

Music Therapy Efficacy on Increasing Word Length in Spanish Dominant Children with a Phonological Process Disorder

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Abstract

Spanish dominant children with phonological process disorders were investigated in specific regard to the efficacy of the use of music for increasing speech clarity in conjunction with structured phonological pattern suppression treatment. A quantitative research design was used through the use of descriptive observational variables. This was an experimental research via a pretest-posttest control group design. At completion of the study, there were 13 participants in the experimental group and 6 participants in the control group all of whom were Spanish dominant. The findings of this research revealed data that provided a concrete means depicting the positive effects of music as a treatment modality for speech remediation. Findings were significant at the .01 level. It was found that 85% of the intervention group mastered suppression of the target process at completion of the study when compared to 50% of the nonintervention group.

Keywords: Speech, Therapy, Phonological, Awareness, Music, Spanish

1. Introduction

The American Music Therapy Association (2009) stated that music therapy is a specialized field that is used to help people in various aspects of their lives including the physical, emotional, social and cognitive areas. This field of expertise had its beginnings after World War I and II when musicians used their skills to help alleviate and better the physical and emotional health of the recovering veterans. Music therapy had its first official academic degree conferred in 1944 and has continued to be a growing health field. Research for the area of music therapy is evident in their various publications such as the *Journal of Music Therapy* and *Music Therapy Perspective*. These publications reiterate data that support the use of music for promoting physical rehabilitation, increasing wellness, decreasing stress, reducing pain, promoting the expression of feelings, enhancing memory, and improving communication. Arntson (2009), a speech-language pathologist, established a set of musical recordings in which the therapeutic purpose is language stimulation and communication expression. This speech-language pathologist completed multiple recordings that focused on increasing imitation skills. Even though the recordings are reported to have positive outcomes in increasing imitation skills and increasing functional language use, they are lacking in valid and reliable research to support the efficacy of its use. Music is being used for rehabilitative purposes; however, the evidence to justify the use of music in the area of speech and language intervention is lacking.

The topic of this research was music therapy efficacy on increasing word length in Spanish-speaking children with a phonological process disorder. There is a significant difference in the number of syllables in Spanish words when compared to English words. One simple example is “ball,” which in Spanish is *pelota*. Children with the phonological process of syllable reduction may say *ota* for *pelota* (Goldstein & Iglesias, 2006). Word length is key when treating a phonological process disorder presented as syllable reduction in Spanish (Goldstein & Fabiano, 2007). Multimodal cueing is a large part of the phonological process treatment approach; however, professionals vary in the manner in which the disorder is treated, and many times, consistency is not maintained. When treating phonological processes, consistency is key, as can be seen in the Hodson approach, which is a structured treatment method for extinguishing the occurrence of the presence of phonological processes (Hodson & Paden, 1990).

The purpose of this study was to determine if evidence existed to support the theory that the use of music was beneficial in decreasing the phonological process of syllable deletion. Syllable deletion is a phonological process that is sometimes referred to as syllable reduction or syllable omission, and it occurs when one or more syllables are omitted during the production of a multisyllabic word (Gordon-Brannan & Weiss, 2007). Many therapists believe that using music is not an effective approach when more concrete modalities can be used (Zoller, 1991). This research was necessary because it provided data to answer the question of whether music was beneficial and, if so, to what extent, or whether it had any effect at all. This study impacted the work setting in that it provided evidence-based information to support the use of music when working with children who presented with a phonological process disorder. This study provided further data for increasing the use of a proven treatment modality that expedited the extinguishing of a commonly seen phonological process in Spanish-dominant children. It also assisted in increasing awareness of the speech-language pathologist, who may use this treatment modality and possibly promote extinguishing the process, thereby reducing the number of children who might have required treatment in the future. In this researcher's work setting, music is used for various purposes in speech therapy: as a positive reinforcer, as an auditory cue, as a part of the structure of the session, as a transitional marker, or simply as a means to provide comfort for the patient. However, as shown in chapter 2 (the literature review), limited research exists to support the use of music.

Considering the information that is known in the area of music therapy and the prevalence of phonological processes in Spanish-dominant children, it was necessary to move forward in speech-language pathology research and seek the evidence to justify music therapy use. Two research questions were answered via the completion of this study:

1. What is the effect of music therapy in suppressing the phonological process of syllable deletion in Spanish-speaking children?
2. What is the effect of music therapy in shortening the length of time spent in therapy when suppressing the occurrence of syllable deletion?

There is a definite lack of evidence-based research that ascertained the benefits or possibly lack thereof regarding using music as an intervention tool. There is limited research related to the area of music treatment in the field of speech-language pathology. These limitations in research hinder the use of music in that they decrease the speech-language pathologist's assurance in the inclusion of music in their speech therapy programs.

1.1 Literature Support

When working with a child with a phonological process disorder, there are various modalities to choose from, such as auditory, kinesthetic, visual, and tactile cues (Fey, 1992). The key areas of effectiveness when using a phonological process treatment approach are the variety in the types of cueing used such as auditory, tactile, visual, and kinesthetic (Hodson & Paden, 1991). The use of music is commonplace in the area of treatment among speech-language pathologists (Fey, 1992; Hodson & Paden, 1991; Zoller, 1991). In this study, the effect of the use of music for increasing word length in Spanish-speaking children with a phonological process disorder was investigated. The researcher hypothesized that the use of music was a positive factor when dealing with increasing word length in children who presented with a phonological process disorder. This literature review supported the use of music as being beneficial when dealing with speech- and language-impaired individuals.

Zoller (1991) delineated how music could be used in speech and language therapy. Zoller stated that music is a natural and enjoyable venue for children. Additionally, the use of melodic intonation therapy for dealing with adult aphasics who are seeking to be verbal once again was mentioned throughout Sparks and Holland's (1976) research. The therapy was found to be effective in increasing verbalizations and communication skills. One concept emerged when reviewing the literature: the rhythmic and constant presentation of a stimulus item increased awareness. Zoller (1991) specified, "Enunciation, articulation and sequencing of sounds and words within songs can facilitate, stimulate, or refine speech" (p. 274). Considering that the use of music for decreasing syllable reduction falls under the category of sequencing sounds, Zoller's findings reinforced that music is a positive modality for speech therapy.

Van Tatenhove (2000) described how music can be used to increase language skills in the areas of core vocabulary and detailed language structures. Van Tatenhove documented the outcomes of the use of music as a treatment technique for increasing vocabulary and language skills in three 14- to 17-year-old teenagers over the period of a year.

She used musical lyrics to increase core vocabulary, increase lexical weaknesses, and reinforce the use of action terminology at the phrase level. Fey (1992) clarified how the traditional articulation treatment correlated with the phonological process approach. Fey believed that the traditional articulation approach was misconstrued and claimed the traditional approach was seen as a drill system as opposed to a cohesive approach that ties language concepts in with treatment. Fey indicated that (a) the phonological process approach targets errors at the rule or feature plane rather than at the phonemic plane, (b) emphasis is placed on extinguishing the error pattern by using positive reinforcement when the wanted sounds are produced, and (c) there is a higher significance placed on speech for communication as opposed to promoting the production of a specific sound. Fey further emphasized the use of multimodal cueing as presented by Hodson and Paden (1991).

Van Riper's (1978) theory of repeated production is significant in the field of speech-language pathology because it is the basis of how traditional articulation treatment was formed:

The hallmark of traditional therapy lies in its sequence of activities for: (1) identifying the standard sound, (2) discriminating it from its error through scanning and comparing, (3) varying and correcting the various productions until it is produced correctly, and finally, (4) strengthening and stabilizing it in all contexts and speaking situations. (p. 179)

Fey (1992) stated that music provided an ingrained repetitiveness that promoted repeated production. In the phonological process approach, multimodal cueing is key; therefore, music provided a naturalistic manner in which to coordinate kinesthetic, auditory, and tactile cueing for production practice. Bernhardt and Stoehl-Gammon (1994) believed that this was seen as being more efficient than a traditional approach because it focused on one "representative exemplar of the process" (p. 125). According to Bernhardt and Stoehl-Gammon, a focus on the main attribute of the process would eventually provide carryover to other sounds that were affected by the process.

The concept of nonlinear phonology (Goldsmith, 1990) provided an emphasis on prosodic structure. Music provides prosodic emphasis for syllables in words in general. The focus of nonlinear phonology theory is on the hierarchical nature of relationships between phonological units including prosodic phonology (Bernhardt & Stoehl-Gammon, 1994). Bernhardt and Major (2005) contended that, in a nonlinear phonological treatment plan, importance is placed on the structure of words throughout the intervention. Therefore, nonlinear phonology provides a support for the use of music in articulation therapy because music inherently provides a structure for words and emphasizes each syllable, whether it is weak or strong, in a rhythmic manner.

The literature review provided clear information on how music is a natural tool for increasing communication abilities. This information provided food for thought regarding the use of music in the following areas: music therapy in general, the phonological process intervention approach versus traditional articulation treatment approach, the effect of music in the prelinguistic stage, and the use of music for increasing speech and language skills. However, even though some information exists, evidence-based research remains limited.

2. Methodology

For the purposes of this study, a quantitative research design was used through the use of descriptive observational variables. This was experimental research using a pretest-posttest control group design. This group design was selected because Gall, Gall, and Borg (2003) affirmed that it "effectively controls for the eight threats to internal validity originally identified by Campbell and Stanley: history, maturation testing, instrumentation, statistical regression, differential selection, experimental mortality and selection-maturation interaction" (p. 392).

2.1 Participants

The setting for this research was an outpatient rehabilitation center in which the experimental group experienced a structured implementation of specific music selections that promoted word length. The target participants were considered an accessible population because these children had already been identified as articulation disordered and were receiving speech therapy. After reviewing studies completed in speech and hearing research, this researcher found that the total number of participants ranged from 5 to 77 in various studies in the areas of voice, fluency, articulation, and language. The majority of the studies had between 10 and 25 participants. Considering this information and the level of prevalence of phonological process disorders, 30 participants were included in this study.

Utilizing random selection, 15 participants were placed in the control group and 15 participants were placed in the experimental group. Subjects included Mexican American children ages 3 to 5 years who were Spanish dominant and were diagnosed with a phonological process disorder characterized by syllable deletion. As part of the diagnostic process, medical and developmental histories were reviewed to rule out the presence of a developmental delay or a hearing impairment that could have hindered the progress of the study. Potential subjects who presented with these complications in their histories were not included in the study. Parents were informed regarding the details of the study, and written consent was obtained.

2.2 Instruments

Because a pretest-posttest control group design of experimental research was used, the selected assessment for pre- and posttests was the Spanish Articulation Measures (SAM; Mattes, 1995) in which the patient is presented with picture plates and is asked to name items. SAM is a criterion-referenced assessment that was developed for evaluating Spanish consonant production in children. It is a valid assessment tool in that it provides data on all consonant productions in Spanish. The validity of the test can be seen when comparing the test targets to Spanish phonological development data, as discussed by Goldstein (1995) and Wilson (1984). There is a more current Spanish articulation assessment tool that was published in late 2006, the Contextual Probes of Articulation Competence: Spanish (Goldstein & Iglesias, 2006). However, that assessment uses pictures of words that are not commonly used in the regional area such as *bolsillo*, *bocadillo*, *habichuela*, *tifon*, and *llovedizo*. The Contextual Probes of Articulation Competence: Spanish would have required modeling for elicitation of the words, decreasing the opportunity for spontaneous assessment of sounds.

The Spanish Articulation Measures (SAM) provides information regarding the presence or absence of phonological processes (Mattes, 1995). It provides no normative data; therefore, its sole function is to assess articulation and categorize phonological process if they are present. The Spontaneous Word Production Task Quick Scoring Form 1.3 of the SAM was used for collection of pre- and posttest data. Forty words were tested. The participants received a percentage correct score for all sounds tested during the pre- and posttests. These scores were compared for changes or increases. For statistical analysis, a *t* test was used to compare means. The purpose of choosing a *t*-test design was to identify whether a statistically significant difference existed between the two mean scores of the two groups due to a dependent variable, which in this case is the provision of music during treatment (Gall et al., 2003). In the area of correlational statistics, the single number that describes the degree of relationship between the two variables was found in order to reveal whether the use of music was a positive or a negative factor when targeting the process of syllable reduction.

2.3 Procedures

This researcher acquired data through a 6-month period and collected data marking the decreases in syllable reduction at the word, phrase, and sentence levels during one 40-minute treatment period every 2 weeks with the experimental group. Participants were seen twice a week for a 6 month period. The music selections, 10 songs, were played and sung along with in conjunction with the phonological processes therapy approach (multimodal cueing) during the initial portion of the session and at the closure of the session. The researcher selected the songs for intervention purposes from the musical repertoire of José-Luis Orozco, who is a bilingual educator, children's author, and recording artist. Orozco (2005) "is an acknowledged expert in children's music and is a featured speaker and presenter at educational conferences and seminars for teachers, parents, librarians and childcare providers who seek to use music as an important learning tool in multicultural classrooms" (Biography section, para. 6).

A frequency count recording was used to analyze observations. During the 2nd session of the week, the speech-language pathologists documented correct suppression of the target process initially at the word level, at the phrase level at the midpoint of the research period, and at the sentence level in the latter portion of the research period. Ten multisyllabic words that naturally occurred in the songs were used as a tally sheet for each patient. A different set of 10 words was integrated into treatment gradually during the intervention period to ensure carryover. The researcher selected words that naturally occurred in the previously presented songs. Specific words that naturally occurred in the selected songs were the focus of treatment in support of the distinctive feature approach, which means that, if an error feature is present, it is not necessary to treat on a specific phoneme, but training of the error feature will generalize to other phonemes (Van Riper & Emerick, 1990).

These words were the targets for documentation purposes at all points of information gathering and were incorporated in the tally sheet for the frequency count recording.

The purpose of documenting at specific intervals of the study was to give the patient enough time to assimilate the music stimulation and begin to carryover the targeted skill. The purpose of these data was to provide documentation at intervals of the treatment period in order to ascertain whether a suppression of the target process was occurring. The control (comparison) group met the same criterion as the experimental group along with following a phonological process approach. However, the difference in the treatment provided was that music and song were not used with these patients, nor were specific sets of words used.

The observers were speech-language pathologists who had been trained in the phonological process approach intervention method by this researcher and were fluent Spanish speakers. The researcher trained the observers in a vertical approach in the area of phonological process treatment in order to maintain continuity (Goldstein & Fabiano, 2007). Prior to commencing the study, the observers were given a model on how the use of music would occur and how to document using the tally sheet with the 10 targeted words as described. This ensured that the observers were well aware of the expectations when engaging in the use of music during treatment. Using multiple observers with both groups assisted in controlling observer bias. Also, by limiting the documentation schedule to one session every 2 weeks, observer omission errors were reduced or eliminated. In addition, a biweekly meeting was held with the observers as a reminder regarding the manner in which the documentation should be occurring and how the structure of the therapy should continue to take place. This was an attempt to reduce observer drift. Frequent contact with the observers served as a check and balance throughout the experimental research study in order to reduce or eliminate reliability decay (Gall et al., 2003).

An advantage of this type of observer use was that the personnel were qualified speech-language pathologists who had been treating children with this type of disorder and were comfortable using either type of treatment. An additional advantage was that the intervention method was used in a whole-language naturalistic therapeutic setting in which the child felt inclined to participate secondary to prior exposure to treatment. Disadvantages were limited to whether or not the child enjoyed music. If a child in the experimental group did not have a positive reaction to the use of music, this intervention method might not elicit the desired suppression of the targeted process.

In the area of statistical analysis, the type of score obtained was a frequency count recording in combination with interval recording. Descriptive statistics were used in which a measure of central tendency was a key component. Each group of 15 children was given a score at each level of measurement such as the initial portion of study, medial portion of study, and final portion of study via formal test (SAM). The word was scored as 1 if all syllables were present and 0 if a syllable was deleted. Only a score of 1 or 0 was given following the criterion. Scores were compiled and the mean was derived to obtain general data regarding the specific scores for each group. The scores were analyzed for possible changes at the three points of information gathering (initial, midpoint, and final portion of study). The mean scores assisted in finding the standard deviation (Gall et al., 2003). The two scores provided an appropriate view of how the subjects performed.

3. Results

A one-sample t test was utilized to assess whether the mean of the distribution differed significantly. Furthermore, in order to answer the final research question, descriptive statistics were used when analyzing the amounts of sessions attended and the length of time in therapy that the subjects required in order to gain mastery of the targeted skill.

3.1 Description of the Sample

Thirty subjects were initially placed randomly as participants in the experimental group or the control group. There were 15 subjects in each group; however, due to attrition, at the conclusion of the study, 13 subjects remained in the experimental group and 6 subjects remained in the control group. Factors that contributed to the attrition that occurred were noncompliance in attendance to treatment and parental requests to remove the subjects from treatment.

3.2 Null Hypothesis

A t test was utilized to compare means; therefore, one null hypothesis was established.

The null hypothesis was that the use of music therapy had no effect on decreasing the occurrence of syllable reduction in Spanish dominant-children.

As part of a means to acquiring information as to whether the experimental group was progressing in the treatment program, a frequency count was obtained by utilizing four lists containing 10 stimulus words during treatment.

Means found for the data acquired were as follows: At the word and phrase level, a mean of 81% was found. At the sentence level, a mean of 93% was found. Gradual increases in correct suppression of the target process revealed increased means at the sentence level for all stimulus words. This frequency count was obtained only from the experimental group because the words used were directly linked to the music selections. The control group followed a multimodal cueing phonological process/distinctive-feature treatment approach as well; however, word lists were not utilized.

3.3 Statistical Analysis

During pretest assessment, the independent-samples t test analysis revealed that the 15 subjects in the experimental group had a mean of 82.77% correctly produced words, the 15 subjects in the control group had a mean of 69.20% correctly produced words and the means did not differ significantly ($p = .09$). The statistical analysis for this study was completed utilizing an alpha level of .05. Levene's test for equality of variances indicated that the variances for the experimental and control group did not differ significantly from each other ($p = .25$). During midtest assessment, the independent samples t test analysis revealed that the 13 subjects in the experimental group had a mean of 88% correctly produced words and the 6 subjects in the control group had a mean of 81.33% correctly produced words, and the means did not differ significantly ($p = .13$). Levene's test for equality of variances indicated that variances for the experimental and control groups did differ significantly from each other ($p = .01$). During posttest, the independent samples t test analysis revealed that the 13 subjects in the experimental group had a mean of 95.77% correctly produced words and the 6 subjects in the control group had a mean of 89.17% correctly produced words, and the means did not differ significantly ($p = .13$). Levene's test for equality of variances indicated that variances for the experimental and control group did differ significantly from each other ($p = .01$). Table 1 depicts the t -test analysis findings.

Subjects were randomly assigned to the experimental group ($n = 13$) or control group ($n = 6$). For the post intervention assessment, the means of the two groups were not significantly different ($t = 1.58$, $df = 17$, $p < .05[.13]$). An independent-groups t test revealed that the experimental group outcomes ($M = 95.77$, $SD = 4.00$) did not differ from the control group outcomes ($M = 89.17$, $SD = 14.38$, $t[df] = 17$, $p > .05$).

Furthermore, a one-sample t test indicated that the mean percentage of the pretest scores of the total 30 subjects ($M = 75.98$) was significantly lower at the $p < .001$ level. Midtest scores analyzed via a one-sample t test revealed a mean percentage of the total 19 subjects ($M = 85.89$) that was significantly lower at the $p < .001$ level. Posttest scores analyzed using a one-sample t test revealed a mean percentage of the total 19 subjects ($M = 93.68$) that was significantly lower at the $p < .001$ level. There was no probability that the differences found in the means could have occurred by chance. Table 2 presents the means and standard deviations from the one-sample t test. The mean of the experimental group during posttest ($M = 95.77$, $SD = 4.00$) was greater than that of the control group during posttest ($M = 89.17$, $SD = 14.38$).

In order to answer the final research question, the total number of sessions that the total group attended was analyzed. Table 3 illustrates the attendance analysis for all subjects during this study. Eleven of 13 participants in the experimental group (85%) mastered suppression of the phonological process of syllable deletion. Only 2 of the 13 experimental group participants (15%) continued in treatment after the study was completed. In comparison, 3 of the 6 control group participants (50%) mastered suppression of the phonological process of syllable deletion and the remaining 50% continued in therapy after completion of the study. When analyzing whether subjects actually spent less time in therapy than the predicted 6 months, the researcher found that 6 of the 13 experimental group participants (46%) showed mastery of suppression of syllable reduction before the 6-month period ended as opposed to one of the 6 control group participants (17%) who showed mastery of suppression of syllable reduction before the 6-month period ended.

4. Discussion

In the past, there has been little hesitancy in using music in speech and language therapy because music provides a naturalistic way to target many aspects of speech and language. However, the justification as to why music is used has been lacking due to the limited number of controlled studies that have been completed. The limited evidence-based data in the area of music in speech and language therapy has placed music therapy in the category of treatment approaches that are known to work but actual justification is lacking. The findings of this study supported effective use of music in speech intervention, especially because of the positive outcomes of the experimental group and, ultimately, their increased clarity of speech.

Even though research on the use of music therapy for speech remediation is limited, there are various supporters for the use of music for speech intervention. King (2007) supported music therapy for speech remediation in adults in the areas of dysarthria and apraxia through the use of various modalities such as melodic intonation therapy. Even though the primary focus of melodic intonation therapy is to promote recovery of functional language skills, many speech-language pathologists have utilized this modality to decrease speech dysfunction and have documented positive outcomes. Additionally, King presented rhythmic speech cueing, which is a more recent approach developed by Colorado State University that targets increased speech production. Rhythmic speech cueing is based on research findings in the area of neurology on response to rhythm: Specifically, rhythm increases arousal of the motor speech system, therefore, increasing organization at its core (Tamplin & Grocke, 2008). The use of rhythm through melodic intonation therapy and rhythmic speech cueing was implemented with music during the experimental study. The syllables were emphasized through rhythm and music, providing the patient with added stimulation to increase suppression of syllable reduction (Tamplin & Grocke, 2008).

Essentially, the concept of therapeutic singing was implemented during this applied dissertation. Tamplin and Grocke (2008) defined therapeutic singing as a modality that implements the use of singing to improve speech production. This modality reinforced the concept of neuroplasticity, in which new motor speech patterns may be acquired through the use of therapeutic singing. These treatment approaches concurred with the findings of this applied dissertation.

The researcher's purpose for completing this study was to establish whether the use of music was an effective tool in speech therapy. Two research questions guided the study:

1. What is the effect of music therapy in suppressing the phonological process of syllable deletion in Spanish-speaking children?
2. What is the effect of music therapy in shortening the length of time spent in therapy when suppressing the occurrence of syllable deletion in Spanish-speaking children?

An intervention program was designed that implemented structured use of music along with an integrated phonological process multimodal cueing/distinctive feature approach to phonological process therapy. The key intervention strategy utilized was the structured implementation of music via auditory stimulation and repetition during the initial and closing portions of each speech therapy session. The purpose of this intervention technique was to increase suppression of the process of syllable reduction in Spanish-dominant children and thereby increase overall speech intelligibility.

4.1 Implications of Findings

The study results revealed that the subjects who were exposed to music as part of their intervention program were able to master suppression of the targeted phonological process in fewer sessions compared to subjects in the control group. Eleven of the 13 participants in the experimental group (85%) mastered suppression of the phonological process of syllable deletion. Only 2 of 13 participants in the experimental group (15%) continued in treatment after the study was completed. In comparison, 3 of 6 participants in the control group (50%) mastered suppression of the phonological process of syllable deletion and the other 50% of the control group continued in therapy after completion of the study. These findings implied that the use of music therapy in speech remediation was effective in increasing awareness and self-correction, therefore, promoting generalization of the targeted skill. Empirical data were provided in that the use of music in speech therapy was observed and experienced and the findings revealed positive outcomes. These findings affect speech-language pathology clinical practice in that professionals may encourage the use of music as part of their intervention, knowing that a positive outcome is likely.

It is feasible that the findings of this study could be generalized to treating a phonological process disorder in Spanish-dominant children in a clinical speech-therapy setting. The key component would be to select music that emphasizes the suppression of the identified phonological process along with providing the structured exposure to the music. This structured exposure to the music provides the auditory and kinesthetic cueing that naturally occurs when listening to music. This researcher speculated that, for this study specifically, the use of the selected music was positively accepted because the cultural background of the subjects provided a frame of reference for the songs that were selected. Orozco (2005) purposefully selects themes and stories that are commonly known in the Mexican culture as the basis for his music. This familiarity with the story portrayed in the music may have contributed to the ease of participant acceptance of the music.

4.2 Limitations

This researcher had hypothesized that the intervention group would experience more positive outcomes than the nonintervention group. What was not anticipated was the rate of attrition experienced by the nonintervention group. Attrition occurred because of noncompliance in attendance and because of parental request. There appeared to be a lack of motivation to attend treatment, which contributed to the reduced numbers. The intervention group, on the other hand, attended regularly and ceased attending due to mastery of goals. Only two subjects were removed from the study due to noncompliance in attendance.

Some limitations may have been present in this study. Treatment was provided in a one-to-one therapist-patient manner in an outpatient rehabilitation center setting. This setting was controlled and lent itself to the implementation of the study in the manner necessary to provide reliable statistics. Additionally, the sampling group was limited to Mexican American children who were Spanish dominant. The Spanish spoken was that which is used near the Mexico-U.S. border. However, because Spanish has the same general basis in all of its dialectical variations, the findings of this study may be generalized in regard to treatment.

Another limitation of this study was that it provided a detailed analysis of treatment only of the phonological process of syllable deletion. The use of music as a modality for extinguishing other processes would be beneficial studies as well. The findings of this study may be applied only to Spanish-dominant children. Investigation of the use of music as a modality for intervention with English-dominant children who present with a phonological process disorder would provide much-needed data.

A threat that was present in this study was that subjects could have possibly withdrawn from participation because of relocation, which is a common occurrence in the Rio Grande Valley due to the high numbers of immigrants and migrants. This is why the study was implemented during the spring when children were enrolled in the public school system and reliable attendance was expected. However, this was not a factor. Subjects who were withdrawn from the study were withdrawn because of noncompliance in attendance in therapy and parental request. Attrition due to these factors occurred and limited the study.

Because the same formal assessment was utilized throughout the study, the probability exists that the children may have become accustomed to the testing conditions and, thereby, unintentionally learned to label the items provided. However, this researcher believes that this was highly unlikely considering that none of the items presented during the formal test was utilized as a stimulus item during intervention and the formal assessments were administered in 8-week intervals.

5. Recommendations

The previous section provided some suggestions for further study. This researcher also provides additional recommendations based on the findings of this study.

It is necessary to replicate this study with different age groups and other phonological processes. It would be beneficial to investigate if music is as effective in treating the process of initial consonant deletion, for example. It is also necessary to implement this study with English-dominant children of the same age group with the same identified phonological process. This would answer questions regarding the use of music therapy efficacy as an intervention in multiple languages. Furthermore, it is necessary to replicate the study with children of diverse language dominances in order to establish if the use of music therapy could possibly provide positive outcomes in any language.

Finally, this researcher recommends that the use of music in speech therapy should continue to be researched in multiple avenues including, possibly, the structured use of amplification, staggered and non-staggered use of music, and, specifically, utilization of music that has been recorded for therapeutic use and has been reported to be effective in treating speech disorders. This final recommendation is significant. A wide variety of music has been recorded and is being used during speech therapy. It is the responsibility of the speech-language pathology profession to engage in the research necessary in order to make the use of this fun and imaginative approach to speech therapy an evidence-based practice.

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Table 1: t-Test Analysis: Differences between Pre- and Posttest Scores

Assessment	N	Mean	SD	SE mean	df	t	p
Pretest							
Experimental	15	82.77	16.22	4.19	28.00	1.74	.09
Control	15	69.20	25.45	6.57	23.76	1.74	.09
Posttest							
Experimental	13	95.77	4.00	1.11	17.00	1.58	.13
Control	6	89.17	14.38	5.87	5.36	1.11	.32

Table 2: Means and Standard Deviations for Experimental and Control Groups for Pretest, Midtest, and Posttest Scores

Assessment	N	Mean	SD
SAM pretest			
Experimental	15	82.77	16.22
Control	15	69.20	25.45
SAM midtest			
Experimental	13	88.00	7.83
Control	6	81.33	16.53
SAM posttest			
Experimental	13	95.77	4.00
Control	6	89.17	14.38

Note. SAM = Spanish Articulation Measures.

Table 3: Attendance Analysis for Experimental and Control Groups

Group	1-10 sessions		11-20 sessions		21-30 sessions		31+ sessions	
	No.	%	No.	%	No.	%	No.	%
Experimental	2	15	2	15	3	23	6	46
Control	1	17	0	0	4	66	1	17