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Heggerty Phonemic Awareness Instruction on the Reading Skills of the Child with Autism Spectrum Disorder

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Abstract:

This study investigates the efficacy of Heggerty Phonemic Awareness Instruction in enhancing the reading abilities of a child who has been identified as having autism spectrum disorder (ASD). The study seeks to tackle the obstacles encountered by people with autism spectrum disorder (ASD) when acquiring reading abilities. The study thoroughly examines existing literature to demonstrate the fundamental importance of phonological awareness in developing reading skills. Furthermore, it highlights the effects of Heggerty Phonemic Awareness Instruction on the reading skills of a 7-year-old subject named 'Jojo,' a student at Tecoy Porter College Prep in Sacramento, California. The study uses a single-case pre-experimental design. The intervention comprised 10–15-minute daily sessions conducted over ten weeks. It focused on eight essential reading abilities as specified in the Heggerty curriculum, which included phonological awareness skills. After the intervention, Jojo's reading abilities were enhanced, particularly in rhyme detection, onset fluency, blending, and segmenting words. The encouraging findings emphasize the effectiveness of tailored reading support, like the Heggerty Phonemic Awareness Instruction, in improving the reading skills of children diagnosed with autism spectrum disorder (ASD). This study underscores the importance of evidence-based practices in supporting the educational needs of children with ASD and recommends further research to validate and extend these findings. This study contributes to the existing literature on literacy interventions for children with autism spectrum disorder (ASD), supporting the inclusion of Heggerty Phonemic Awareness Instruction in special education programs to enhance reading abilities and academic achievements in this specific learning need.

Keywords: ASD, Heggerty Phonemic Awareness Instruction, Reading Intervention

Introduction:

It is crucial to instruct children in recognizing individual sounds in written words as part of their development of phonemic awareness. This involves delivering explicit, systematic, and repetitive instruction using the Heggerty Phonemic Awareness method, ultimately enhancing their reading and writing skills. These lessons are integrated into the Tier 1 curriculum for preschool, kindergarten, 1st grade, and some 2nd-grade schools to ensure that all children benefit from this essential instruction. Evidence suggests that teaching reading with phonics is more effective than teaching reading alone at improving reading ability, but teaching phonics alone is more effective at enhancing phonological ability (Double et al., 2019).

Some readers-to-be will come to the text with various experiences to help them figure out what happened, even if they have not mastered the written code. Other children will enter a classroom without academic experience and may struggle to become fluent readers due to unforeseen reasons (Al-Bataineh & Sims-King, 2013). Given this general information, teachers must use the children's prior experiences and the tools at their disposal to tap into their skills and scaffold their move into reading. To accomplish this, we need a comprehensive understanding of what works best for children in the early and most vital years of learning so that they may become good readers.

A phoneme is the smallest unit of speech that influences a word's meaning. Phoneme awareness differs from phonics because it teaches children to isolate, modify, blend, and segment sounds without using print (Heggerty, 2005). The most basic is learning that sounds relate to written symbols (i.e., learning the alphabet), referred to as phonics. Similarly, phonemic Awareness generally encompasses their awareness that words are made up of sounds, and their awareness goes beyond rote learning of letters and the sounds of those letters. However, the language suggests that the best way to improve reading is through the combined use of phonics and phonemic awareness, as described in an article by Langenberg (2020).

Most children with autism spectrum disorder (ASD) struggle with reading (Solari et al., 2019). There is evidence that only a tiny number of children with ASD have average reading scores, even when they verbally communicate well and function within the normative range of general cognitive ability. This information contrasts with typically developing (TD) peers with comparable general mental ability, where at least 80% score on average (Solari et al., 2019). This suggests that many ASD children are not responding favorably to reading education and that teaching reading may not be effectively intended to support their success in reading. This supports the need to comprehend how children with ASD interact with words in one way or another.

When ASD and dyslexia are present simultaneously, which occurs in around 1/3 of ASD cases, both reading fluency and comprehension are impaired. The child may take longer to read a page and stumble when reading aloud. Sitting still for long periods can also make it difficult to read the assigned pages. Word recognition and decoding skills are impacted by dyslexia, a learning condition. Sometimes, Autism and dyslexia coexist. Children with ASD and dyslexia may lack phonemic awareness or the ability to divide words into their sounds and combine new sounds to construct words and rhyme. Also, dyslexic children could find it challenging to recognize familiar words visually. Compared to their contemporaries, they frequently read slowly and haltingly. Effective strategies include focusing on phonics, word and sound play, frequent exposure to sight words, and even a multi-sensory touch-typing course for older children.
Several studies have addressed the reading struggles of the child with ASD. For example, researchers Als Baitneh and Sims-king (2023) examined the effects of phonemic awareness instruction on the success in early reading of kindergarten students. Donald Langenberg (2020) examined phonics and phonemic awareness and their integration into curricula to improve reading fluency and comprehension skills. The authors Solari et al. (2019) investigated students' reading struggles affected by spectrum disorders (ASD). There is still a gap in conducting studies about the effects of the Heggerty Phonemic Awareness Intervention Program on the reading of the child with autism spectrum disorder (ASD).

Conducting this study will provide the foundation for one of the Heggerty Phonemic Awareness Intervention Program sessions, which support students' specific needs and provide insights into practical intervention strategies. Furthermore, we must study this to contribute to intervention protocols developed based on empirical evidence supporting the use of the Heggerty Phonemic Awareness Intervention Program. Studying the efficacy of the Heggerty Phonemic Awareness Intervention Program with children with ASD will assist in understanding how to develop effective interventions for this population, support educational outcomes, and help inform Special Education practice.

The researcher observed that the child with autism spectrum disorder has difficulty reading skills. Difficulties with language development and communication skills that might affect reading skills. Also, Sensory sensitivities are common to the child with ASD and can affect the ability to focus and concentrate on reading tasks. It was also observed that the child with ASD has difficulty with abstract thinking, which is essential in reading. Through these observations, the researcher is motivated to conduct this study and enable her to provide a reading enhancement plan as an intervention that is appropriate and suitable for the child with ASD. This is essential for the researcher as a SPED teacher handling children with ASD to address the educational disparities, tailor reading intervention based on individual needs, and support evidence-based policy.

This study aims to determine the effectiveness and implementation of the Heggerty Phonemic Awareness Instruction for improving children's reading skills with autism spectrum disorder (ASD). The results and findings will be utilized to craft the reading enhancement program.

Literature Review:

Autism Spectrum Disorder (ASD) encompasses a range of neurodevelopmental disorders characterized by deficits in social cognition, communication, and behavior (Velikonja et al., 2019). ASD is classified as a spectrum due to the variability in symptoms and severity among individuals (Rosen et al., 2021). Approximately 30% of individuals with ASD also have intellectual disabilities, contributing to the wide-ranging differences observed among affected individuals (Maenner et al., 2021).

Epidemiological studies estimate the prevalence of ASD to be between 0.8 to 1.5 percent, affecting 4 to 6 per 1,000 people or more (Maenner et al., 2021). Despite this variability, most individuals with ASD are likely to participate in reading programs as reading is crucial for education and cognitive development (Maenner et al., 2021).

Research on reading abilities in ASD highlights difficulties in reading comprehension and word reading processes (Singh et al., 2021; Macdonald et al., 2021). Understanding word-reading processes is essential to comprehend text effectively, analogous to language comprehension in written form (Hoover Tunmer, 2020).

Studies on eye movement patterns suggest differences in visual processing in individuals with ASD, indicating potential overarousal theories related to social and affective processing (Park et al., 2021). Additionally, challenges in understanding Theory of Mind (ToM) concepts correlate with ASD symptom severity (Libsack, 2021).

Early-grade education focuses on developing phonemic awareness, phonics, and fluency to facilitate reading proficiency (NICHD, 2000; Strickland, 2011). Explicit teaching methods, combined with practice, are crucial for skill development (Strickland, 2011).

Vocabulary development is integral to reading education, which can be enhanced through exposure to rich language experiences (Foorman et al., 2021). Effective comprehension instruction involves exposure to high-quality literature and diverse genres (Sisk et al., 2018).

Writing instruction should be transparent, building on students' existing skills, and emphasizing the writing process (Graham et al., 2012). Morphology and syntax understanding aid in word formation and sentence structure (Berg & Stegelman, 2003).

The Heggerty Phonemic Awareness curriculum targets phonemic awareness deficiencies in young learners (Heggerty & VanHekken, 2015). It covers various areas like letter naming, rhyming, blending sounds, and more, aiming to improve reading, spelling, and writing skills (Heggerty & VanHekken, 2015; Bunghanoy & Sumalinog, 2023).

Research underscores the importance of phonological awareness in reading success, emphasizing its developmental progression from preschool to early grades (Kilpatrick, 2013; Moats, 2009).

ASD presents complex challenges in communication and behavior, emphasizing the need for early intervention and support (Velikonja et al., 2019). The Heggerty Phonemic Awareness Curriculum provides a structured approach to enhance literacy skills, particularly focusing on phonemic awareness, which is crucial for reading development (Heggerty & VanHekken, 2015).

Related studies provide valuable insights into understanding ASD and effective literacy instruction, aiding researchers and educators in supporting individuals with ASD and promoting literacy skills development.

Methodology:

Design

This study utilized a single-case pre-experimental design. A single case was observed at two-time points, one before and one after the implementation. Changes in the outcome of interest are presumed to result from the intervention. No control or comparison group was employed. This study was used to determine if Heggerty Phonemic Awareness Instruction, a program targeted at typically developing children, would help a child with ASD acquire reading skills.

Environment

This study was conducted at Tecoy Porter College Prep, 2801 Meadowview Rd., Sacramento, California. Tecoy Porter College Prep is a TK-6 Public Charter school offering a college-preparatory curriculum designed to prepare students for success in higher education and beyond. The school emphasized academic excellence, character development, and community service, which is part of the California Department of Education. The school has a mission to graduating-achieving students of good character prepared for college and citizenship in a democratic society. It is a school under the Fortune School of Education. The charter school's community influences the design of Tecoy Porter College Prep and draws on sustainability practices. The campus has three wings: multipurpose, classrooms, and administration. The students of this campus are mostly African Americans. The school has programs like the NWEA Map Test, a statewide kindergarten to second-grade assessment, and SBAC from third to sixth grade. This is to measure the level of performance among their grade level statewide. The school aims to utilize the performance rating to build effective instruction and classroom culture to close the African-American Achievement Gap. The school also encourages awards and recognition to the scholars who have shown excellence in academics and non-academics, namely: Character Counts awards, 6 Star Scholar, Soaring Scholar, Principal's Honor Roll, Honor Roll, Magnificent Mathematician, Perfect Attendance, Dynamite Dojo, Scholar of the Week. Also, the scholars are privileged to enjoy Fun Friday as a treat for one week of Hard work coming to school.

In addition, the school promotes family involvement and community services to get families involved in school-related activities. There is also an integration of the use of technology in classroom instruction. They are using the Dojo Classroom app to track scholars' classroom performance and behavior. Also, a means of communication with families via Dojo messages is sent directly to their phones when points are added or taken away. The Clever App connects the scholars to their accounts to access reading eggs for ELA and Math Seeds for Math to get into online learning activities as supplementary learning tools. The school develops scholars' creativity and physical engagement through their VAPE, Yoga, and Recess sessions. The sessions are routinized from Monday to Friday, increasing the interest in the lessons toward success. Nevertheless, the school builds strong and structured culture and discussion habits, which practices and develops scholars' holistic performance.

Subject

The subject of the study was a child with an autism spectrum disorder. A physician must diagnose the child with the condition as having the specified learning disability and a challenge in reading. The child was selected using the Purposive sampling technique. Purposive sampling refers to a group of non-probability sampling techniques in

which the chosen subject carries the characteristics you need in your sample; a child with autism spectrum disorder is chosen based on the purpose of this study.

The subject selected acquired the following inclusion criteria: (1) must be a child diagnosed with ASD by a SPED Specialist; (2) must have parental consent. Moreover, a child without the following criteria was automatically excluded from participating in the study.
Instrument

This study utilized an adapted research instrument that measured the children's reading skills based on the eight stipulated component skills by Dr. Michael Heggerty in 2003.

The Heggerty Reading Assessment is composed of three assessments that measure the reading skills of a child with ASD on eight stipulated components before and after implementing the Heggerty Phonemic Awareness Program.

Experimental Process
First, the child underwent a pre-assessment to assess his reading comprehension before the intervention. After the assessment, the researcher kept the record. The Heggerty Phonemic Awareness Program started a day after the assessment. It consisted of 10-15 minutes of daily sessions from Monday to Friday, starting at 9:00 AM. There was a total of 50 sessions, about ten weeks. After the 50th session, the child underwent a post-assessment to determine his improvement throughout the program. In the daily session, the child practiced the eight reading skills with the help of the researcher, but the words to be practiced changed daily from week 1 to week 10.

The Heggerty Phonemic Awareness Program included multiple assessment forms for a child with an autism spectrum disorder. Each activity in the program can be completed in less than 5 minutes. Each assessment takes approximately 10 minutes. All assessments impart immediate feedback. They can be used to track a child's progress.

Results and Discussion:

Profile of the Child with Autism Spectrum Disorder
The **child's profile** includes the family background, medical history, educational background, and reading development. The succeeding paragraphs present comprehensive discussions of the child's profile.

Family Background. The child is a 7-year-old with autism spectrum disorder (ASD) who goes by the pseudonym Jojo. Jojo has a fraternal twin brother and an 8-year-old brother. Their biological parents are Delfina and Adriel. They were legally adopted by Mr. and Mrs. Watts as their foster parents when he was five days old. His primary language of communication is English at home and in educational settings.

Medical History. Jojo has been classified as having autism spectrum disorder (ASD), which is the primary reason for obtaining special education assistance since September 2019; the pediatrician and school psychologist evaluate Jojo's eligibility based on the diagnosis of autism spectrum disorder. His birth mother had hypertension (high blood pressure) during pregnancy. There was no alcohol, tobacco, marijuana, medication, or illegal substance exposure before or during the pregnancy. He was born via spontaneous vaginal delivery at post-term after the due date and weighed lbs., 4oz at birth.

There were no complications during the delivery, and Jojo was discharged after
three days to foster care and placed with his relatives and or adoptive family within a week. There is no significant history of allergies, asthma, respiratory concerns, known vision problems, ear infections, seizures, gastrointestinal concerns, cardiac concerns, or skin problems. Jojo has no hospital admission records, either since birth or currently, about any disease, accident, etc.

Educational Background. Jojo has been actively engaged in his academic journey at Tecoy Porter College Prep, an inclusive education program under Fortune School of Education, a Charter School in Sacramento, California. Despite facing unique challenges such as autism spectrum disorder and ADHD, Jojo's commitment to his education shines through, reflecting positively on his academic performance and growth within his grade level. Jojo benefits from comprehensive special education services to support his unique needs. He is placed in the least restrictive environment, allowing him to participate in the general education curriculum while receiving necessary support. His services include push-in and pull-out sessions once a week, tailored specifically to address his speech goals and enhance his communication skills.

In addition to speech therapy, Jojo receives occupational therapy, counseling, guidance, and behavior intervention services for 30 minutes each week. These services are provided by the district or the Local Educational Agency (LEA), which is the Fortune School of Education. Moreover, Jojo has the direct support of a 1:1 aide, who assists him in accessing the routines and curriculum effectively.

Jojo's educational placement is primarily within the general education classroom, where he spends 95% of his time. This inclusion allows him to engage with his peers and participate in the standard curriculum, improves his social skills, increases peer interactions, and enhances his sense of belonging. The remaining 5% of his time is dedicated to receiving specialized services outside the regular classroom, ensuring he receives targeted support for his developmental goals.

Since Transitional Kindergarten, Jojo has been receiving counseling services to work on his behavioral goals, fostering a supportive environment for his overall development. Jojo would benefit from an additional 30 minutes per week allocated to each of his specialized services. This additional time would provide more in-depth support for his speech and motor skills, offer extended behavioral interventions, and promote greater emotional and social development, further supporting his development.

Jojo's detailed educational support plan includes the following:
Speech Therapy: 30 minutes weekly to enhance his communication skills, tailored to address specific speech goals through push-in and pull-out sessions. Jojo has made good progress on his speech goals of articulation, word count, and expansive conversation.
Occupational Therapy: 30 minutes weekly to support his fine motor skills, sensory processing, and overall functional abilities. Jojo has improved hand-eye coordination, writing abilities, and daily living skills.
Counseling and Guidance Services: 30 minutes weekly to address his behavioral goals and foster emotional and social development. Jojo has benefited from better emotional regulation, improved coping strategies, and enhanced social interactions.
Behavior Intervention Services: 30 minutes weekly to develop and reinforce positive behavior strategies. Jojo has progressed in reducing disruptive behaviors,
following classroom rules, and playing well with peers.

In addition to these services, Jojo benefits from the direct support of a 1:1 aide. This aide, who has responsibilities such as providing individualized instruction, assisting with daily tasks, and facilitating social interactions, assists Jojo throughout the school day. The aide helps Jojo access classroom routines and the general education curriculum, providing individualized attention and support.

Jojo’s education involves steps and detours to ensure he gets general education services. The general education classroom plus special education services is not a compromise but a ‘nothing about us without us’ statement, where each student’s emotional, social, and academic needs are acknowledged and respected, where Jojo can learn alongside ‘regular’ kids, and where he learns about himself.

All in all, the school's total approach, combined with Jojo’s determination, means he is well-positioned to grow and thrive further within his school. The school intends to increase the time spent on Jojo’s particular interventions to increase the number of different teaching strategies he receives, expand the number of support services, and provide more staff training.

Reading Development Background. Jojo’s reading abilities are above those of a kindergarten student. He still seems interested in puzzles and reading. He still needs to turn the book upside down. Additionally, his ability to point to images of everyday objects after a glance suggests a developing understanding of visual cues and associations.
In terms of literacy skills, Jojo is making remarkable progress. He has a solid grasp of every capital letter, can recite the alphabet from A to Z, and exhibits skills in identifying letters, remembering numbers and sequences, and recognizing simple colors and forms. Notably, he is beginning to read and shows academic potential, a testament to his hard work and the effective teaching methods at TPCP.

Improvements in behaviors and participation are evident, particularly in structured speech therapy tasks and occasional involvement in Applied Behavior Analysis (ABA) sessions during speech therapy. Jojo has shown a strong commitment to communication skill development, as evidenced by his active participation in class discussions, willingness to ask for help when needed, and efforts to use new vocabulary words in his daily conversations.

Furthermore, comprehensive evaluations such as the reading diagnostic assessment through I-Ready support Jojo's academic development. This assessment, which involved a series of reading tasks and comprehension questions, resulted in advanced ratings in critical areas such as phonological awareness, phonics, high-frequency words, vocabulary, and comprehension. These ratings were based on his performance compared to national norms for his grade level, providing a reliable measure of his reading skills. This underscores his strong foundation in reading skills and readiness for more advanced literacy instruction.

TPCP utilizes the Heggerty Phonemic Awareness Instruction Curriculum to enhance reading skills. Implemented during Carpet Time for 15 minutes daily, this curriculum provides structured phonemic awareness instruction to

strengthen foundational reading skills across all grade levels from Early Start Kindergarten to 2nd grade. This curriculum has particularly benefited Jojo, helping him improve his letter recognition and sound blending skills.

TPCP is a charter school that has the freedom to build an education program specific to its mission, vision, and goals. Charter schools can start with a blank slate, creating curricula and approaches to education most suitable for their students. Charter schools are often viewed as less one-size-fits-all operations and can adopt cutting-edge teaching methods and curricular approaches.

At TPCP, scholars receive additional academic support, accommodations, and special education services to supplement the regular curriculum and ensure academic success. During Carpet Time, all scholars are grouped and engaged in a reading practice session using the Heggerty Phonemic Awareness Instruction Curriculum. During Center Time, scholars with special needs receive individualized one-on-one Heggerty sessions with the teacher, tailored to their specific needs and pace. This tailored approach ensures academic success and celebrates Jojo's unique learning style, allowing him to develop and strengthen his reading skills according to his abilities.

This personalized approach ensures that scholars with special needs receive customized instruction, addressing their unique learning requirements. By providing one-on-one support during Center Time, TPCP demonstrates its unwavering commitment to inclusivity and personalized support, ensuring that every scholar, including Jojo, can develop and strengthen their reading skills according to their abilities. This commitment reflects TPCP's dedication to all its scholars' academic growth and success.

Reading Skills of the Child with Autism Spectrum Disorder (ASD)
This section presents the reading skills of the child with autism spectrum disorder (ASD) before and after implementing Heggerty Phonemic Awareness Instruction. The researcher implemented the intervention for ten weeks with 10-15 minutes of daily interaction.

Reading Skills of the Child with Autism Spectrum Disorder before the implementation of Heggerty Phonemic Awareness Instruction
Jojo's reading skills were assessed before the implementation of the intervention, Heggerty Phonemic Awareness Instruction. The assessment covered the eight components (i.e., rhyme recognition and production; onset fluency; blending and segmenting compound words; isolating final sounds in words; adding, deleting, and substituting words and syllables; and blending and segmenting into onset-rime) of reading. The data has been analyzed, and the results are shown in Table 1.

The tabular values revealed the result of the Heggerty Phonemic Awareness Instruction Assessment of Joio, a child with autism spectrum disorder (ASD). The assessment revealed mixed results in his phonological awareness and reading skills. While Jojo demonstrated proficiency in several areas, he struggled with specific skills critical for developing fluent reading. These findings underscore the importance of targeted educational interventions to address his unique needs.

Jojo scored a 5 in Rhyme Recognition (RR) and Rhyme Production (RP), both interpreted as proficient. His strong performance in these areas indicates robust auditory discrimination abilities, which are crucial for early reading development. Rhyme recognition, which involves identifying words with similar ending sounds, is a foundational phonological skill that supports overall phonological awareness and broader language development. As evidenced by Jojo's proficiency in rhyme production, creative sound manipulation further highlights his capabilities in these essential early literacy skills (Hall, 2023).

Table 1
Level of Reading Skills of the Child with Autism Spectrum Disorder Before the Implementation of Heggerty Phonemic Awareness Instruction

Components	Performance Score	Interpretation
Rhyme Recognition (RR)	5	Proficient
Rhyme Production (RP)	5	Proficient
Onset Fluency (OF)	3	Developing
Blending Compound Words and Syllables (BCWS)	6	Proficient
Isolating Final Sounds in Words (IFSW)	3	Developing
Segmenting Compound Words and Syllables (SCWS)	6	Proficient
Adding Words and Syllables (AWS)	6	Proficient
Blending Onset – Rime (BOR)	5	Proficient

Deleting Words and Syllables (DWS)	4	Proficient
Segmenting into Onset – Rime (SO)	0	Beginning
Substituting Words & Syllables (SWS)	6	Proficient
Overall	49	Proficient

Note. RR, RP, OF, IFSW, BOR, SO: 0-2 – Beginning; 3 – Developing; 4-5 – Proficient
BCWS, SCWS, AWS, DWS, SWS: 0-2 – Beginning; 3-4 – Developing; 5-6 – Proficient
Overall: 0-19 – Beginning; 20-39 - Developing; 40-60 – Proficient.

Despite these strengths, Jojo's assessment revealed significant challenges in three key areas: Onset Fluency (OF), Jojo scored a 3, which is interpreted as developing. His developing score in this area underscores the need for rapid sound identification and production interventions to improve his reading fluency. Onset fluency involves rapidly identifying and producing the initial sounds in words. (Peristeri et al., 2024).

Isolating Final Sounds in Words (IFSW). Jojo scored a 3 in this area, indicating a developing skill level. His struggles suggest a need for targeted support to enhance his ability to focus on and isolate final sounds amidst background noise. This task requires auditory discrimination or the discrimination of the ending sounds of words. A skill that we know is difficult for children with autism due to their sensory issues and known difficulties with auditory processing (Autism Society., 2023).

Segmenting into Onset-Rime (SO). Jojo's score of 0, interpreted as the beginning level, points to significant difficulties with segmenting words into their constituent onset (initial sound) and rime (the rest of the word). This skill requires abstract thinking and sound manipulation, areas where children with ASD often face challenges due to their cognitive and auditory processing difficulties (Hall, 2023).

Understanding Jojo's strengths and challenges is crucial for developing effective educational interventions. His proficiency in rhyme recognition and production demonstrates a solid foundation in some aspects of phonological awareness. However, his difficulties in onset fluency, isolating final sounds and segmenting into onset-rime highlight the need for targeted support.

Research indicates that children with ASD frequently experience challenges in auditory processing and executive functioning, which can significantly impact their phonological awareness and reading skills. Auditory discrimination issues further complicate their ability to isolate sounds, affecting reading proficiency (Peristeri et al., 2024). Additionally, sensory processing issues can hinder their focus on specific phonological tasks, complicating the isolation of final sounds in words (Autism Society, 2023).

Evidence-based interventions, such as the Heggerty Phonemic Awareness Instruction, a structured and systematic phonological intervention designed to meet the diverse learning needs of children with ASD, can be implemented to assist Jojo and other children with ASD, specifically in their areas of weakness, such as fluent onset production, ability to isolate final sounds and ability to produce segmented onset/rhyme segments.

For children with ASD, the step-by-step nature of the Heggerty program provides
predictability and conformity to a plan that we know these kids crave. ASD children thrive with predictable, systematized instruction. These interventions could provide Jojo with the foundation for reading fluently; he may progress when his learning strengths are built upon, and his sensory and learning challenges are addressed (Randy et al., 2010).

Jojo's assessment results highlighted his strengths and areas needing development in phonological awareness. While he demonstrated proficiency in rhyme recognition and production, his difficulties in onset fluency, isolating final sounds, and segmenting into onset-rime require targeted support. Research and evidence-based interventions, such as the Heggerty Phonemic Awareness Instruction, offered promising approaches and helped Jojo overcome these challenges. With the proper support, Jojo continued to develop his reading skills and achieved academic success, emphasizing the importance of tailored educational strategies for children with ASD.

Reading Skills of the Child with Autism Spectrum Disorder After the Implementation of Heggerty Phonemic Awareness Instruction

Jojo's reading skills were assessed after the implementation of the intervention, Heggerty Phonemic Awareness Instruction. The assessment covered the mentioned eight components (i.e., rhyme recognition and production; onset fluency; blending and segmenting compound words; isolating final sounds in words; adding, deleting, and substituting words and syllables; and blending and segmenting into onset-rime) of reading. The data has been analyzed, and the results are shown in Table 2.

Table 2

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Competencies	Performance Score	Interpretation
Rhyme Recognition (RR)	5	Proficient
Rhyme Production (RP)	5	Proficient
Onset Fluency (OF)	5	Proficient
Blending Compound Words and Syllables (BCWS)	6	Proficient
Isolating Final Sounds in Words (IFSW)	5	Proficient
Segmenting Compound Words and Syllables (SCWS)	6	Proficient
Adding Words and Syllables (AWS)	6	Proficient
Blending Onset – Rime (BOR)	5	Proficient
Deleting Words and Syllables (DWS)	5	Proficient
Segmenting into Onset – Rime (SO)	4	Proficient
Substituting Words & Syllables (SWS)	6	Proficient
Overall	58	Proficient

Note. RR, RP, OF, IFSW, BOR, SO: 0-2 – Beginning; 3 – Developing; 4-5 – Proficient
BCWS, SCWS, AWS, DWS, SWS: 0-2 – Beginning; 3-4 – Developing; 5-6 – Proficient
Overall: 0-19 – Beginning; 20-39 - Developing; 40-60 – Proficient.

The tabular values revealed Jojo's reading skills after the implementation of the Heggerty Phonemic Awareness Instruction. His performance scores indicated proficient levels in all assessed components, demonstrating significant progress in phonological awareness. Jojo achieved a perfect score of 5 in Rhyme Recognition (RR) and Rhyme Production (RP), reflecting his strong phonological awareness, which is crucial for early reading development (Goswami & Bryant, 1990).

Jojo also scored 5 in Onset Fluency (OF), highlighting his ability to identify initial sounds in words. Onset fluency is foundational for decoding skills and reading achievement (National et al., 2000). His scores of 6 in both Blending Compound Words and Syllables (BCWS) and Segmenting Compound Words and Syllables (SCWS) demonstrated his advanced skills in these areas. Blending and segmenting are critical for reading fluency and comprehension, enabling children to break down and synthesize word parts (Ehri et al., 2001).

Isolating Final Sounds in Words (IFSW) is another area where Jojo excelled, scoring 5. This skill is essential for developing decoding and reading proficiency (Torgesen et al., 1994). His score of 5 in Blending Onset-Rime (BOR) and a slightly lower, yet proficient, score of 4 in Segmenting into Onset-Rime (SO) indicated a solid understanding of the onset-rime structure, which aids in recognizing word patterns (Treiman, 1985).

Jojo's perfect scores of 6 in Adding Words and Syllables (AWS), Deleting Words and Syllables (DWS), and Substituting Words and Syllables (SWS) suggested an advanced ability to manipulate phonemic elements. This skill is crucial for spelling and reading complex words, indicating a deep understanding of the sound structure of language (Adams, 1990).

The Heggerty Phonemic Awareness Instruction offers an organized and methodical approach to teaching phonemic awareness skills. It utilizes multi-sensory activities to engage children with ASD through auditory, visual, and kinesthetic modalities. This program provides explicit instruction, breaking down complex tasks into manageable steps, which benefits children with ASD, who need a structured method to grasp abstract topics efficiently (Whalon et al., 2018).

The program's ability to differentiate and accommodate the unique needs of each child, including those with ASD, ensures effective education. Educators can adjust the pace, level of support, and instructional tactics to meet individual learning needs. Continuous assessment and monitoring of progress, as demonstrated by Jojo's advanced ratings in phonological awareness, phonics, high-frequency words, vocabulary, and comprehension from the I-Ready reading diagnostic assessment, are essential for ensuring the effectiveness of interventions and making necessary adjustments.

Jojo's proficient performance across various literacy competencies, as shown in Table 2, underscores the significant positive impact of the Heggerty Phonemic Awareness Instruction. This evidence-based intervention has proven effective in enhancing phonological awareness, particularly in onset fluency, isolating final sounds, and segmenting

into onset rimes. It emphasized the importance of tailored instruction and continuous assessment in supporting the academic success of children with ASD (Whalon et al., 2018).

Improvement of Reading Skills of the Child with Autism Spectrum Disorder after the implementation of Heggerty Phonemic Awareness Instruction

The reading skills of Jojo with autism spectrum disorder after implementing the intervention, Heggerty Phonemic Awareness Instruction, were assessed to determine if there was a significant improvement. The McNemar's Test is used; the results are shown in Table 3.

Table 3
Improvement Level in the Reading Skills of the Child with Autism Spectrum Disorder After the Implementation of Heggerty Phonemic Awareness Instruction

Area	$valueX^2$-	DF	P-value	Decision	Interpretation
Reading Skills	9.778[a]	4	0.04	Reject Ho	Significant

Note. Significant at p<0.05.

The tabular data revealed a significant improvement in Jojo's reading skills after implementing the Heggerty Phonemic Awareness Instruction. The statistical analysis, with a p-value of 0.04, underscored the effectiveness of this intervention, as it was below the alpha level of significance (α = 0.05).

The Heggerty Phonemic Awareness Instruction program offered consistency and repetition in teaching essential skills through multiple methods, significantly improving reading abilities. It emphasized that after two to three months of implementing the Heggerty curriculum, non-reading children could segment and blend words, enhancing their reading proficiency (Randi et al., 2010).

The Heggerty Phonemic Awareness Instruction helped children with ASD, like Jojo, improve their reading skills by developing foundational phonemic awareness, enhancing phonological processing abilities, supporting language development, and improving reading fluency and word recognition. This structured and systematic approach instilled confidence and motivation, facilitating generalization to reading tasks (Wierschke, 2021).
Phonemic awareness, an essential skill for reading development, enabled children with ASD to decode and encode written language by focusing on specific skills like onset fluency, isolating final sounds, and segmenting into onset rimes. The program's systematic teaching of blending, segmenting, and altering sounds within words enhanced children's ability to decode and recognize words, which was crucial for reading fluency. Collectively, the findings of both tables clearly showed that Jojo's reading skills, illustrated by Tables 1 and 2, show a significant change following the Heggerty intervention, which is typical of reading intervention of the program Heggerty since they taught critical skills through repeated and consistent instruction (Randi et al., 2010).

Before the intervention, Jojo demonstrated proficiency in overall phonological awareness and reading skills but faced challenges in specific areas such as Onset Fluency (OF), Isolating Final Sounds in Words (IFSW), and Segmenting into Onset-Rime (SO). These challenges were common among children with ASD due to auditory processing, sensory sensitivity, and cognitive issues (Peristeri et al., 2024; Autism Society, 2023; Hall, 2023).

Jojo's progress in these reading skills demonstrated the program's ability to address his specific learning needs effectively. Continuous assessment and the tailored nature of the Heggerty instruction validated the efficacy of such a specialized program in supporting children with ASD. This structured implementation and the flexibility to adjust teaching strategies to individual needs ensured an inclusive and supportive learning environment (Whalon et al., 2018).

In conclusion, Jojo's reading skills development highlighted the critical role of evidence-based interventions like the Heggerty Phonemic Awareness Instruction. The structured and systematic implementation of this program, along with continuous assessment and personalized educational approaches, provided a robust framework for addressing the unique needs of children with ASD, fostering an environment where students like Jojo could achieve academic success (Randi et al., 2010; Whalon et al., 2018). Jojo's progress serves as a testament to the effectiveness of tailored interventions in supporting individuals with autism spectrum disorder (ASD) in their educational journey. By incorporating strategies that target specific areas of need, such as phonemic awareness, educators can create a supportive learning environment that nurtures growth and development in students with diverse learning profiles. Furthermore, the success achieved by Jojo underscores the importance of early intervention and individualized support in maximizing educational outcomes for children with ASD.

Conclusion:

Reading skills are necessary and a gateway to a world of knowledge and understanding. This is remarkably accurate for a child with autism spectrum disorder, who may encounter delays in language acquisition and may

experience delays in language development. Training in phonemic awareness involves perceptively distinguishing, identifying, and altering individual sounds (phonemes) within spoken words. A versatile and effective method in various educational settings can help a child with ASD concentrate on and manipulate the sounds in spoken words, leading to significant improvements in their reading skills.

Research consistently validates the effectiveness of phonemic awareness instruction in enhancing reading skills, especially in children with autism spectrum disorder. The study's findings, presented in Tables 1, 2, and 3, confirm the pivotal role of phonemic awareness education, specifically through the regular practice of Heggerty Phonemic Awareness Instruction, in improving the reading abilities of children with ASD. It is crucial to integrate systematic phonemic awareness instruction to support reading development in children with autism spectrum disorder.

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