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Most Effective Treatment Modules for Increasing Expressive Language in Children with Down Syndrome

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MOST EFFECTIVE TREATMENT MODULES FOR INCREASING EXPRESSIVE LANGUAGE IN CHILDREN WITH DOWN SYNDROME

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Introduction

The study of Down syndrome (DS) in children has been investigated for years. Children with DS are commonly evaluated and treated by speech-language pathologists for a variety of communication needs. There is a substantial amount of research on comparisons of treatment modules and which module is superior. Although DS is quite common, prevalent in approximately 1 in 750 births, the impact of DS on children varies; thus making treatment decisions largely individualized. The purpose of this research paper is to examine empirical research investigations in birth to school age populations who have been diagnosed with DS. This review provides a description of characteristics, language related domains, and comparisons of DS intervention techniques to provide a cohesive discussion of language intervention with DS. Throughout this review, claims will be assessed with supporting evidence, validity, reflections, and future directions. Predominantly, this review will focus on which treatment modules are more effective in increasing language skills in children with DS. There is a need for early intervention for children with DS given their availability for early diagnosis and well-known strengths and weaknesses to increase expressive communication.

Expressive Communication

In order to fully grasp an understanding of language development in children with DS, one must first have a basic understanding of DS. DS is a genetic disorder in which there is an extra copy of chromosome 21; this is often referred to as Trisomy 21. Cognitive abilities vary on an individual case and can range from typical intelligence to severe retardation (Roberts, Price, & Malkin, 2007). Language is among the most impaired domains of functioning in DS and is often considered the greatest barrier to independent living (Abbeduto, Warren & Conners, 2007). Children with DS have identifiable strengths in expressive communication. According to

Kaderavek (2011), strengths include vocabulary development, gestures, and literacy. Vocabulary development typically meets or exceeds nonverbal cognitive levels. However, the rate at which vocabulary is learned is slower than typically developing peers. According to research, children with DS use gestures to communicate just as typically developing children do (Caselli et al.,1998) investigated use of gestures in 40 children with DS ranging from 10 to 49 months of age. Children with DS produced a greater percentage of gestures in categories that imply more advanced cognitive skills, including symbolic communicative gestures, pretending gestures, and actions which involve an ability to perform symbolic transformations. Caselli et al. (1998) suggested that symbolic communicative gestures and actions continue to increase and appear to be more sophisticated in children with DS than might be expected for their level of word comprehension. This shows a specific preference for gestural communication (Kaderavek, 2011) reported that children with DS learn to read at functional levels; it even goes to state that research demonstrates individuals with DS are reading "over-achievers" (p. 261). Data such as this leads interventionists to focus on reading interventions to increase successful therapy and maintain motivation in children with DS.

In a recent study conducted by Cleland, Wood, Hardcastle, Wishart and Timmins, (2010), the relationship between speech, oromotor, language and cognitive abilities in children with DS was examined in 15 children with DS between the ages of 9 and 18 years old. Participants of this study completed a battery of standardized tests measuring speech, language, and cognitive functions. Findings of each test were correlated to determine relationships between speech, language, and cognitive abilities. Investigators found that receptive vocabulary is a strength compared to expressive vocabulary; however, it was unclear whether it is more advanced compared with non-verbal cognitive skills. Results from this study support prior literature which

suggests that children and young people with DS present with marked deficits in expressive language (Cleland et al., 2010). Unexpectedly, language skills did not correlate with performance or verbal mental age. This suggests that language impairment in DS is not a result of cognitive delay rather, a 'specific' language impairment (Cleland et al., 2010).

Children with DS primarily demonstrate weaknesses in areas of morphosyntax, phonology, and pragmatics (Kaderavek, 2011). Individuals with DS typically produce sentences that lack articles, propositions, pronouns, conjunctions, auxiliary verbs, morphological markings and subordinate clauses (Kaderavek, 2011). The ability to form a grammatically correct sentence is more impaired than nonverbal cognitive abilities. It is stated in Kaderavek, (2011), that individuals with DS rarely progress beyond the simple sentence structures exhibited by a typically developing two-year-old. It has been established that children with DS have significant phonological deficits. Detailed descriptions of phonological deficits and warrants for intervention are later discussed. Pragmatic functions such as turn taking, requesting, and commanding develop in the same order as typically developing children however, emerge at a much slower rate (Cupples & Iacano 2000). The characteristics of the strengths and weaknesses of expressive communication in children with DS warrant a need for early intervention.

Early Intervention

Evaluation of the effectiveness of early intervention can be difficult given the wide variety of designs and strict limitations of studies. Many speech-language pathologists would argue that early intervention, which is providing speech and language services between the ages of birth to three, is vital in preventing and treating communication disorders. This is especially true for children with genetic disorders such as DS. Fortunately, DS is easily identified at birth allowing for intervention to begin within the first months of life. Given that DS identifies

children in the established risk category, we can conclude the condition stems from an event that took place in the past. One cannot eliminate the presence of DS and communication intervention should be based on the child's current level of functioning and not on the child having a specific and identifiable condition (Rossetti, 2001). In other words, the early intervention should treat the child's communicative delay and not a specific diagnosis. There are many research studies that advocate early intervention. Hines and Bennett (1996) composed a list of research studies that utilized early intervention. They investigated research studies that significantly prove the effectiveness of early intervention. In a study conducted by Connolly, Morgan, and Russell (1984), 15 children with DS ranging from seven – 10 years of age who had previously received early intervention was compared with a group of children with DS who had never received early intervention. Outcomes from this study showed that the group of children who had previously received early intervention demonstrated higher scores on measures of intellectual adaptive functions and did not show the typical decline. This study demonstrates long term effects of receiving early intervention. Another study conducted by Sharav and Shlomo (1986), investigated 51 children with DS ranging from six months to 13 years old. This study sought to measure the long term effects of stimulating children with DS. The children received home based treatment and special education at school. This study provided researchers a variety of results. Mental and motor scores declined until 18 months; at 18 months elevation of scores were shown until five years of age. Then, a drop in intelligence scores at five years old. Compared to the control group, the group of stimulated children maintained higher level functioning. This concluded that children whom had participated in the stimulation program maintained overall higher levels of functioning compared to the children who did not participate in the stimulation program. In this study, there were no significant differences between males and females. A study

conducted by Irwin (1989), investigated nine children with DS between the ages of two and five years old. This investigation compared two groups; Group A whom had participated in a variety of preschool programs with Group B, which consisted of 12 children, that had not participated in preschool programs. Group A demonstrated more advanced letter knowledge and moderately advanced in numerical skills compared to Group B. This study accounted the success of Group A to preschool programs, level of competence on leaving preschool, and degree of parental involvement. The fourth study conducted by Connolly, Morgan, Russell, and Fulliton, (1993), studied 10 children who had previously participated in an early intervention group from birth to three years of age. Standardized tests were administered to two groups, a control group who did not receive early intervention and the experimental group who received early intervention until three years of age. Intellectual and adaptive functional levels were higher for children in the early intervention group. Not only do children with DS need early intervention for language development, it is also suggested they be provided cognitive, motor, and social development intervention as well. The conclusion that children and families would benefit from early intervention is robust; the difficulty lies with determining the most effective treatment module.

Although there is overwhelming evidence advocating for early intervention, there are research studies that discount the efficacy of early intervention. It would be unwarranted to omit research studies such as these as more cumulative research could provide for more accurate intervention. In a study conducted by Piper and Pless (1980), a total of 37 infants were assessed over a six month period by an independent evaluator. Their intervention program was based on a biweekly therapy sessions of one hour in duration. During these sessions, evaluators and/or parents were instructed to focus on activities that stimulate normal development such as, rolling, sitting, reaching, or speaking. Measures of this study were based on the Home Observation for

Measurement of the Environment Inventory (HOME), which identifies key features of the infants' environment that are most likely to influence development. Another measure Piper and Pless (1980) used was The Griffiths Mental Development Scales; these scales measured developmental quotients for five skill areas: locomotor, personal-social, hearing and speech, hand and eye, as well as overall mental development. It was theorized that these scales would permit a more sensitive evaluation of the development progress of children with disabilities. Test administration and scoring were completed by a hired psychologist. Results from this controlled trial are discouraging to those practicing in the field of early intervention. It was discussed there was no evidence to support that early intervention was efficacious in treating or remediating mental disabilities in children with Down syndrome. There were no statistical differences between the control group and the experimental group. It should be strongly noted that the findings from this study are in sharp contrast with other literature reports that suggest benefits from early intervention. Ironically, throughout my research on the effects of early intervention, there was a discussion by Bricker, Carlson, and Schwarz (1981), which analyzed the previous study by Piper and Pless (1980). The investigators of this response discussion article examined two main ideas of Piper and Pless (1980); existing efficacy data that suggest early intervention may be effective and methodologic weaknesses in the research design employed by the investigators. Bricker et al., (1981) believed the length of a six month intervention is far too brief. Furthermore, each infant was only seen for an hour every other week and the authors noted they were unable to assess the degree of which the parents implemented treatment within the home. The effect between length of intervention and frequency of implementation can be a positive predictor of a child's progress. In addition, Piper and Pless (1980) did not utilize any dependant measures. Measures such as criterion-referenced tests may have validated the author's

evaluation design. It is stated, for a reader to assume on the basis of this investigation that early intervention is not effective in children with Down syndrome and their families would be an unfortunate error that might subsequently block or make more difficult the delivery of sound educational services the children with Down syndrome and their families (Bricker et al., 1981). It should be noted that each of these investigations are dated and the likely improved early intervention based on decades of research and policy changes have supplemented improved early intervention strategies.

Prelinguistic Milieu Training

Prelinguistic milieu training (PMT) is an effective type of intervention for children with DS in early intervention. Prelinguistic vocal development begins at birth for typically developing infants. Some investigators of pre-speech development suggest that children with DS are relatively normal in this domain of prelinguistic development. These vocalizations consist of crying, coughing, sneezing, burping, cooing, babbling, and jargon. In many children with DS, the appearance of prelinguistic and linguistic stages exhibit a substantial delay. PMT is an early communication intervention designed to help children with developmental delay that are limited in communication acts (Warren, Yoder, Gazdag, Kim, & Jones 1993). PMT serves as a direct method of teaching gestures, vocalizations, and coordinated eye gaze behaviors. Researchers used PMT within ongoing daily interactions that take place in the child's natural environment (Warren et al., 1993). Procedures of PMT are based on teach milieu training; which is an approach to teaching words and early grammatical constructions that borrows methods from highly instructive behavioral programs and uses them under much more naturalistic conditions with naturally occurring reinforcers that are selected by the child (Fey, et al., 2006). There are five major goals for implementing PMT: establish routines to serve as communication contexts,

increase the frequency of nonverbal vocalizations, increases frequency and spontaneity of coordinated eye gaze, increase frequency and spontaneity and range of conventional and nonconventional gestures, and to combine components of intentional communication acts (Fey et al., 2006). This intervention is designed for children who are making little or no use of conventional words and signs. Many studies have been conducted to establish empirical evidence on the efficacy of PMT.

As discussed in Yoder and Warren (2002), PMT accelerated growth in frequency of child-initiated comments and lexical density if the children began treatment with low frequency comments and canonical vocal communication. This article focuses on children with intellectual abilities, one of which is DS (Yoder & Warren, 2002). Empirically based literature that focuses on children with a variety of intellectual disabilities can provide useful intervention strategies that are successful and unsuccessful for different populations. Clinicians modified the environment to create opportunities for communication, and followed the child's lead by observing the child's attempts to manipulate toys, and waiting for the child to respond verbally and nonverbally. Surprisingly, in children with DS, the investigators found that they tend to use fewer requests after PMT, but the same number of comments. This pattern suggests the possibility that requesting is more difficult in children with DS than commenting. This article suggests that PMT be used on an individual basis as DS is highly variable. (Yoder & Warren, 2002). Yoder and Warren (2002) combined PMT with parent responsivity education, similar to RT discusses prior, forming a hybrid approach which is now referred to as RE/PMT. Warren, Fey, Finestack, Brady, Bredin-Oja and Fleming, (2008) stated that the logic of RE/PMT is the idea of arming children with a broader and more frequently used repertoire of intentional nonverbal communication behaviors, and sensitizing parents to these changes. This technique is

later discussed in a comparing study. In a study conducted by Warren et al. (1993) commenting, requesting, and vocal imitations were examined with a 20 month old boy with DS using a multiple baseline design. Commenting, requesting, and imitations increased during intervention. The results of this experiment suggest that a modified milieu teaching approach is a viable method for facilitating prelinguistic communication in young children with developmental delays. Another important finding from this article is in the area of generalization. Generalization occurred from trainer to classroom teacher and across settings, materials, and adult interaction style. In an effort to further evaluate the effects of RE/PMT conducted by Yoder and Warren (2002); Fey et al. (2006) replicated an experiment to provide comparison results. Fey et al. (2006) found that children who underwent RE/PMT intervention for six months demonstrated significantly higher levels of communication performance than the children who received no intervention. The findings from Fey et al., (2006) indicate that RE/PMT procedures can be used with at least some children with DS with no signs of adverse effects and important indications of positive impact. The variations of these findings could contribute to a multitude of ideas such as a difference in age group, different time tables, and a modification of PMT in Fey et al., (2006). In a more recent study conducted by Warren et al. (2008), the longitudinal effects of Fey et al. (2006) participants were evaluated. As stated above, Fey et al. (2006) reported that at six months of RE/PMT led to significant treatment results in the use of intentional communication. Combined with evidence from previous studies, researchers suggest that RE/PMT should be applied clinically at low intensity over a short term; perhaps one time a week for up to six months. Warren et al. (2008) however, found no evidence for long term benefits from this intervention. Ultimately, the investigators in this study recommend that this intervention extend over six months and employ more frequent training sessions; two to three

times per week. Despite the inconsistent findings between articles, Warren et al. (2008) concluded that the children who received RE/PMT would improve communication more than those children who had not received RE/PMT.

The conflicting findings from the previous articles exhibit a need for further investigation of the RE/PMT approach. Although there is supplementary evidence advocating the use of RE/PMT, there will likely be adverse results from comparing articles. It is necessary to acquire prelinguistic attributes because the development of joint attention, imitation, turn-taking, etc, underlie the development of pragmatic functions. Validity of this intervention technique is apparent in empirical research studies. Strengths of this technique is evident in the numbers and in my research, there was an abundance of articles advocating for this approach while there were fewer that opposed it. Given the variability of DS, intervention approaches for children with DS will consistently have arguing viewpoints. Future directions should include extensive research on the short-term and long-term results of the RE/PMT approach. Also, I would suggest that a variety of age groups be used while adjoining a larger pool of participants in future studies. In more dense studies, I would propose separating the degree of severity of the DS to observe if the RE/PMT approach has diverse effects on mild, moderate, or severe levels. This, along with other future implications, could develop a more direct plan for intervention. One prelinguistic attributes are established, interventionist should focus on the next step in increasing intelligibility of expressive speech. This direction leads clinicians to look at phonological awareness intervention.

Parental Involvement in Intervention

It is well known in the world of speech-language pathology that parental involvement in treatment programs can significantly enhance a child's development. Specifically in DS, parent

implemented therapy approaches should help facilitate therapy practices as opposed to therapy that does not involve parents. An intervention developed specifically for parents or caregivers is Responsive Teaching (RT). This strategy is designed to address cognitive, language, and social emotional needs of children (Mahoney, Perales, Wiggers, & Herman, 1996). RT was developed for caregivers who spend large amounts of time interacting with young children to aid in maximizing routine interactions to enhance development. Empirical evidence suggests RT promotes cognitive and communication development in children by engaging in highly responsive interactions (Mahoney et al., 1996). The RT curriculum was organized around the idea that responsive parents promote children's development more by encouraging children to engage in pivotal development behaviors and less by directly teaching the skills and concepts that are the benchmarks of higher levels of functioning (Mahoney et al., 1996). RT is typically easy for parents to follow due to the naturalness and simplicity of the intervention. It includes five main interactive dimensions including; reciprocity, contingency, shared control, affect, and match (Mahoney et al., 1996). These dimensions are based upon the principle of active learning. RT sessions can be conducted individually with parents and children in the home, centre-based settings, or with groups of children with similar developmental delays. Mahoney et al. (1996) suggests RT sessions last 30 minutes to one hour weekly. Unfortunately, there is no evidence that different levels of intensity of RT treatments are more or less effective.

In a study conducted by Mahoney and Perales (2005), 50 mother-child dyads in which each child had either pervasive developmental disorders or developmental disabilities were investigated. These children were between 12 and 54 months of age. Children received weekly, one hour parent-child sessions conducted either in parents' homes or a center based facility. Participants participated in this study for approximately one year. Results from RT treatments

indicated that children made remarkable developmental and social emotional improvements (Mahoney & Perales, 2005). RT intervention proved to stand among comparable early intervention strategies. RT ranks high on my hierarchy of early intervention techniques for many reasons. There is empirical evidence supporting the effectiveness of this specific treatment module and it can be implemented by parents or caregivers individually at home. Not only can RT be conducted by parents or caregivers, it is by far one of the most straightforward strategies I have found throughout my research. The RT curriculum is very simple and can become a rote routine for most caregivers.

In a study conducted by Dodd, McCormack, and Woodyatt, (1994), parents' communicative behaviors and their children's language abilities were assessed. This study examined the phonological skills of nine preschool children with DS. The group of nine children had various ways of communicating ranging from completely mute to multisyllabic utterances. Parents' of these children were given instruction on how to interact with their child while videotapes were made before, during, and after the program. Results from this study indicated that their children's phonological abilities including consistent and inconsistent errors and patterns, were associated with the parents' communicative and interaction styles. Implications from this article show that the language for children with DS is somewhat dependant on parents and caregivers interaction style (Dodd et al., 1994). There is a definite need for further research in this particular area of language and cognitive abilities in children with DS. This area is difficult to research and publish due to variability in environment and reliability of research. Like all children, progress for children with DS is influenced by family life and parents' child rearing skills, inclusion with peers at home and in preschool, and the quality of education available; the first priority for parents is to maintain normal family life (Buckley & Sacks, 2001).

Phonological Awareness Intervention

Phonological awareness is critical in early reading and spelling development for children who are at risk of literacy difficulties including kids with DS (Bysterveldt, Gillion, & Moran, 2006). Children with DS warrant a need for phonology intervention to establish a conscious level of understanding sound structure in words. Historically, children with DS have been taught to read by sight word approach; although this may benefit a child at an early level, research has shown it is unlikely to lead to independent reading ability (Bysterveldt et al., 2006). It is critical that children with DS learn how to decode written words and obtain necessary skills for word recognition through phonological decoding to establish the skill and ability for independent reading. Early phonological development in children with DS usually follows the same pattern as that of typically developing children but proceeds much more slowly. Phonological patterns such as, consonant cluster reduction, final consonant deletion, stopping, prevocalic voicing, gliding, and final consonant devoicing are found in both typically developing children and children with DS. Although these patterns are found in both, the difference occurs in the rate of development. Children with DS develop phonological skills at a much slower rate; consequently suppression of these phonological processes occur at a later time (Cupples & Iacono, 2000). It is also well known there is greater inconsistency and variability in errors produced by children with DS than typically developing children (Bysterveldt et al., 2006). Given this wide range of variability, age-of-mastery norms for phoneme acquisition is inappropriate to apply to children with DS.

In a study conducted by Bysterveldt, Gillion and Foster-Cohen, (2010), a multiple, single-subject design was used to evaluate phonological awareness intervention in children with DS. Ten children with DS ranging in age from four to five years of age were included in the investigation. Specifically, researchers hypothesized that the experimental integrated

phonological awareness intervention would improve speech production accuracy, letter name and letter sound knowledge, and phonological awareness skills. Participants were assessed using Peabody Picture Vocabulary Test – III (PPVT-III) and Pre-School Language Scale (PLS-4) to measure expressive and receptive language. Intervention targets were chosen based on the initial assessment results. Each participant received four speech targets which consisted of dominant phonological error patterns, as well as one control target. Treatment consisted of a parent-implemented home program, speech therapy sessions, and learning through computer sessions. Intervention consisted of two, six week cycles of therapy separated by a six week break. Results from this experiment support their first hypothesis on improving speech production accuracy significantly on both trained and untrained words. The second hypothesis was partially supported in that a portion of the participants improved letter name and letter sound knowledge. The third hypothesis was also partially supported in that some participants reached 70% accuracy of phonological awareness skills on untrained phoneme level tasks. This suggests that phonological awareness was being stimulated during the intervention period, but participants had not reached mastery of identifying initial sounds in words therefore could not demonstrate the transference of knowledge to novel items (Bysterveldt et al., 2010). This article implies that an integration approach combining speech, letter knowledge, and phonological awareness can provide for several treatment goals and may provide for a valuable alternative to traditional therapy techniques which target one language domain.

Another study completed by Bysterveldt et al. (2006) investigated the effectiveness of phonological awareness intervention in seven, four year old children with DS by comparing pre-intervention and post-intervention performance on phonological awareness and letter knowledge tasks. This study illustrated parent implemented therapy and showed significant improvement of

five out of the seven participants. Parents were instructed to bring the child's attention to four targeted letters and their sounds within words during a shared reading activity. Parents were trained to state the letter name while pointing to the letter in the book, describe the sound it makes, and bring the child's attention visually and orally. Intervention was designed to enhance initial phoneme awareness, letter name and sound knowledge, and concepts of print. As a group, participants showed significant performance gains on print concepts where the task was based on familiar books. Results also suggested that phoneme awareness needs to be taught in the context of known letter names and sounds in order for the child to make the connection the letter names and sounds in isolation and in words.

Cupples and Iacono (2000) hypothesized that phonological awareness and early oral reading skills would be positively associated in children with DS. Participants included 23 children with DS between the ages of six and 10 years old. This study included cross-sectional and longitudinal components. Cognitive, linguistic, reading, phonological awareness, phonological memory, and reading measures were used to assess children. Results from this study indicated phonological awareness, oral reading skills, and phoneme segmentation are all positively associated in children with DS. This supports their original hypothesis that phonological awareness is correlated with better reading skills. Another longitudinal study conducted by Bird, Cleave, and McConnell, (2000) claimed that school age children should be taught both phonological awareness and decoding skills directly. Bird and colleagues recommend that literacy programs for children with DS should encompass emergent literacy skills and narrative development. It is now well known that phonological awareness is essential in early intervention of children with DS. These peer-reviewed articles support my claim in that phonological awareness techniques facilitate language in children with DS. The validity is in the

abundance of studies that have found similar results in regard to phonological awareness treatment. Future directions in this area should include more longitudinal studies on the effectiveness of this intervention approach. This would allow for more reliable, ethically sound intervention programs. Also, the development of more empirically based intervention strategies would more likely improve speech production. There are few intervention techniques and a high demand for them in this area. Further research is required before making any more definitive claims on the effectiveness of phonological awareness.

Literacy Intervention

It is critical in early development that children with DS be exposed to literacy in the home and at school. A survey taken on parents with children with DS, by Otaiba, Lewis, Whalon, Dyrlund, and McKenzie, (2008), reported that all 107 respondents reported to reading to their children and using literacy instructional materials for 10-30 minutes a day. Otaiba and colleagues (2008) reported that this has increased considerably compared to prior research. Exposure to reading in the home serves many benefits. This allows children to be more prepared for the exposure they will receive in a school setting. Reading serves as a foundation for many skills required in educational settings including, standardized tests, literacy development, and reading fluency.

In an investigation of literacy instruction to children with DS, by Al Otaiba (2004), parents reported that none of their children received more than two hours of reading instruction per week at school. In this study, four children between seven and 12 years old were evaluated with the Peabody Picture Vocabulary Test-Revised (PPVT-R), Comprehensive Test of Phonological Processing (CTOPP), and subtests of Woodcock Reading Mastery Test-Revised. After evaluation, examiners developed a model of reading instruction and progress monitoring

that included five instructional components: phonological awareness, phonics, sight-word fluency games, and vocabulary and comprehension. Each child had an individualized model appropriate for their level of learning derived from assessment and standardized tests. After 10 weeks of tutoring, the children were re-administered standardized tests to measure any gains in reading skills. Results indicated that every student showed growth in reading skills, although not every student showed growth in the same reading skills (Al Otaiba 2004). It is noted that large individual differences in student growth were apparent on test scores. These results validate common themes of previously discussed research above. Each child with DS is unique in their severity level, vocabulary, emergent language skills, etc. A program designed with integrating approaches such as the one in this study provides an appropriate model for teaching students with DS. In addition to measuring performance on standardized tests, this study used a curriculum-based measurement (CBM) to monitor student progress weekly. This CBM was deemed appropriate because it allows for the curriculum to be administered at the same skill level, it is suitable for multiple forms for monitoring progress, and is time efficient as well as inexpensive. This was an efficient and objective measurement of student outcomes. It provided a supplementary tool to measure success in reading growth and also explained more detail of specific areas of progress. It proved to be more sensitive for change compared to standardized scores.

A study done by Ricci (2011) demonstrated given good early reading instruction, some children with DS can attain reading levels that are only two years behind their age in primary school. Ricci adds that with DS can read at levels that are not only comparable to the reading abilities of typically developing children, but are also more advanced than their own cognitive abilities (Ricci, 2011). Ricci and Al Otaiba (2011) have shown to prove that reading is salient in

children with DS. Specifically, shared reading activities between caregiver and child are vital to literacy development. It is reported in Ricci (2011), that a relative strength is children with DS is visual memory. Visual memory is a strength and can be used in literacy interventions.

One of the only randomized controlled trials for reading and language in children with DS was recently published in 2012. This study, conducted by Burgoyne et al., (2012) aimed to evaluate the effects of language and literacy intervention for children with DS. Teacher assistants (TA) provided reading and language instruction in a school setting 40 minutes daily for 40 weeks to the experimental group. The intervention program focused on a reading strand and a language strand. A reading strand is a reading intervention approach that integrates reading and phonics together. A language strand is used to teach new vocabulary and new expressive oral and written language. Results of this article indicated that the experimental group showed significantly greater progress than the waiting control group in single word reading, letter-sound knowledge, phoneme blending, and expressive vocabulary. This study was the first randomized controlled trial for integrating approaches of teaching reading and language intervention for children with DS. Future directions should aim to target specific treatment modules to provide for ethically sounds therapy decisions.

Integrated Approaches

The use of integrated therapy approaches is more effective in treatment of children with DS as opposed to individual treatments. After reviewing the articles above, it is apparent that an integrated approach is most effective. It is mentioned throughout articles that combining intervention techniques provide for better results than using a single technique. A common theme appeared throughout this research: there is huge variability in language within DS. Intervention should be individualized while focusing on specific domains of language. The impact of

empirical research suggests that each individual with DS is unique and early intervention should be based on their current level on functioning and communication needs. Research also stressed the importance of early intervention involving the use of gestures paired with words. Gesture use is often a strength for children with DS; therefore, intervention should focus on pairing words with meaningful gestures such as the use of sign language. Also, research indirectly indicates that intervention should target specific vocabulary, syntax, and pragmatic skills for functional environments. Recent studies inferred that given the severity of the language impairment, augmentative or alternative communication devices should be a part of facilitating and enhancing speech in individuals with DS for either primary means, short term use, or as a supplement to verbal communication. It is clear that children with DS warrant intervention and speech clinicians should utilize differential diagnosis. This allows for intervention to target the cause of the disorder in each individual and not focus on the general diagnosis of DS. Not only should speech pathologists use differential diagnosis, research has demonstrated treatment of DS will vary depending on severity. Intervention options will differ in intensity, duration, and strategy. Approach should involve phonological awareness, print awareness, letter knowledge, and literacy areas. These should be utilized in working with children with DS. It is vital to develop a program that is specific to individuals is necessary in providing empirical treatment when practicing with children with DS.

At this level, there is a great need for more research in the area of language in children with DS. After researching different intervention strategies, it is clear there is little research focusing on the effectiveness of specific intervention strategies for improving the communication skills of individuals with DS. There are many intervention strategies and suggestions yet, little

research on the effectiveness of said strategies. Future directions should target utilizing integrated approaches and their effectiveness.

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