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UNIVERSITY OF KENTUCKY
LEWIS HONORS COLLEGE

**Early Childhood Language and Literacy Development Programs for Autism Spectrum
Disorder and d/Deaf and Hard-of-Hearing Students**

by

MAYSON SPILLMAN

AN UNDERGRADUATE THESIS SUBMITTED
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**Early Childhood Language and Literacy Development Programs for Autism Spectrum
Disorder and d/Deaf and Hard-of-Hearing Students**

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Senior Honors Thesis

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Abstract

This paper examines several popular approaches in the United States for enhancing early childhood literacy and language development in two special education populations— d/Deaf or hard-of-hearing (d/DHH) students and students with autism spectrum disorder (ASD). In addition to examining the effectiveness of these approaches, I adopt an educational equity lens to describe how variability in implementation can impact outcomes for these children. Based on my critical reading of the literature, I offer three broad recommendations for school psychologists: (1) Carefully consider dosage and fidelity of implementation, (2) Use caution when modifying existing interventions for these populations, and (3) Increase in-service training and networks of support. This paper is intended for school psychologists who may not have time to read the latest literature and are looking for better ways to implement language and literacy programs into their practice. At the end of this review, school psychologists will know the latest research on supporting language and literacy outcomes for d/DHH students and students with ASD, and how to better implement programs in their practice with an equity mindset.

Keywords: early literacy, early childhood education, phonological awareness, oral language skills, print knowledge, special education, autism spectrum disorder, d/Deaf and hard-of-hearing, intervention, implementation, educational equity

Introduction

This paper examines the early childhood literacy and language development in U.S. public preschools for two special education populations: d/Deaf or hard-of-hearing (d/DHH) students and students with autism spectrum disorder (ASD). This paper uses an educational equity lens to examine programs and their implementation for these student populations to determine what is being done to advocate for educational equity for the populations of interest and what more should be done. This paper is intended for school psychologists who may not have time to read the latest literature and are looking for better ways to implement language and literacy programs into their practice. At the end of this review, school psychologists will know the latest research on supporting language and literacy outcomes for d/DHH students and students with ASD, and how to better implement programs in their practice with an equity mindset.

In this introduction, I will first describe the importance of early literacy skill development in early childhood settings. I will then describe the unique need for special education students—especially d/DHH children and children with ASD—to develop early literacy skills. I propose that adopting an educational equity lens can help researchers and practitioners identify and develop more effective ways to implement evidence-based practices better to improve outcomes for children at scale.

Early Literacy Skill Development

Early literacy comprises five conventional skills, defined by the National Institute of Child Health and Human Development (NICHD) as developing later on and are directly related to reading, writing, and spelling skills, and 11 precursory skills upon which conventional literacy skills depend and grow. The five conventional skills are decoding, oral reading fluency, reading

comprehension, writing, and spelling; the 11 precursory skills are alphabet knowledge, phonological awareness, rapid automatic naming of letters and digits, rapid automatic naming of objects and colors, writing, phonological memory, print concepts, print knowledge, reading readiness, oral language, and visual processing (Lonigan & Shanahan, 2008). Because these precursory skills are necessary for developing conventional literacy skills, early interventions tend to focus on growing these areas of literacy. All 11 skills are not crucial to literacy development later in life, but some are integral to developing literacy skills (Strickland & Shanahan, 2004). For example, rapid automatic naming of letters, digits, objects, and colors and phonological memory do not strongly correlate with future literacy development in the literature, as do alphabet knowledge, phonological awareness, and oral language skills.

This literature review focuses on three of the primary literacy skills defined by the NICHD— print knowledge, phonological awareness, and oral language —due to their importance in developing future literacy. These skills are also most commonly found to be where many special education populations fall behind compared to their peers. Print knowledge combines all aspects of print literacy, including alphabet knowledge, print concept, and early writing (Lonigan & Shanahan, 2008). Phonological awareness focuses on the ability to “distinguish or segment words, syllables, or phonemes,” and oral language skills are the “ability to produce or comprehend spoken language, including vocabulary and grammar” (Lonigan et al., 2008, p. vii-viii). However, it is especially important not to look at each skill in isolation; they are not as highly correlated when standing alone as when intertwined with other early literacy skills (Spencer et al., 2013). Combining different skills often yields the best results, as each skill does not develop in a vacuum but is impacted by other skills and environmental factors.

Literacy Development in Early Childhood Education

A student's first formal education experience can greatly impact their literacy development. As early childhood education (ECE) programs are becoming more popular among American children, we must know which literacy practices are best. ECE programs are becoming increasingly popular, with 64% of three-to-five-year-olds enrolled in some program (USAFacts, January 2020). With federally funded programs like Head Start, which aim to give low-income families access to ECE, public preschools are increasing in popularity (46% compared to private schools at 18%) (USAFacts, 2020). Full-day ECE program enrollment is also increasing, compared to part-time enrollment, from 17% in 1970 to 65% in 2017 (USAFacts, January 2020).

In 2007, the National Early Literacy Panel found that over one-third of American fourth graders are far below grade level and cannot effectively complete their schoolwork. This disproportionately affects children of color, as 56% of Latino and 60% of African American fourth graders were below basic reading levels (Shanahan, 2008). In this report, Shanahan also states that "early cognitive and linguistic development predict later achievement... [and] patterns of preschool learning are closely linked with reading achievement in primary grades" (2008, xiv). However, not all programs effectively develop students' literacy and language skills. They may use lesson plans or curricula that are not empirically supported or the most up-to-date practices (Herrera et al., 2021). Because of this, students are often already behind their peers when reaching kindergarten and have difficulties closing this gap throughout the rest of their education.

Early Childhood Education Experiences for d/DHH and ASD Student Populations

The Individuals with Disabilities Education Act (IDEA) defines special education as "specially designed instruction, at no cost to the parents, to meet the unique needs of a child with a disability" (*Sec. 300.39 special education*, 2017). In particular, "specially designed instruction"

means that the child must have access to the general curriculum to meet educational standards set by the district, state, and/or country. The number of students with disabilities has been increasing in the United States, and these students receive the best education when various professionals and specialists can work together to deliver high-quality instruction in various disciplines (i.e., speech-language pathology, occupational and physical therapy, and teachers) (Kaderavek, 2009). Practices like universal design, differentiated instruction, and embedded learning opportunities allow increased access for special education students in early childhood education and ensure a higher quality of learning for these students (Kaderavek, 2009).

Language and literacy development early on is critical for success in later years of school and beyond. Because special education students require unique and specially designed instruction to excel in school, it is important to understand which literacy skills should be focused on in their ECE to ensure they do not start off behind their peers. Research must be done looking at this group of students to ensure they receive the same quality and rigor of education that their peers receive to allow them to reach their full academic potential. Special education encompasses many physical and learning disabilities that impact each student differently. It is impossible to narrow the focus of early childhood special education intervention to one or two skills for all students using special education services. Therefore, educators must be aware of data-backed trends and the needs of their individual students to craft and implement curricula that are most effective for their classroom.

Special education students comprise a diverse group of learners. However, two populations deserve special attention: d/Deaf or hard of hearing (d/DHH) and students with autism spectrum disorder (ASD). Students with hearing loss lose many aspects of the language experience due to the inability of amplification devices such as hearing aids and cochlear

implants to accurately restore auditory information to its initial level (Runnion & Gray, 2019). As a result, they perform worse than their peers on print concept knowledge, phonological awareness, and oral language skills scales (Runnion & Gray, 2019). ASD children also tend to struggle with literacy in their developmental years, particularly with print knowledge, phonological awareness, and oral language skills (Westerveld et al., 2016). Furthermore, the prevalence of autism has increased dramatically since the 1980s, from one in every 2000 to one in 54 children in the United States (*What is autism?* 2022). Because of this increase, it is increasingly important to understand the educational experience of ASD students and ensure they receive a high-quality education equitable to their peers.

Educational Equity in Special Education Classrooms

To best meet the needs of d/DHH and ASD student populations, it is important to attend to issues of educational equity in the ECE classroom. The National Equity Project (n.d.) defines educational equity as “each child receiv[ing] what they need to develop to their full academic and social potential” and has steps that educators and policymakers can take toward equity for all students. Equity in schools requires examining inherent biases, developing each student's talents and interests, and “removing the predictability of success or failures that currently correlates with any social or cultural factor” (National Equity Project, n.d.). Educational inequity appears for special education students in a variety of aspects. Students of color make up most students with disabilities, and many are also in low-income families. As a result, they may experience racial inequity in the school system due to implicit biases (Pak & Parsons, 2020).

Educational equity is often thought about through racial and income inequity. Ensuring students of color and those from low-income households receive equitable education to their privileged counterparts is essential in this fight for equity in the classrooms and beyond.

However, what is often not thought about in this discussion is students with disabilities and their experiences in the classroom. Students with disabilities may receive more disciplinary measures than their peers, removing them from the classroom and their learning, exacerbating the opportunity gap (U.S. Government Accountability Office, 2018). Additionally, as schools become more technologically dependent, students with disabilities can be left out or hindered by a lack of accessibility to technology or apps (Shaheen, 2022). The pandemic has impacted special education students in vastly different ways. Many Individualized Education Plans (IEPs) had to be adapted in the landscape of a global pandemic, and students were cut off from the resources they benefited from with in-person education. Technology may not effectively implement previously used programs for a student, or the student may no longer have access to certain technologies or materials from home. Therefore, implementing IEPs or other accommodations for students with disabilities must be altered when situations change drastically (The Center for Learner Equity, 2020).

In this review, educational equity will look at the context in which students with disabilities find themselves in the contemporary classroom. While this will focus on access to resources, programs, and effective implementation, it is also important to acknowledge systemic barriers for many students with disabilities, particularly students of color and low-income students, that add additional obstacles to equitable education.

Implementation of Literacy Skill Development Programs in Early Childhood Special Education Classrooms

Implementation is the key ingredient to an efficacious program. No matter the program's significance during research, the implementation must align with the needs of the students to be an effective tool in promoting literacy and language development. For various reasons, evidence-

based practices (EBPs) are not often found in school settings. Either they require too much time and attention for teachers to dedicate to one student, teachers do not have the proper training to implement EBPs effectively, or they feel the EBP is not the right fit for the particular student in question (Lushin et al., 2020). Furthermore, a study examining parents' satisfaction with their ASD students' IEP plan and implementation found that over half of parents were dissatisfied with one aspect of the IEP, and over one-third of parents were dissatisfied with the implementation of their child's IEP (Slade et al., 2018).

An education environment is often not inclusive for d/DHH students unless they have access to interpreters, culturally and linguistically sensitive learning materials, and assistive devices (Jokinen, 2018). This can be exceptionally difficult for schools to provide in low-income districts with little access to the technological and personnel resources required to give students appropriate accommodations. The lack of knowledge hearing students possess of sign language and other communication tools can also erect barriers for d/DHH students to receive equitable education in the classroom.

Current Study

This review examines the early childhood literacy and language development in U.S. public preschools for two special education populations: d/Deaf or hard-of-hearing (d/DHH) students and students with autism spectrum disorder (ASD). An educational equity lens is used to examine programs and their implementation for these student populations to determine what is being done to advocate for educational equity for the populations of interest and what more should be done. This review is intended for school psychologists who may not have time to read the latest literature and are looking for better ways to implement programs into their practice. At the end of this review, school psychologists will know the latest research on supporting language

and literacy outcomes for d/DHH students and students with ASD, and how to better implement programs in their practice with an equity mindset.

Two research questions guide this review:

1. How are programs/curricula aimed at d/DHH and ASD students being implemented?
2. How is educational equity addressed in the implementation of special education early childhood programs for d/DHH and ASD students? How can implementation be improved to enhance equity?

Methods

This literature review focuses on the language and literacy development of d/DHH and ASD students in U.S. public preschools. Specifically, the development of print concept knowledge, phonological awareness, and oral language skills. Finally, the paper examines the development of these skills via the implementation of programs and their effectiveness in providing equitable implementation to these populations.

The research examining the efficacy of each curriculum or lesson plan was found using searches on Google Scholar, PsycInfo, and ERIC databases. Due to the small number of studies examining these specific populations, the programs were chosen primarily based on the availability of research that examines their efficacy. They were cross-checked with the What Works Clearinghouse (WWC) database to determine if there is previous research regarding its efficacy. However, no report, or low efficacy, on the WWC database did not eliminate a program from consideration. Studies examined were primarily limited to the last five years (2017-2022) to draw from the most up-to-date data in the field. However, some articles were used from the last 10 years (2012-2022) to ensure a robust understanding of the literature in such a narrow field of

work. Keywords such as “literacy,” “language,” “literacy development,” “language development,” “phonological awareness,” “print knowledge,” “print concept,” “oral language,” “oral language skills,” “early childhood education,” “early childhood,” and “special education,” “d/DHH,” “deaf,” “autism,” “ASD,” and “autism spectrum disorder” were used to find peer-reviewed articles, as well as reports published by non-profit research institutions, such as the Institute of Education Services (IES) WWC. These non-peer-reviewed reports were included to ensure this review can view the efficacy of such programs as a whole and to see a clearer picture of the evidence found.

Results

The results section is organized as follows. For each population, I first briefly describe the effectiveness of popular programs designed to enhance print knowledge, phonological awareness, and oral language skills. Second, I briefly review and critique how these programs have been implemented in learning settings. Third, using an educational equity lens, I provide a commentary on how these programs can be implemented in ways that can uniquely benefit d/DHH and ASD students.

d/Deaf and hard-of-hearing (d/DHH) students

Summary of program effectiveness

Visual Phonics is a program designed for d/DHH students to understand the 45 phonemes in the English language and make the connection between print English and spoken English (Woolsey et al., 2006). A literature review by Trezek (2017) found that Visual Phonics increased grapheme-phoneme correspondences (or alphabet knowledge for this review) for preschool-aged children. One study showed students could also apply the information they learned 20 weeks after instruction was deemed successful and could use instruction on other

material. Additionally, Trezek looked at the efficacy of all three studies, using the 2014 Council of Exceptional Children standards for reading and deafness research studies. According to their standards, the three studies in Trezek's literature review were ranked two (potentially evidenced-based practice) on a scale from one (evidence-based practice) to five (negative effects) (Trezek, 2017).

Foundations for Literacy, known as *Foundations*, is a curriculum designed explicitly for d/DHH students and “targets the phonological underpinnings of literacy” (Tucci & Easterbrooks, 2015, p.280). *Foundations* increases functional hearing students' skill development in alphabet knowledge, specifically syllable segmentation, initial phoneme isolation, and rhyme discrimination (Tucci & Easterbrooks, 2015); however, it does not have the same standalone impact for students without functional hearing. Tucci & Easterbrooks discovered in their study that students without functional hearing did not benefit from *Foundations* alone, but when paired with Visual Phonics, students all mastered letter-sound correspondence (2015). This study emphasizes the importance of using multiple curricula or systems to meet the needs of different students best. The *Foundations* curriculum also targets phonological awareness. A study by Miller and colleagues found that the program intervention was associated with “learning syllable segmentation, initial sound isolation, and rhyme recognition skills,” but individuals within the intervention varied widely (Runnion & Gray, 2019, p. 25). Therefore, individual needs should be prioritized using interventions based on the *Foundations* curriculum for phonological awareness development. In a literature review conducted by Alasim and Alqraini, seven studies from 1995-2016 used Visual Phonics to study d/DHH phonological awareness development, only three of these studies fit this review's population age range, but all seven studies found an increase in phonological awareness skills for d/DHH students. Furthermore, the combination of Visual

Phonics and *Foundations* allowed d/DHH students to access the *Foundations* curriculum and adapt it to their needs (Alasim & Alqraini, 2020).

Phonological Awareness Training (PAT) is another common intervention for students to develop their phonological awareness skills. A study in 2016 implemented a PAT intervention with nine pre-kindergarten students below a specific level of hearing (35dB). The intervention was 15 minutes a day, four times a week for the entire school year, with a 2:1 or 3:1 student-teacher ratio. They found that at the end of the study, almost all, or all, students were at or above the developmental range scores for beginning sound awareness, letter names, and letter sounds, and half of the students reached the developmental range for rhyme awareness (Werfel et al., 2016). Though the sample size is small, the results are promising and show the benefits of PAT interventions for d/DHH students.

Dialogic Reading is a popular intervention during shared book reading for students with functional hearing in various care settings, from home to early childhood classrooms. It relies on two acronyms PEER (Prompt, Evaluate, Expand, and Repeat) and CROWD (Completion questions, Recall, Open-ended, Wh-words, and Distancing). PEER is how the adult instructor engages with the child, asking them to evaluate and expand their responses, and repeating correct answers to reinforce what has been learned. CROWD references the types of questions asked to the students while reading the book (see Urbani, 2019, for more information about PEER and CROWD). It ensures active participation by the students during reading time to work on developing essential reading comprehension and oral language skills. Despite the overwhelming evidence that dialogic reading is an effective intervention tool for young children (Towson et al., 2017), almost no research has been done on the d/DHH population. Trussell and Easterbrooks conducted a study with kindergarten and first-grade students and found that dialogic reading was

beneficial for students in isolated d/DHH classrooms and students who received their education in general classrooms (2014).

Implementation Considerations and Critiques

An important part of enhancing literacy skills in this population is not just the content of the curriculum but how these are actually implemented in classrooms. Features of implementation can also advance or limit educational equity. Below, I highlight three critiques of implementation in this area and offer a potential solution for each critique.

Critique #1: Grouping Students Based on Language Needs. The IES categorizes dialogic reading as an EBP, which means implementation is more crucial than ever to ensure the intervention does what is intended. As stated in the introduction, EBPs are often not implemented in classrooms as they are in research, which causes the research-to-practice gap (Urbani, 2019). Research on d/DHH students' literacy and language development skills in early childhood education is limited. In a literature review by Towson and colleagues, they found 30 studies that examined early childhood education populations (ages 2-5) and the effect of dialogic reading on student outcomes, but none of the studies included d/DHH children (2017). Since this article, there has been one study by Urbani about dialogic reading for this population (2019). There are many obstacles for instructors when trying to implement dialogic reading in their d/DHH classrooms: increased time and effort dialogic reading takes for the teacher, maintaining sign and spoken language simultaneously for different levels of students, and the conflict in the educational philosophy of teachers and the practice (Urbani, 2019).

A suggestion Urbani gives in this paper is to split up students by language needs so that the instructors can focus on one primary type of communication rather than trying to accommodate the wide variety of needs in the classroom. However, this causes issues with

educators increasing the amount of time and effort the instruction takes, as they must create and implement multiple lesson plans throughout the day rather than just one (Urbani, 2019).

Suggestions for Practitioners. Based on my reading of the literature, I believe Urbani's suggestion is not conducive to classrooms that are already low on resources and staff, as splitting up students into multiple groups adds extra strain on the interventionist to create multiple unique lesson plans that cater to the needs of students while also requiring multiple other caregivers or staff to engage with the students who are not currently in the dialogic reading lesson. Instead, if interventionists have access to technology resources, they could have other students engage in self-guided learning activities that require less overhead while working with a smaller group of students on dialogic reading interventions. Interventionists could also work with the teachers and train them in dialogic reading practices if there is a lack of time and resources to create multiple lesson plans. This way, there is more than one interventionist creating and implementing lesson plans with students to reduce strain on one practitioner. Creating an intervention team that all understand the goals of dialogic reading in the classroom can help the main interventionist reduce burnout and fatigue working on their own (Urbani, 2020). It would also allow educators with more expertise in one communication method to work directly with those students. This 2020 article by Urbani gives implementation advice based on a plethora of concerns one may have about dialogic reading in their classroom, as well as more resources to find information.

Critique #2: Skepticism Among Educators Regarding Research on Intervention Effectiveness and Usefulness. A review of phonological awareness practices for d/DHH children in public d/Deaf schools in the United States found that educators tend to rate phonological awareness as having lower importance for d/DHH students than for typically hearing students and use fewer phonological awareness assessments for d/DHH students than

they do for their peers. Furthermore, they did not find phonological awareness-focused lessons or approaches “very helpful” (Puhlman & Wood, 2020). These are crucial beliefs to address because educators and interventionists cannot deliver effective and beneficial programs that they do not believe to be helpful or relevant to themselves. One obstacle for practitioners to get on board with phonological awareness interventions for d/DHH students is simply the lack of research with results with large effect sizes (Puhlman & Wood, 2020). It is difficult to make time and resources available for intervention with little research backing up its efficacy for a specific population, especially as the information often has to come from teachers with prior experiences who are already overworked.

Suggestions for Practitioners. It is always good to digest research using a critical eye. However, it is important to appreciate the information that well-designed rigorous studies can provide regarding the impact of interventions in actual classroom contexts. Resources such as the What Works Clearinghouse can provide educators with easy-to-digest information that can allow informed decision-making about which interventions might be most appropriate for their students.

Critique #3: Schools Lack the Resources Needed to Properly Implement Interventions. The intervention by Werfel and colleagues was successful for many reasons. The researcher adjusted the PAT program to target the areas of phonological awareness that d/DHH students struggle with most. They also used high-intensity sessions that occurred often and lasted the entire school year to allow enough time for students to benefit from the program. They also ensured a low student-teacher ratio that allowed the interventions to directly target students' individual needs and encourage all students to engage actively in the intervention and gain the most benefit. However, it is essential to note that the circumstances in which the intervention

was implemented are rare and only feasible for some d/DHH classrooms. The educator shortage often means that 2:1 or 3:1 student-teacher ratios are just not possible, and only some classrooms have the benefit of a team of researchers designing and modifying interventions for their classrooms. The Werfel study was the ideal scenario for d/DHH intervention but cannot apply to every classroom.

Suggestions for Practitioners. One way school psychologists can look to implement PAT for d/DHH students is to use the intervention steps described in studies like Werfel's and adapt them to their own classroom. For example, two interventions in Werfel and colleagues' paper had different frequencies and doses of the intervention to from five-to-six minutes four times a week to 25 minutes three times a week (2016). This creates a "shortcut" where a brand-new intervention does not have to be designed from scratch specifically for a classroom, but another one can be adapted.

Table 1: Summary of d/DHH early literacy programs

Program	Visual Phonics (VP)	Foundations for Literacy
Literacy Skill(s) Targeted and Main Features	<p>Print Knowledge</p> <p>Grapheme-phoneme relationship between spoken and print English</p> <p>Not a communication system</p> <p>Direct and clear relationship between phoneme sound and hand cue that provides easy learning for students and instructors.</p>	<p>Print knowledge and phonological awareness</p> <p>Designed specifically for d/DHH students, though it is also used for students with functional hearing.</p>
Implementation Strategy	<p>Many used the <i>Foundations of Literacy</i> curriculum in tangent with VP</p> <p>VP was found to be sufficient on its own in providing support for grapheme-phoneme relationship learning</p>	<p>Must be paired with another program, such as VP or Cued Speech, to be effective</p>
Critiques of Strategy	<p>Limited uses beyond direct learning of the relationship between print and spoken English</p> <p>Lack of interventions targeting other aspects of print knowledge</p>	<p>Unable to be as effective if not paired with another strategy, such as VP</p> <p>Targets both print knowledge and phonological awareness, and does both effectively</p>
Suggestions for Improvement		<p>Use in conjunction with other interventions such as VP to increase effectiveness</p>
Studies Cited	<p>Woolsey et al., 2006</p> <p>Trezek, 2017</p>	<p>Tucci & Easterbrooks, 2015</p> <p>Runnion & Gray, 2019</p> <p>Alasim & Alqraini, 2020</p>

Program	Phonological Awareness Training (PAT)	Dialogic Reading
Literacy Skill(s) Targeted and Main Features	Phonological awareness	Reading comprehension and oral language skills Uses two acronyms for engagement PEER (Prompt, Evaluate, Expand, and Repeat) and CROWD (Completion, Recall, Open-ended, Wh-words, and Distancing)
Implementation Strategy	2:1 or 3:1 student-teacher ratio 15 minutes a day, four times a week, full school year	Active participation of students during reading time Splitting students into language-need groups (ASL vs. spoken language) Multiple lesson plans for each language-need group
Critiques of Strategy	Teacher shortage makes small student-teacher ratios less feasible Consistent, high-frequency, and high-quality instruction increases intervention efficacy	Active participation better ensures students are receiving efficacious instruction Splitting students into different group and creating unique lesson plans adds strain on interventionists' time and effort.
Suggestions for Improvement	Adapt interventions found in articles focused on a similar population If feasible, try and lower student-teacher ratio during interventions	Have students non engaged in the lesson use self-guided technological activities that require less overhead if staffing issues Training teachers and other educators to allows the load of creating lesson plans to be shared among multiple instructors
Studies Cited	Werfel et al., 2016	Urbani, 2019 Towson et al., 2017 Trussell & Easterbrooks, 2014

Autism Spectrum Disorder (ASD) Students

Summary of Program Effectiveness

Read It Again! PreK (RIA) is a whole-class program that combines language and literacy development instruction with shared book reading. RIA builds off of shared book reading, which is common in many early childhood classrooms, and its materials are free to download and includes professional development materials for teachers (Piasta et al., 2020). Though RIA has been shown to increase preschool students' skills in print awareness, as well as phonological awareness and vocabulary, a randomized-control trial study by Piasta and colleagues tested the efficacy of RIA with special education students compared to typical shared book reading and found no statistically significant effects on special education students' outcomes in these skills. RIA may be less practical to implement in early childhood special education classrooms than typical shared book reading because it allows for less flexibility due to the explicit nature of the literacy and language instruction required for RIA.

Shared book reading is not a specific intervention but a common instructional tool for developing emergent literacy skills in early childhood education. It aims to engage students in the reading process by pointing out specific aspects of the book, such as pictures and word meanings. Students are asked questions and find connections between the text and real life (What Works Clearinghouse, 2015). The WWC Intervention report from 2015 showed mixed results on whether shared book reading was an effective instructional tool for print and alphabet knowledge. However, the studies reviewed were not focused on special education students' benefits from the program (What Works Clearinghouse, 2015). However, my review of the latest research shows that shared book reading could help ASD students in particular. For example, print knowledge is a skill that many ASD students lag in when entering kindergarten and do not

catch up to their peers by the end of the year (Dynia et al., 2016). In a 2020 article, if ASD students had high engagement during the intervention or high book-reading orientation, their print knowledge increased later in the study (Bean et al., 2020). Shared book reading is a crucial way to develop these emergent skills for children with ASD especially in print knowledge (Bean et al., 2020).

Dialogic Reading is a shared book reading intervention focusing on oral language skill development, primarily vocabulary acquisition. Dialogic reading is a common intervention tool for many different populations, as shown by its appearance in d/DHH interventions earlier in the review. Unlike d/DHH students, a few studies have been conducted to determine the effectiveness of dialogic reading for oral language skill development in preschool ASD students. With dialogic reading, vocabulary is the targeted skill within oral language. In a 2019 systematic review, Boyle and colleagues found 11 studies examining dialogic reading and ASD students, six fitting this review's age range and one in the last five years (Boyle et al., 2019). A study by Fleury and Schwartz found that preschool participants participated more during the intervention than in the baseline and had an increase in vocabulary across all participants (2017). Dialogic reading is a great intervention tool, specifically for ASD students, because it encourages them to participate in verbal discussions around the book when communication deficits are often part of ASD's manifestation in children (Fleury & Schwartz, 2017). Two more recent studies, in 2018 and 2020, found similar results; that dialogic reading increased vocabulary gains in ASD students (Coogle et al., 2018; Coogle et al., 2020). A 2017 study tested both a modified dialogic reading intervention and a phonological awareness intervention and found that both successfully increased student outcomes in oral language and phonological awareness skills, respectively (Hudson et al., 2017).

Word Boxes. Word boxes is a phonological awareness intervention that works on phonemic segmentation, an aspect of phonological awareness that involves students saying each letter, or phoneme, out loud. Though this study was conducted with seven- and eight-year-old participants, it found that the word boxes method increased phoneme segmentation for students with and, notably, that the teachers found the intervention beneficial for their students and easy to use and implement in their classrooms going forward (Joseph, 2018). However, this study also focused on ASD students with high verbal skills and few behavioral problems, so the generalization of these results needs further examination to include more students on the spectrum and of different ages.

Implementation Considerations and Critiques

Similar to the previous implementations section, implementation can advance or limit educational equity for ASD students. In this section, I will highlight four implementation critiques regarding educational equity and offer a potential solution for each.

Critique #1: Interventions Require Training That Programs Fail to Include. Read it Again! Pre-K is a great intervention for early literacy skill development because it includes important professional development information to allow interventionists to implement the program in its intended format. Piasta and colleagues also did something crucial by starting off with a full-day workshop and following up halfway through with a shorter check-in. Including a follow-up training session is important in ensuring educators continue to implement RIA accurately and adjust if necessary.

Suggestions for Practitioners. Building in time during pre-service training, the summer, and throughout the school year to train interventionists and check in is crucial. It can greatly increase their confidence in their ability to implement the intervention and their actual efficacy as

an interventionist. Even if there is not enough time for a full-day workshop, a short session highlighting how to implement each program can be beneficial in ensuring they are used as intended.

Critique #2: Increasing Engagement. The shared book reading intervention conducted by Bean and colleagues found that ASD students engage less in shared book reading than other students (2020). One way to combat this is to use books in lessons their students find interesting (Bean et al., 2020). Because of fixations that are a part of many ASD students' lives, using subjects they already have developed an interest in can help increase engagement in discussions.

Suggestions for Practitioners. Because ASD students have been found to engage less in shared book reading than their peers, it is important to increase their engagement, and moreover, their benefits from shared book reading interventions. Beyond using books with topics that the students naturally gravitate towards, I believe it may be helpful to scaffold discussion in different ways to increase their engagement. This could look like adding additional prompts that require thoughtful answers or leading the discussion in certain ways that increase verbal participation.

Critique #3: Combining Interventions May Have Unintended Consequences. The 2020 study by Coogle and colleagues expanded on their previous work to see if including modeling practices along with dialogic reading interventions would increase efficacy and student vocabulary outcomes. Interestingly, they found that an intervention focused on dialogic reading was most effective in increasing student outcomes, and the addition of modeling decreased performance for the two student participants (Coogle et al., 2020). The authors state that adding the modeling component of the intervention could have taken the students' focus away from the dialogic reading and deteriorated its effectiveness. Furthermore, in this study, the interventionist

was the educator rather than the researchers, which meant they had a better understanding of their students and aided in a successful intervention (Coogle et al., 2020).

Suggestions for Practitioners. Based on my review of the literature, this study makes significant contributions to the field, as it highlights the importance of not adding too many factors to an intervention that could distract from one another and decrease effectiveness. Seemingly good ideas of combining efficacious practices may not always have the desired outcome, and it is essential to stick with one intervention at a time with students who may get distracted or overwhelmed easily, such as ASD students. Another study by Hudson and colleagues found that modifying the dialogic CROWD to a CROWD+ format in which the interventionist gave students extra processing time between questions and repeated the prompt multiple times increased ASD students' expressive and receptive vocabulary (Hudson et al., 2017). Adjusting pre-established interventions, like dialogic reading and shared book reading, rather than combining multiple interventions, to better complement ASD students can allow for a more successful intervention.

Critique #4: Consistency of Implementation and Phased Models. The word boxes intervention has been used in schools since 1993, but, to my knowledge, Joseph's 2018 article was the first to examine its efficacy with ASD students. Though this study examined just three students outside of the intended population, it examines a different intervention style that can be applied to ASD students of different ages and places on the spectrum. The sessions were also 30 minutes long, and though the study duration was not clear in the article, there were 35 sessions, which implies long-term usage. Consistency of intervention is essential for effective implementation and results. The phased model emphasizes progress in one area before moving on to the next and allows for flexibility in the timeframe used for each student or classroom.

Suggestions for Practitioners. Ensuring interventions are implemented consistently in the classroom can improve their efficacy. Using shorter interventions, 10-30 minutes like many interventions in this review use, and over long periods of time, full school years, can increase their effectiveness for students. Furthermore, the phased model used by Joseph may be useful for other interventions in the classroom beyond word boxes.

Table 2: Summary of ASD early literacy programs

Program	Read it Again! Pre-K (RIA)	Shared Book Reading
Literacy Skill(s) Targeted and Main Features	Print awareness, phonological awareness, vocabulary Free, downloadable materials and professional development materials	Print knowledge
Implementation Strategy	Explicit instructions with limited flexibility 30-week curriculum with 2 sessions a week, approximately 20 minutes each	Whole group shared book readings focused on words, letters, book and print organization, and print meaning
Critiques of Strategy	Inclusion of professional development materials and workshops allows for accurate understanding Lack of flexibility not conducive to special education classrooms that may need more intense instruction	No information on the frequency or dosage of the intervention Level of activity engagement may depend on interest in book subject
Suggestions for Improvement	Adapt to include more intensive lesson plans and allow more flexibility within the lesson to adapt to individual students needs	Use books with subjects that are naturally engaging with your students Scaffold engagement with students who need more help paying attention
Studies Cited	Piasta et al., 2020	What Works Clearinghouse, 2015 Dydia et al., 2016 Bean et al., 2020

Program	Dialogic Reading	Word Boxes
Literacy Skill(s) Targeted and Main Features	Oral language CROWD and PEER questions (<i>see d/DHH summary table</i>)	Phonological awareness
Implementation Strategy	Combined modeling practices with dialogic reading intervention (Coogle et al., 2020) Modified CROWD+ that increased processing time for students between questions and repetition to ensure understanding (Hudson et al., 2017)	35 30-minute sessions 3 phases: phoneme segmentation, word identification, and spelling; once target score in one phase is reached, move onto the next
Critiques of Strategy	Question stems encourage verbal participation Combining multiple interventions distracted students and took away focus	Intervention was done with older students (7- to 8-year-olds) with high verbal skills no data on students younger and/or on different areas of the ASD spectrum
Suggestions for Improvement	Use one intervention, rather than combining multiple that could distract students CROWD+ format to give students more time for processing	Consistent implementation throughout long-term intervention (e.g., full school year) Phased model to ensure understanding of each topic of intervention
Studies Cited	Boyle et al., 2019 Fleury & Schwartz, 2017 Coogle et al., 2018 Coogle et al., 2020 Hudson et al., 2017	Joseph, 2018

Discussion

Above, I have examined program- and population-specific critiques and recommendations through an equity lens. To conclude, I highlight three themes that school psychologists should consider when implementing early literacy practices for d/DHH and ASD students in their early education settings: (1) dosage and fidelity of implementation, (2) modifying existing interventions for different populations and potential drawbacks, (3) increasing in-service training and support systems for practitioners.

Considering Dosage and Fidelity of Implementation.

Ensuring efficacious implementation of programs and curricula is vital in best practices. When discussing program efficacy, the program itself is not the only factor but how it is implemented. In a study by McGinty and colleagues, they found that in classroom-based interventions of print knowledge, the number of times print-referencing instruction was implemented in a session was significantly related to the development of print knowledge skills, but the dose frequency (number of sessions per week) was not (McGinty et al., 2011). In other words, if the quality of each intervention session is high, fewer sessions are needed to increase student skill development, allowing teachers to spend valuable class time on other skill development. Therefore, practitioners should ensure that teachers focus not just on getting through the lessons, but that the lessons are being implemented with fidelity.

Modifying Existing Interventions: Strengths and Drawbacks.

Autism spectrum disorder is broad, and students on the spectrum have various needs. A common thread among interventions for ASD students to improve early literacy is to use existing programs, like dialogic reading and word boxes, and modify them to fit the needs of ASD students better. Adapting existing programs decreases interventionists' load to create new

programs for their students. Lowering the time and energy upfront can allow school psychologists to begin implementing sooner, with a program that has been proven to be effective with students in a different population. However, adapting programs for ASD students means that the intervention wasn't designed specifically with this population in mind. This means that it may not be as effective as intended due to the unique learning experience ASD students have. ASD-specific literacy programs may be ideal, but not always possible with a school's current resources. When modifying an existing program, it is also essential to not only look at the DSM-V definition of ASD needs but to look at your classroom and students who need help and modify it to their needs.

Increasing In-Service Training and Networks of Support.

Teachers lack training in early literacy skills after their initial training (Puhlman & Wood, 2020). This leads to out-of-date or unsupported classroom practices and fear of starting something new in the classroom that may not work out. When interventions can be implemented in a classroom, it is crucial to establish early on a support system for the educators and practitioners undertaking this huge responsibility to help their students develop skills in a new way. Creating a team of people in the school and district that interventionists can lean on when they inevitably encounter struggles is the best way to ensure the intervention is successful for both students and educators. It is also beneficial to support educators in receiving professional development or in-service training on tools and interventions that can be used in the classroom and supported by data.

Implications

Limitations

There are some limitations to this review that must be acknowledged. First, the search was limited to a few keywords to ensure a helpful review of current literature, so articles that did not utilize specific language, such as “oral language” or “phonological awareness” that may be relevant to the topic, would not be included. Furthermore, only one author conducted the literature search, so there may be articles that did not make it into the review that should have. The literature review is also limited as it focused solely on United States populations, which removed critical literacy and language development studies conducted in other areas that could apply to U.S. practitioners. Finally, one definition and measure of educational equity was chosen to base the scope of the paper on, but there are many different definitions of educational equity that would change the lens and motivation of the paper.

Directions for Future Research

The lack of research aimed at intervention efficacy for d/DHH students' literacy skill development is a glaring issue. Few studies have looked at print knowledge skill development as a whole, specifically for d/DHH students. Print referencing is a common intervention for students with typical hearing to develop their print concept knowledge, but it is unknown if this would be successful with the d/DHH population (Werfel, 2017). Many studies have targeted alphabet knowledge as one way to measure print knowledge for d/DHH students; however, the evidence shows that d/DHH students excel at alphabet knowledge tests but routinely fall behind their peers on print knowledge as a whole (Werfel, 2017). This is an issue because interventions target a skill that students are already succeeding with and ignore aspects of print knowledge in which d/DHH students need support. The literature base regarding print concept knowledge

interventions for d/DHH students is severely lacking, so educators do not have EBPs to implement in their classrooms.

Interventionists and educators can only hope to implement interventions and programs for their students effectively if there is little research examining the topic. Critiquing the implementation of programs is difficult when there are so few studies to examine. The lack of evidence also burdens teachers who must create and modify interventions designed for general education children and test different strategies to develop literacy skills. Educators are already overworked and creating this extra task to fit into their already busy schedule is an obstacle for many to implement effective classroom practices.

The field needs a more robust database for d/DHH students and ASD students' literacy development. Researchers taking the time to adopt and modify interventions and programs currently supported for typically developing students to special education students will allow educators and practitioners to run their classrooms better. Taking the onus off of educators to make these adjustments will allow for a smoother research-to-practice transition for d/DHH and ASD educators. Future research should also be clear about what skills they are aimed at developing and what exact details of their interventions for replication research and application to classrooms.

Conclusion

This paper examined early childhood literacy and language in U.S. public preschools for d/DHH and ASD students. Programs were viewed through an educational equity lens to understand their efficacy and how they were implemented in each study. Furthermore, the review critiqued the implementation strategies put forth by the authors of each study and gave suggestions for school psychologists to take these critiques and make the interventions useful for

their classrooms. Three themes were highlighted to consider broadly when making implementation decisions: (1) dosage and quality of implementation, (2) modifying existing interventions for different populations and potential drawbacks, and (3) increasing in-service training and support systems for practitioners. Moving forward from this paper, I hope practitioners think more critically about their practices and the values around which they center their work.

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