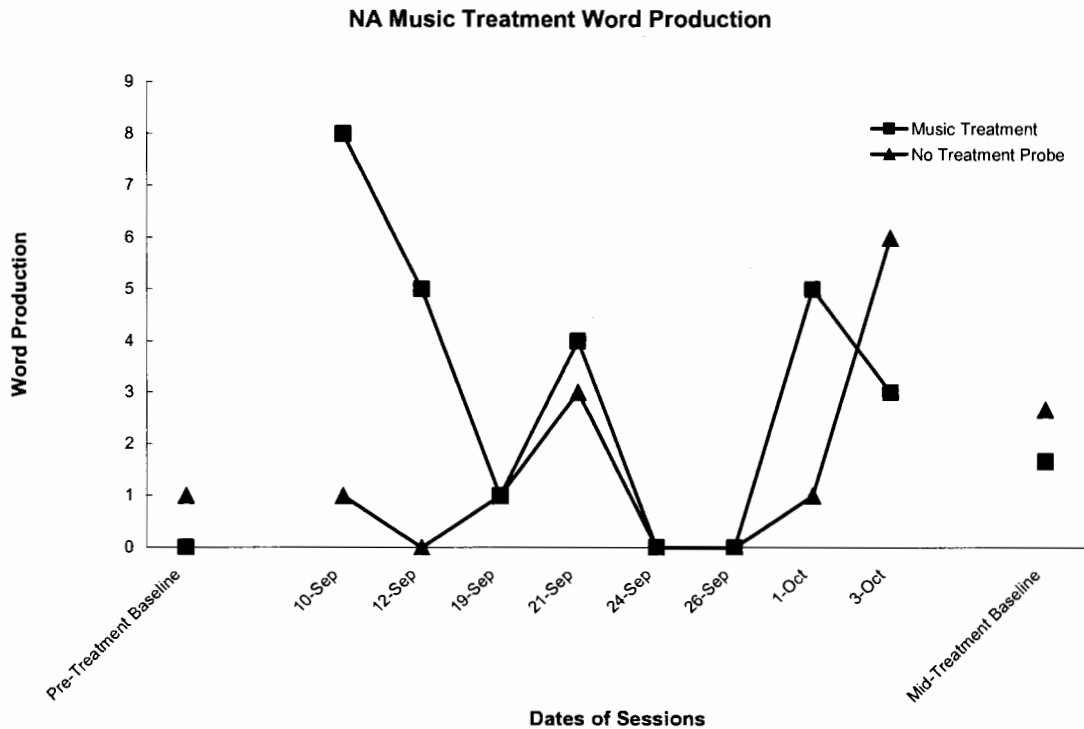
NA Music Treatment Word Production

Figure 3. NA's average word production of pre-treatment baseline and mid-treatment

baseline sessions in comparison to total word production of music treatment sessions.

BA Music Treatment Word Production

Figure 4. BA's average word production of pre-treatment baseline and post-treatment baseline sessions in comparison to total word production of music treatment sessions.

Results from the literacy treatment approach were variable for each individual child as well. NA was more consistent in her word productions from treatment session to treatment session during the literacy treatment approach which occurred during the second cycle. Her word production increased steadily with 4 productions during the first literacy treatment session and 12 to 15 productions in subsequent sessions, with one irregular spike of 29 words on the sixth treatment session. Further, NA's production of literacy treatment words remained much higher than her production of the no treatment probe words. Overall when looking from the pre-treatment baseline session to the post-

treatment baseline session, following her literacy treatment cycle, NA again made slight gains. (See Figure 5.) BA had a more random pattern of word production from treatment session to treatment session during the literacy treatment cycle, reaching a high of 28 productions. He seemed to have made significant gains within the first few treatment sessions, and then his progress became more erratic during the last half of the literacy treatment cycle. However, BA's production of literacy treatment words was consistently higher than the no treatment probe words. He produced 11 to 28 words from the literacy treatment depending on the session, but never more than 2 of the no treatment probe words. Like his progress in the music treatment cycle, BA made gains from the pre-treatment baseline session to the mid-treatment baseline session, following his literacy treatment cycle. (See Figure 6.)
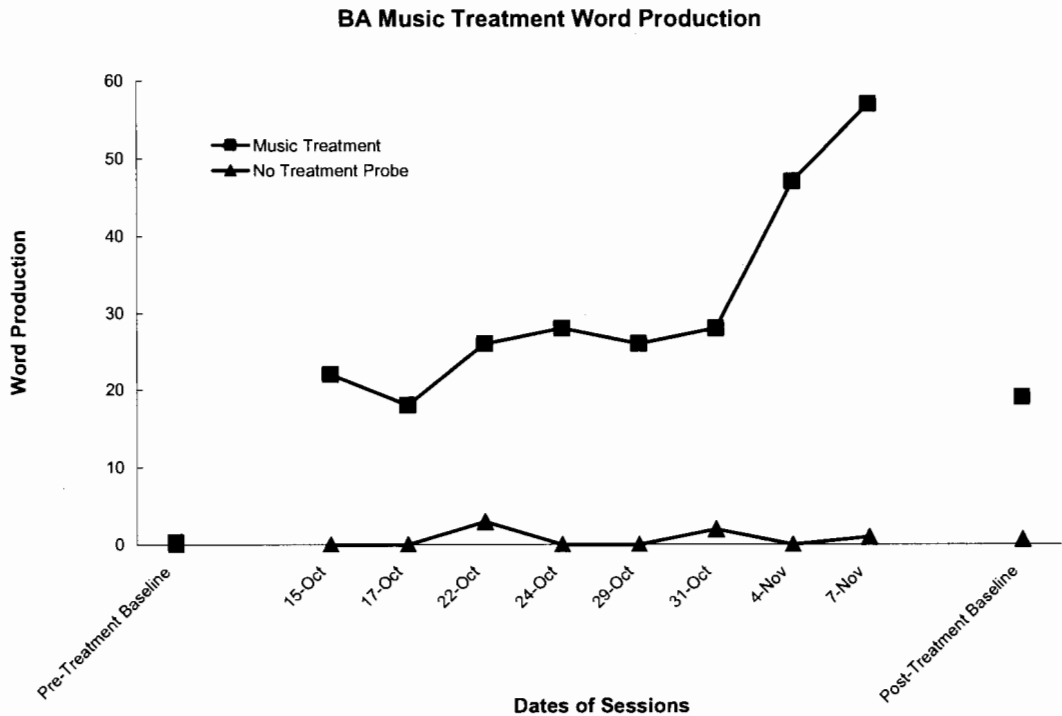
NA Literacy Treatment Word Production
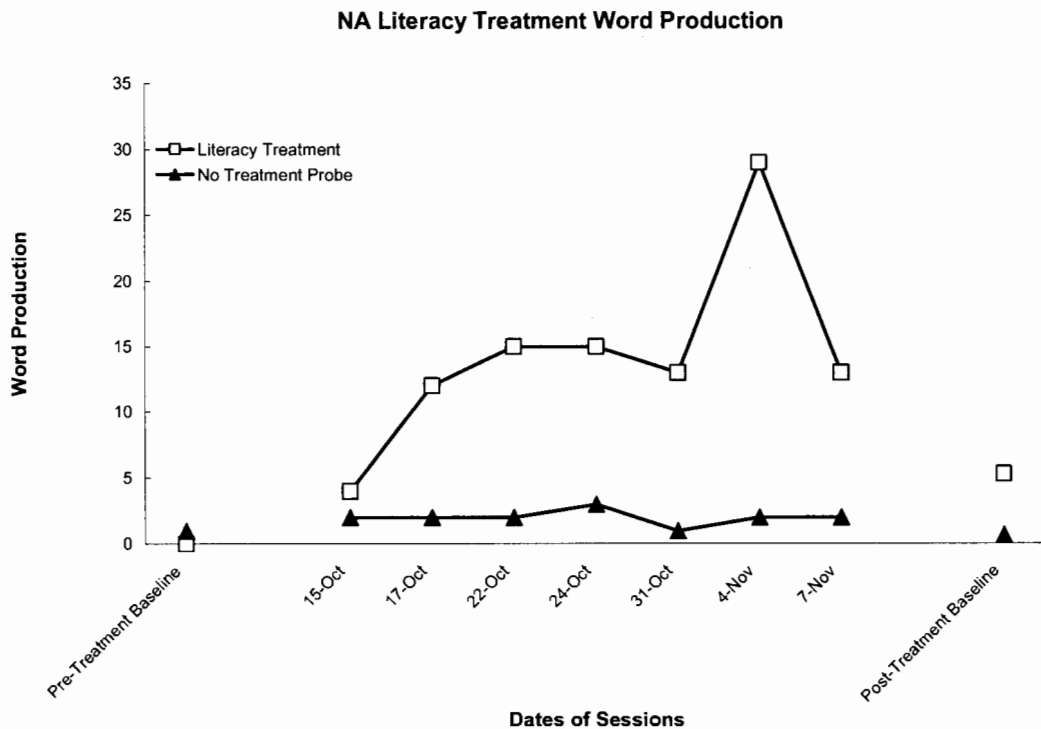
Figure 5. NA's average word production of pre-treatment baseline and post-treatment

baseline sessions in comparison to total word production of literacy treatment sessions.

BA Literacy Treatment Word Production
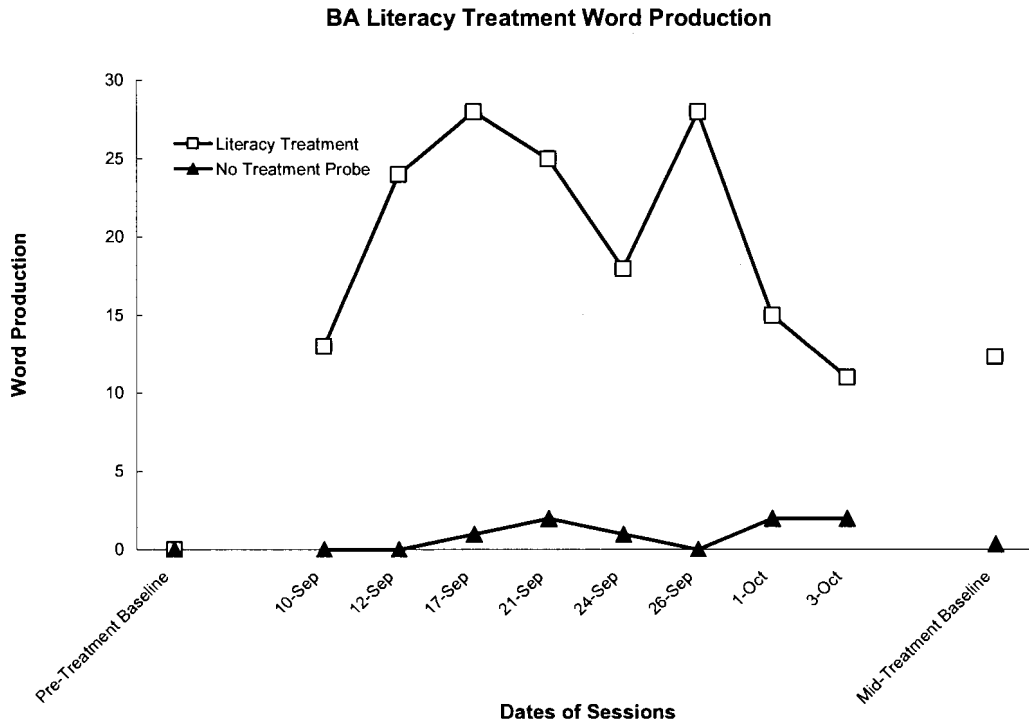
Figure 6. BA's average word production of pre-treatment baseline and mid-treatment

baseline sessions in comparison to total word production of literacy treatment sessions.

Following treatment and the post-treatment baseline session, the *Preschool*

Language Scale-4th Edition (PLS-4; Zimmerman et al., 2002), and the *MacArthur*

Communicative Development Inventories (CDI): Words and Sentences (Fenson et al.,

1993) were again administered to determine change in each participant's expressive

language and lexical inventory.

NA Treatment Results

NA made progress as far as lexical acquisition and expressive language, although

her linguistic growth did not seem to be keeping up with her age. Results from the *PLS-4*

(Zimmerman et al., 2002) indicated that she was saying more words overall and using words to communicate more often than gestures. She had begun to combine some words, but these words and word combinations seem to consist mainly of nouns (i.e. objects). While she made overall progress in the area of expressive communication, she still scored within one standard deviation below the mean for her chronological age. Results from the *MacArthur CDI: Words and Sentences* (Fenson at al., 1993) indicated that NA progressed in all areas except for two: usage of word endings and sentence complexity. While NA made progress in several other areas, she still was below average for her chronological age.

Table 12 displays the post-treatment results of the *PLS-4* (Zimmerman et al., 2002), and Table 13 displays the post-treatment results of the *MacArthur CDI: Words and Sentences* (Fenson et al., 1993) for NA.

Table 12

Post-Treatment Test Results of the Preschool Language Scale – 4th Edition (PLS-4) for NA

	Raw Score	Standard Score	SS Confidence Band (90% Level)	Percentile Rank	Age Equivalent
PLS-4: Expressive	28	87	80 to 94	19th	25 months
PLS-4: Receptive	26	84	76 to 92	14th	22 months

Note. SS = Standard Score

Table 13

Post-Treatment Test Results of the MacArthur Communicative Development Inventories (CDI): Words and Sentences for NA

	Vocabulary Inventory	Use of Words	Word Endings	Word Forms	MLU	Complexity
Raw Score	88 words	4	0	2	2.33	0
Score Interpretation	5th to 10th percentile	Below Avg to Avg	Below Average	20th to 30th percentile	Below Average	5th to 10th percentile

BA Treatment Results

BA also made progress as far as lexical acquisition and expressive language. Like NA, BA's linguistic growth did not seem to be keeping up with his age. Results from the *PLS-4* (Zimmerman et al., 2002) indicated that he was saying more words overall and using words to communicate more often than gestures. He had begun to combine some words and ask wh-questions (e.g. "Where truck?"). He also began to use plural word endings. While he made overall progress in the area of expressive communication, he still scored within one standard deviation (but not more than one) below the mean for his chronological age. Results from the *MacArthur CDI: Words and Sentences* (Fenson at al., 1993) indicated that BA, like NA, progressed in all areas except for two: usage of word endings and sentence complexity. While BA made progress in several other areas, he still was below average for his chronological age.

Table 14 displays the post-treatment results of the *PLS-4* (Zimmerman et al., 2002), and Table 15 displays the post-treatment results of the *MacArthur CDI: Words and Sentences* (Fenson et al., 1993) for BA.

Table 14

Post-Treatment Test Results of the Preschool Language Scale – 4th Edition (PLS-4) for BA

	Raw Score	Standard Score	SS Confidence Band (90% Level)	Percentile Rank	Age Equivalent
PLS-4: Expressive	30	91	84 to 98	27th	24 months
PLS-4: Receptive	33	109	101 to 117	73rd	29 months

Note. SS = Standard Score

Table 15

Post-Treatment Test Results of the MacArthur Communicative Development Inventories (CDI): Words and Sentences for BA

	Vocabulary Inventory	Use of Words	Word Endings	Word Forms	MLU	Complexity
Raw Score	79 words	5	1	2	2	0
Score Interpretation	<5th percentile	Below Avg to Avg	Below Avg to Avg	15th percentile	Below Average	5th percentile

The purpose of this investigation was to determine whether music, particularly sung lyrics, has an equal or greater effect on speech and language acquisition in toddlers with late-developing speech and language when compared to a more traditional literacy-based intervention involving storybook reading. Using a single-subject alternating treatment design with multiple baselines across subjects, the post-treatment evaluations, formal and informal measures, showed an increase in expressive language as well as lexical inventory for both participants in just eight weeks of total treatment (four weeks per cycle). Results using the music treatment approach indicated more linguistic growth for BA when compared to results from the literacy treatment approach. However, results from the literacy treatment approach indicated more linguistic growth for NA when compared to results from the music treatment approach.

CHAPTER V

DISCUSSION

The purpose of this investigation was to examine the application of a music-based treatment approach in comparison to a literacy-based treatment approach when applied to late-talking toddlers. This study was a single-subject, alternating treatment design with multiple baselines across subjects. After eight weeks of following the treatment protocol, it seemed both participants made some overall progress in the areas of expressive language and lexical inventory; however, the gains were not significant enough to "catch them up" to their peers. Factors that may have diminished progress during treatment were individual behavior, general health, and attendance. Also important to note are possible factors that may have supplemented progress such as maturation and other environmental changes (e.g. new classroom at child care with older aged peers), thus any changes that occurred in the formal test scores cannot be entirely attributed to treatment.

Results of the *MacArthur Communicative Development Inventories (CDI): Words and Sentences* (Fenson et al., 1993) indicated that the areas of delay prior to the study were still delayed when compared to age-matched peer abilities. However in the area of vocabulary production, participants made large overall gains. Prior to treatment, participants had an average of 18 words (NA had 19 and BA had 17). After treatment, participants had an average of 83.5 words. Participants increased their lexical inventory to 79 words (BA) and 88 words (NA).

Likewise, on the *Preschool Language Scale-4th Edition (PLS-4;* Zimmerman et al., 2002) both participants demonstrated improvement in specific areas of expressive communication. While their raw scores indicated that they each made overall gains, their standard scores indicated that these gains were not great enough in conjunction to their age. That is, while raw scores increased, standard scores and percentile ranks decreased. Prior to treatment, NA had an expressive communication raw score of 25, a standard score of 96, and she scored in the 39th percentile. Following treatment, she had an expressive communication raw score of 28, a standard score of 87, and she scored in the 19th percentile. BA showed results similar to NA. Prior to treatment, he had an expressive communication raw score of 24, a standard score of 92, and he scored in the 30th percentile, while following treatment, his expressive communication raw score was 30, his standard score was 91, and he scored in the 27th percentile. However, while the *PLS-4* (Zimmerman et al., 2002) is a valid and reliable tool for standardized testing, it assesses other areas of language which were not addressed (i.e. trained) in this study.

<div align="center">Research Questions Addressed</div>

Research Question #1

Do sung lyrics in speech and language intervention promote growth of expressive vocabulary in toddlers who are late talking? Yes, the music treatment proved effective for increasing lexical production for participant BA. NA appeared to benefit in an inconsistent way from treatment session to treatment session, but demonstrated little retention of gains in the mid-treatment baseline sessions. She actually produced more no-treatment probe words than music treatment words. NA did demonstrate increased

attention to task during the music treatment. These results support previous studies that have used music treatment for behavioral purposes. For example, in Whipple's (2004) meta-analysis, overall positive results were seen when using music with children with autism to address behavior skills such as participating in a routine, completing gross motor tasks, reducing self-stimulation, and maintaining eye contact.

Research Question #2

Does literacy-based speech and language intervention promote growth of expressive vocabulary in toddlers who are late talking? Yes, the literacy-based treatment was effective for both participants. While BA learned more words than NA, both produced more of the literacy treatment words than the no treatment probe words both during treatment and during the baseline sessions following the literacy treatment. These results support previous studies that have used reading as a method of intervention. For example, Kouri et al. (2006) found that using pre-reading vocabulary instruction increased children's identification of key words and their story comprehension.

Research Question #3

Does a speech and language therapy approach integrating sung lyrics promote a greater increase in growth of expressive vocabulary in toddlers who are late talking compared to a literacy-based speech and language therapy approach? There is no evidence that either a music treatment approach or a literacy-based treatment approach is more effective for toddlers who are late talkers. The music treatment approach did result in a higher production of words for BA during treatment sessions; however, there was no clear difference between music and literacy treatment word production at the post-

treatment baseline session. NA acquired more words in the literacy treatment; however, certain factors may have contributed to this (e.g. order of treatments).

Implementation of a structured treatment approach revealed some difficulties with 2-year-old children. The most difficult factor of administering treatment to the participants was cooperation. NA seemed to prefer to play alone and would become upset easily. The length of treatment sessions had to be altered on several occasions to accommodate NA's behavior. When she became upset and could not be re-directed to participate in activities, treatment was halted for that session. BA was very compliant; however he became distracted quite easily. Once he became disinterested, it was difficult to regain his attention. The length of treatment sessions had to be altered occasionally to accommodate his lack of attention.

One aspect of the treatment protocol that was particularly difficult was eliciting each item consistently and equally. Each participant had preferences for what they wanted to play with, and at times it was difficult to re-direct them to another object. This is one area in which the music treatment approach seemed to be superior to the literacy treatment approach. Both participants seemed to thoroughly enjoy singing along to the short songs, and were more easily redirected with singing. This should be examined in future research.

There are several possible explanations for the increased lexical inventory, particularly the changes in the formal test scores of the *MacArthur CDI: Words and Sentences* (Fenson et al., 1993) and the *PLS-4* (Zimmerman et al., 2002). Besides the treatment approaches, other factors that could have contributed to the linguistic growth

were maturation and other environmental changes (e.g. new classroom at child care with older aged peers), as well as the error of measurement of the tests. However, family life remained stable during this time and no other speech and language services were being provided. Also trained words from the treatments were used more frequently than the words from the no treatment probe during treatment and baseline sessions, thus attributing some of the linguistic growth to this study.

While it appeared that there was a drop off in production of treated words during the baseline sessions from the treatment sessions, it actually demonstrated how frequently each participant used the word without a direct elicitation. For example during the treatment sessions, each word was modeled several times, eliciting a response. During the baseline sessions, however, an open-ended elicitation approach was used, requesting information from participants with general questions and statements such as "What do you see?" and "Tell me about this."

Some limitations of this study included the use of a single-subject design. While there were two participants, each produced variable results. More participants following this same protocol are needed to determine validity and consistency across subjects, as well as to determine its practicality and feasibility in treating children who are late talkers. Also, the fact that the literacy treatment was more effective for NA could be attributed to the style of treatment but also the order of treatments. Future research should examine the order of treatments for several participants, as this could be an issue for interpretation of findings in a single-subject, alternating treatment design.

Likewise, there are several areas of the treatment protocol that, had they been altered, may have increased the participants' improvement. Further research is needed to identify those aspects which were most influential during treatment. Some questions to consider: First, is auditory bombardment at some point during the treatment session helpful in learning the target words? Would interest of the participants be increased if three dimensional objects were used instead of two dimensional representations from pictures and books? Would the music treatment approach be more effective if familiar tunes with altered lyrics were used? Lastly, would participants benefit from decreased duration and increased frequency of treatment sessions? These are all questions that need to be answered with future research.

In conclusion, a music based treatment approach as well as a literacy based treatment approach proved to be beneficial in increasing language acquisition in late talking toddlers. However, overall neither proved to be more successful than the other as results of participants varied. It is most probable that the success of a specific type of treatment is highly dependent on individual preference. Further research is needed to answer questions left unanswered by this study. However, the implications of this study will help determine future remediation of late talking toddlers, and thus provide these children with an increased opportunity for typical development.

REFERENCES

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR*. Washington, DC: Author.

American Speech-Language-Hearing Association. (2007). *Speech, language, & swallowing*. Retrieved April 2, 2007, from http://www.asha.org/public/speech/

Belin, P., Van Eeckhout, P., Zilbovicius, M., Remy, P., Francois, C., Guillaume, S., et al. (1996). Recovery from nonfluent aphasia after melodic intonation therapy: A PET study. *Neurology, 47*, 1504-1511.

Bohannon, J.N. III, & Stanowicz, L. (1988). The issue of negative evidence: Adult responses to children's language errors. *Developmental Psychology, 24,* 684-689.

Casby, M.W. (1988). Speech-language pathologists' attitudes and involvement regarding language and reading. *Language, Speech, and Hearing Services in Schools, 19*, 352-361.

Culatta, B., Page, J.L., & Ellis, J. (1983). Story retelling as a communicative performance screening tool. *Language, Speech, and Hearing Services in Schools, 14*, 66-74.

Duffy, J.R. (2005). *Motor speech disorders.* (2nd ed.). St. Louis, MO: Elsevier Mosby.

Dworkin, J.P., Abkarian, G.G., & Johns, D.F. (1988). Apraxia of speech: The effectiveness of a treatment regimen. *Journal of Speech and Hearing Disorders, 53*, 280-294.

Ellis Weismer, S., Murray-Branch, J., & Miller, J.F. (1993). Comparison of two methods for promoting productive vocabulary in late talkers. *Journal of Speech and Hearing Research, 36*, 1037-1050.

Fenson, L., Dale, P.S., Reznick, J.S., Thal, D., Bates, E., Hartung, J.P., Pethick, S., & Reilly, J.S. (1993). *MacArthur-Bates Communicative Development Inventories*. San Diego: Singular Publishing Group, Inc.

Gillon, G.T. (2000). The efficacy of phonological awareness intervention for children with spoken language impairment. *Language, Speech, and Hearing Services in Schools, 31*, 126-141.

Haneishi, E. (2001). Effects of a music therapy voice protocol on speech intelligibility, vocal acoustic measures, and mood of individuals with Parkinson's disease. *Journal of Music Therapy, 38*, 273-290.

Heilmann, J., Ellis Weismer, S., Evans, J., & Hollar, C. (2005). Utility of the MacArthur-Bates Communicative Development Inventory in identifying language abilities of late-talking and typically developing toddlers. *American Journal of Speech-Language Pathology, 14*, 40-51.

Holman, K.C. (2005). *CARD: Learning about language: Child development study at KKI focuses on following late talkers through the ambiguous "gray period" of language development*. Retrieved April 11, 2007, from Kennedy Krieger Institute Web site: http://www.kennedykrieger.org/kki_misc.jsp?pid=5402

Kaderavek, J. & Justice, L.M. (2002). Shared storybook reading as an intervention context: Practices and potential pitfalls. *American Journal of Speech-Language Pathology, 11,* 395-406.

Kennelly, J. & Brien-Elliot, K. (2001). The role of music therapy in pediatric rehabilitation. *Pediatric Rehabilitation, 4*, 137-143.

Kouri, T.A. (2005). Lexical training through modeling and elicitation procedures with late talkers who have specific language impairment and developmental delays. *Journal of Speech, Language, and Hearing Research, 48,* 157-171.

Kouri, T.A., Selle, C.A., & Riley, S.A. (2006). Comparison of meaning and graphophonemic feedback strategies for guided reading instruction of children with language delays. *American Journal of Speech-Language Pathology, 15,* 236-246.

Kuhl, P.K. (2004). Early language acquisition: Cracking the speech code. *Nature Reviews Neuroscience, 5,* 831-843.

LaPointe, L.L. (2005). *Aphasia and related neurogenic language disorders.* (3rd ed.). New York: Thieme Medical Publishers, Inc.

Marcus, G.F. (1993). Negative evidence in language acquisition. *Cognition, 46,* 53-85.

McCauley, R.J. & Fey, M.E. (2006). *Treatment of language disorders in children.* Baltimore, MD: Paul H. Brookes Publishing Co.

Myers, D.G. (2002). *Exploring psychology.* (5th ed.). New York: Worth Publishers.

Owens, R.E., Jr. (2005). *Language development: An introduction.* (6th ed.). Boston: Pearson Education, Inc.

Paul, R. (1996). Clinical implications of the natural history of slow expressive language development. *American Journal of Speech-Language Pathology, 5*, 5-21.

Paul, R. (1997). Understanding language delay: A response to van Kleeck, Gillam, and Davis. *American Journal of Speech-Language Pathology, 6*, 40-49.

Rescorla, L. (1989). The language development survey: A screening tool for delayed language in toddlers. *Journal of Speech and Hearing Disorders, 54*, 587-599.

Rescorla, L. & Goossens, M. (1992). Symbolic play development in toddlers with expressive specific language impairment (SLI-E). *Journal of Speech and Hearing Research, 35*, 1290-1302.

Rescorla, L., Roberts, J., & Dahlsgaard, K. (1997). Late talkers at 2: Outcome at age 3. *Journal of Speech, Language, and Hearing Research, 40*, 556-566.

Robertson, S.B. & Ellis Weismer, S. (1999). Effects of treatment on linguistic and social skills in toddlers with delayed language development. *Journal of Speech, Language, and Hearing Research, 42*, 1234-1248.

Roper, N. (2003). Melodic intonation therapy with young children with apraxia. [Electronic version]. *Bridges, 1*, 1-7.

Styba, L. (1999). *The speech-language pathology website.* Retrieved April 2, 2007, from http://home.ica.net/~fred/

Thal, D.J., Bates, E., Goodman, J., & Jahn-Samilo, J. (1997). Continuity of language abilities: An exploratory study of late-and early-talking toddlers. *Developmental Neuropsychology, 13*, 239-273.

Thal, D. & Tobias, S. (1994). Relationships between language and gesture in normally developing and late-talking toddlers. *Journal of Speech and Hearing Research, 37*, 157-170.

Tyler, A.A. & Tolbert, L.C. (2002). Speech-language assessment in the clinical setting. *American Journal of Speech Language Pathology, 11*, 215-220.

Van Kleeck, A., Gillam, R.B., & Davis, B. (1997). When is "watch and see" warranted? A response to Paul's 1996 article, "Clinical implications of the natural history of slow expressive language development." *American Journal of Speech Language Pathology, 6*, 34-39.

Whipple, J. (2004). Music in intervention for children and adolescents with autism: A meta-analysis. *Journal of Music Therapy, 41*, 90-106.

Williams, A.L. & Elbert, M. (2003). A prospective longitudinal study of phonological development in late talkers. *Language, Speech, and Hearing Services in Schools, 34*, 138-153.

Zimmerman, I.L., Steiner, V.G., & Pond, R.E. (1992). *Preschool Language Scale*. (3rd ed.). Chicago: The Psychological Corporation.

Zimmerman, I.L., Steiner, V.G., & Pond, R.E. (2002). *Preschool Language Scale*. (4th ed.). San Antonio, TX: Psychological Corporation, a Harcourt Assessment Company.

Zoller, M.B. (1991). Use of music activities in speech-language therapy. *Language, Speech, and Hearing Services in Schools, 22*, 272-276.

APPENDIX A

Aphasia   An acquired communication disorder caused by brain damage that impairs a person's ability to understand, produce, and use language; may disrupt the ability to generate and use symbol systems (LaPointe, 2005, p. 2).

Apraxia of Speech (AOS)   An acquired neurological disorder of motor planning characterized by loss of the ability to execute or carry out learned purposeful movements, despite having the desire and the physical ability to perform the movements (Duffy, 2005, p. 5).

Autism   A developmental disability that results from a disorder of the human central nervous system; marked by delays in social interaction, language development as used in social communication, and/or symbolic or imaginative play.

Childhood Apraxia of Speech (CAS)   A developmental motor planning disorder of the nervous system that affects the ability to sequence and say sounds, syllables, and words.

Cycles Approach   An approach in which a target is addressed for a single session or week; the following session or week another goal is addressed. This pattern continues until all selected targets have been addressed.

Elicitation   Stimulation that calls up a particular response or class of behaviors.

Expressive language disorder   Impairment of the ability to produce language, especially for the purpose of communication.

Focused Stimulation   A therapy technique that provides concentrated exposures of specific linguistic forms/functions/uses within naturalistic communicative contexts (McCauley & Fey, 2006, p. 553).

Formal testing   Testing that is administered and scored in a standard manner. Formal tests are designed so questions, administration, scoring procedures, and interpretations are consistent.

Informal observation   Watching and listening in a more natural environment to obtain information and possibly create hypotheses to be tested later.

MacArthur-Bates Communicative Developmental Inventory (CDI)   Parent report assessment protocol for assessing language and communication skills in infants and young children.

Mand-Elicited Imitation Approach   A therapy approach which involves requesting (manding) a response from an individual, followed by a direct request of the therapy target (elicited imitation; e.g. "Tell me ball").

Milieu teaching techniques   A behavioral method based on naturally occurring environmental events as well as following the child's lead of interest.

Modeling   Through interaction, a caregiver or clinician demonstrates correct production of a target, usually concentrating on the focus of the child's interest.

Parent-based intervention   An approach utilizing a parent or caregiver, who provides speech and language intervention following training or education; a cost-effective approach.

Parent report   Obtaining information about an individual from a parent or caregiver.

Phonetic inventory   A collection of an individual's productive consonants or consonant clusters that occur in initial, medial, or final position of words.

Phonological awareness   The explicit understanding of a word's sound structure; critical for the efficient decoding of printed words and the ability to form connections between sounds and letters when spelling (McCauley & Fey, 2006, p. 279).

Preschool Language Scale-4ᵗʰ edition   A standardized assessment tool constructed to look at language skills in children from birth to 6 years 11 months; useful diagnostic and research tool that can be used to identify current comprehension and expressive language skills and also measure changes in language skills.

Receptive language disorder   Impairment of the ability to understand or comprehend language.

Speech sampling   Obtaining a sample of an individual's speech sounds, syllables, words, and/or phrases during natural conversation or play.

Story retelling   A procedure in which a child listens to and then reconstructs stories; active participation results in increased language development, comprehension, an interest in books and in learning to read.

Whole language approach   A content-oriented method of teaching children to read, emphasizing story retelling (McCauley & Fey, 2006, p. 394).

APPENDIX B

Music Treatment Session Protocol

Layout of session
Length: 30 minutes on average

5 minutes: Bombard with training words by singing short songs and melodic lines, using visual context (e.g. book, photos, other 2-dimensional object with pictures); each training word will be presented several times (10-12 times) within one minute.

15 minutes: Child-led time in a pre-set environment; different song or melodic line will be assigned to different items in environment; training words elicited at least 10 times each and targeted.

5 minutes: Probe child for generalization with Treatment Probe List.

5 minutes: "Free play" in which child's spontaneous productions of training words and probe words are recorded and tallied; no training will occur during this period of time.

Example of bombardment:
Targeting "cat"

[sung to the tune of "Hot Cross Buns"]
"One little cat! One little cat! Chasing all the mice away, one little cat!"

Example of elicitation and training:
Targeting "cat"

[sung to the tune of "Hot Cross Buns"]
"One little cat! One little ___ - what is it? Sing with me, 'One little cat!'" [Individual responds and sings.] "Great singing!" Finish singing song.

[sung to the tune of "Hot Cross Buns"]
"One little cat! One little ___ - what is it? Sing with me, 'One little cat!'" [Individual does not respond. Singing and item are withheld until child says or sings 'cat'.] "Great singing!" Finish singing song.

APPENDIX C

Literacy Treatment Session Protocol

Layout of session
Length: 30 minutes on average

5 minutes: Bombard with training words by reading a story, using visual context (e.g. book, photos, other 2-dimensional object with pictures); each training word will be presented several times (10-12 times) within one minute.

15 minutes: Child-led time in a pre-set environment; different story will be assigned to different items in environment; training words elicited at least 10 times each and targeted.

5 minutes: Probe child for generalization with Treatment Probe List.

5 minutes: "Free play" in which child's spontaneous productions of training words and probe words are recorded and tallied; no training will occur during this period of time.

Example of bombardment:
Targeting "cat"

[read from a script]
"Hello, Cat! Breakfast time for Cat. Cat is hungry! Bye, Cat!"

Example of elicitation and training:
Targeting "cat"

"Hello, Cat! Breakfast time for ___ - who? Tell me, 'Cat.' [Individual responds, "Cat."] "Yes, breakfast for *Cat*!" Finish reading story.

"Hello, Cat! Breakfast time for ___ - who? Tell me, 'Cat.' [Individual does not respond or responds incorrectly. Story and item is withheld until child says 'cat'.] "Yes, breakfast time for *Cat*!" Finish reading story.