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The Effectiveness of a Caregiver Delivered Phonics Intervention for At-Risk Students

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By

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This dissertation has been examined and approved by the following members of the student's committee.

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ABSTRACT

Reading skills are important for students' academic success. Phonics specifically is a foundational skill which is necessary for reading fluency and overall reading proficiency. Additional support outside of the classroom can be beneficial for those struggling and at-risk. There are various strategies and interventions that can help student's gain important academic skills. In addition to various reading skills and interventions, parents and caregivers can help implement interventions within the home setting to support students in their academic growth. Overall, the research has documented the effectiveness of reading intervention delivered by parents and caregivers, but there is little research on caregiver implemented phonics interventions. The current study used a multiple probe design across materials to examine the effectiveness of a phonics interventions implemented by parents of four 2nd grade students struggling with phonics skills. Results of this study demonstrated that parents can effectively implement a phonics intervention to increase students' decoding of words including practiced sounds. The intervention was also effective in students decoding all sounds. Finally, it was acceptable to both parents and students. Additional research investigating phonics interventions is needed with a variety of individuals to determine the effects of parent delivered interventions.

Chapter 1: Literature Review

Schools must support students' reading achievement by providing effective reading instruction and an environment that is conducive to student learning. Reading skills are critical to students' long-term academic success (Kern & Friedman, 2014; Leahy & Fitzpatrick, 2017). Children who can read fluently typically have larger vocabularies, better reading comprehension, and higher levels of achievement in school and on standardized tests (Leahy & Fitzpatrick, 2017). The importance of early reading success is also apparent in the research. Success in reading in the early grades is highly predictive of reading success years later, into high school and beyond (Leahy & Fitzpatrick, 2017).

The foundation for early reading success begins to develop even before students begin formal schooling. The home literacy environment influences early reading success (Hill & Taylor, 2004). Influential practices within the home literacy environment include ensuring the availability of books in the home, talking to children, reading books to and with children, and even participating in formal and informal preliteracy activities (Jeynes, 2012; Khajehpour & Ghazvini, 2011). Formal and informal activities can support the development of reading skills at home (Evans et al., 2000; Stockard, 2011). Informally, the availability of books and other printed materials in the home and contact with paper and pencil support reading achievement (Christenson et al., 1992). Children who have access to books in the home, own a library card, and visit the library also have higher levels of reading interest on average (Christenson et al., 1992). A wide range of

more formal interventions have been found to be effective in the home, such as dialogic reading (Mol et al., 2008) and rereading materials initially read at school (Blum et al., 1995; Koskinen et al., 2000).

The impact of the home literacy environment illustrates that teachers and other school staff are not the only adults that can help support children's learning. Caregivers and other family members can make significant contributions to their child's academic achievement (Ceka & Murati, 2016). Caregiver involvement has been shown to improve a child's attitude toward school, behavior, and social adjustment (Sapungan & Sapungan, 2014). Caregiver involvement in the home setting has a more significant impact on achievement than their involvement in other school activities (Darling & Westberg, 2004). Caregivers know their child best, and the benefits of their academic support and involvement are consistent in the research.

Reading Skills as a Foundation for Academic Success

Academic achievement is an ongoing, cumulative process in which mastery of new skills is built upon an existing foundation (Duncan et al., 2007). La Paro and Pianta (2000) found moderate stability from preschool language and prereading skills to second grade academic skills. Juel (1988) found a high degree of stability in reading skills from first to fourth grade. Specifically, 88% of first graders with poor reading skills continued to have poor reading skills at the end of fourth grade. Conversely, 87% of good first-grade readers continue to be good readers in fourth grade. Other research has documented that basic oral language skills provide a foundation for more advanced

reading comprehension (NICHD Early Child Care Research Network, 2005b). The research suggests that mastering key basic reading skills is critical in early schooling, and both teachers in schools and caregivers in the home play a role in children's reading success (Arnold et al., 1994). Bursuck et al. (2004) suggest that to make a difference for children, effective reading instruction needs to begin early and focus on phonological awareness, alphabetic understanding, reading fluency, vocabulary acquisition, and understanding of connected text, which is consistent with the National Reading Panel's (NRP; 2000) report. Addressing reading skills earlier in a child's reading journey can be helpful for preventing reading difficulties (Foorman et al., 1998).

The Importance of Phonics to Reading Achievement

A variety of skills must develop to facilitate overall reading achievement. The NRP (2000) identified the Big Five skills that they suggested are important for reading achievement: phonemic awareness, phonics, reading fluency, reading comprehension, and vocabulary. Reading requires the skill to decode and recognize words, the ability to actively make comprehend what is being read, and integration between decoding and comprehension processes (Graham & Kelly, 2008). Phonics skills are critical to decoding and are the focus of this study. Phonics encompasses children's knowledge of letter-sound correspondences and using that knowledge to decode and recode words (NRP, 2000). Most phonics instruction occurs in kindergarten through 2nd grade. The NRP (2000) indicated that this period is when phonics instruction is most beneficial, although students who struggle with phonics may continue to require instruction in phonics.

Research focuses on phonics interventions implemented by teachers and other school staff; a smaller portion of the research includes interventions implemented by caregivers.

Children with good phonics skills associate letters and letter combinations with appropriate sounds, identify common spelling patterns, and apply these skills quickly and accurately (Campbell, 2020; NRP, 2000). Children who demonstrate these skills can typically recognize words quickly through a variety of processes, including decoding using letters or letter combinations and recognizing whole words (Campbell, 2020). Quick and accurate word recognition or decoding facilitates reading fluency. Quick and accurate word recognition also ensures sufficient cognitive resources are allocated toward more advanced processes, such as reading comprehension (Price, 2015). In addition, children with good phonics skills are more prepared to apply strategies to identify words they don't know, which facilitates comprehension (Price, 2015).

Best Practices for Phonics Instruction and Intervention

Perspectives on the best methods for reading instruction have shifted over the decades and centuries. For example, during the early 20th century, comprehensive phonics instruction was at the forefront of American education (Price, 2015). However, in subsequent decades, the effectiveness of phonics instruction was debated among researchers. Some researchers believed children who were not taught phonics read more smoothly and were superior in comprehension, while others found that phonics instruction did not negatively impact reading comprehension (Price, 2015). This debate

continued and arguments focused on whether children should be taught to read individual words through a whole language approach or taught grapheme-phoneme correspondence and blending through a phonics-based approach (Herring, 2017). The whole language movement changed the way reading was taught for several decades (Stahl et al., 1998). In recent decades, researchers have drawn on this longstanding debate and the research to conclude that a phonics-based approach is beneficial to readers and have suggested specific methods for teaching phonics (Connelly et al., 2001; NRP, 2000; Paris, 2009). Phonics instruction has been shown to be superior to other approaches such as whole language in (a) preventing reading difficulties among at-risk students, and (b) helping to remediate pre-existing reading difficulties in disabled readers (NRP, 2000). The NRP (2000) indicated that early phonics instruction and intervention is most beneficial, although students who struggle with phonics may require support later in their education. Phonics instruction is beneficial for students in kindergarten to grade 6, students with disabilities, and children of all socioeconomic statuses (Facun-Granadozo, 2014; NRP, 2000). Additionally, phonics instruction has the potential to support students identified as reading disabled by remediating their difficulties. Currently, there is a consensus that phonics instruction should be taught explicitly and systematically, using a synthetic approach, and integrated with instruction on other reading skills.

Phonics Instruction Should Be Synthetic

There are three approaches to teaching phonics: synthetic, analytic, and linguistic (Sitthitikul, 2014). The synthetic approach to phonics starts with a limited set of letters that are taught by the sounds they represent and built into different kinds of words. Gradually, more letters are added, and then consonant blends and other combinations are introduced. Children are taught additional word recognition strategies like visual spelling patterns, to ensure they have a range of strategies to draw upon when reading (Herring, 2017). Teachers can show the word 'cap', and students respond by breaking the word down into its phonemic units, /c/ /a/ /p/. Students will then blend the sounds aloud to make the word 'cap'. The National Reading Council (1998) favored the synthetic approach based on measures of word recognition, spelling, vocabulary, and reading comprehension through the third grade.

In comparison, the analytic approach can also be referred to as "whole to part" and leverages the alphabetic principle (Beishline, 2020). It teaches learners to look at the whole word and break them down into their phonemes. If children can read the word *car,* they recognize the onset /c/ and the rime as /ar/ to complete the word. This approach comes from a discovery model, children discover letter patterns within memorized words (Beishline, 2020).

Lastly, the linguistic approach begins with recognizing and blending the 44 basic sounds of the English language. The instruction begins with teaching students to identify and isolate a phoneme and then introducing the student to the grapheme (letter or letter combination) that represent that sound. It progresses to blending and segmenting

phonemes and then to whole words. In the early stages, this approach avoids potentially confusing phonics concepts, including multiple sounds made by many letters, particularly vowels, and silent letters (Gray et al., 2007). It also allows the children see the relationship between already-familiar oral sounds and written language (Gray et al., 2007). This approach is highly structured and scaffolded.

The features within phonics instruction vary. The National Reading Panel (2000) compared three specific phonics programs: synthetic phonics, larger-unit phonics, and miscellaneous programs that maintained features fundamentally different from those in the other two. In a synthetic phonics approach, students are taught to first convert letters into sounds and then blend the sounds for a complete pronunciation of the word. A larger-unit approach, on the other hand, requires students to blend subparts of words that are larger than individual letters, such as letter combinations or spelling patterns.

Phonics Instruction Should Be Systematic

The NRP (2000) recommends that phonics instruction be delivered in an explicit and systematic manner. Students should be directly taught the phonemic code, including the relation between consonants, short vowels, long vowels, consonant and vowel diagraphs, and their sounds. Students should first learn common sound-spelling correspondences and then progress to less frequently encountered relationships. Phonics instruction should increase in complexity until students master more complex spelling patterns, conventions, or morphemes.

Systematic phonics training is associated with a host of positive outcomes for students' reading and writing development. In a study examining the effects of phonics instruction, Stuart (1999) compared a systematic phonics program to a nonsystematic program delivered to kindergarten students for 12 weeks. Students who completed the systematic program were able to read significantly more words and pseudowords than those who took part in the nonsystematic program. Additionally, systematic program participants were able to write significantly more words. Systematic phonics instruction has shown to be more effective in teaching children to read than alternative programs that do not contain a phonics component (Ehri et al., 2001).

Phonics Instruction Should be Explicit

Explicit instruction is essential for students to make connections they need for both skill acquisition and generalization (Pullen et al., 2005). Most children need explicit decoding instruction to gain an understanding of the alphabetic principle and to apply to alphabetic principle to word reading (Pullen et al., 2005). Archer and Hughes (2011) indicated that explicit instruction is one of the best tools to maximize students' academic growth. Explicit instruction can be defined as a structured, systematic, and effective methodology for teaching academic skills (Archer & Hughes, 2011). It is explicit because it is a direct approach to teaching that can include both an instructional design and a delivery procedure. There are many elements to effective explicit instruction (Archer & Hughes, 2011). Explicit instruction includes clear statements about the purpose of learning, and student expectations are provided in each session.

Additionally, students are explicitly taught strategies and procedures for performing the focal skill. Scaffolding is also provided such that the teacher demonstrates the skill, often while using a 'think aloud', and then the student gradually develops independence in performing the skill while the teacher monitors and provides explicit feedback. Thus, within instruction, goals, expectations, strategies, and feedback are all made explicit to the child. The features of explicit instruction are meant to achieve the following goals: more engaged time/time on task, high levels of correct responding, increased content coverage, more time receiving instruction at one's instructional level, and teaching both content and strategies (Arches & Hughes, 2011). Phonics instruction/programs that contain the elements of explicit instruction lead to greater student achievement (Archer & Hughes, 2011).

Phonics Should Be Integrated with Other Reading Skills

Phonics instruction typically includes more than just teaching children to segment and blend letters or letter combinations to decode words. It typically includes instruction in a range of phonics subskills, practice in reading words in isolation and in connected text, and practice in reading unfamiliar words by identifying sounds. Phonics instruction has been shown to be more effective in improving reading during the earlier stages of reading development (Double et al., 2019).

Phonics instruction is more effective when coupled with phonemic awareness instruction and should also be included in instruction supporting reading fluency and reading comprehension (NRP, 2000). In general, including phonics instruction when

learning other literacy skills can be beneficial for learning a range of literacy skills including reading and spelling (Fielding-Barnley, 1997).

Effective Phonics Interventions

There are many evidence-based approaches for providing phonics instruction that are consistent with the features of effective phonics instruction described previously (Double et al., 2019; Glazzard, 2017; Larabee et al., 2014). Word boxes and word building are the focus of this review.

Word Boxes

Word boxes is an extension of Elkonin sound boxes, which was first introduced by D.B Elkonin (Elkonin, 1973; Joseph, 2000). They were designed to teach children to segment sounds sequentially and targeted phonemic awareness. Segmentation has been suggested as an effective method for teaching children to identify the sounds in spoken words (Stahl et al., 1998). Elkonin also incorporated positional analysis exercises using the boxes and the counters (Joseph, 2000). Word boxes include a focus on phonics, and this intervention has three phases. First, the child simultaneously articulates a word and places counters into respective divided sections of a rectangle. Second, the interventionist replaces counters with magnetic or tile letters, and the child is asked to move the letters into the boxes as they slowly articulate the word. Last, the child writes the letters in the respective divided sections of the rectangle as they are saying the word.

The goal of word boxes is to help students attend to phonological and orthographic features of words while using a visual decoding framework and guided interactions. This intervention is suggested for students who struggled with decoding or spelling and is designed to build proficiency with the skill (Burns et al., 2017). Word boxes has been shown to be a more effective approach to word identification than traditional phonics instruction (Joseph, 2000).

This intervention aligns with the best practices of phonics instruction in that it contains explicit instruction by introducing the intervention and training the students on how to complete each step with modeling and feedback. This intervention is also systematic; students start with simple manipulatives and then gradually move to writing the sounds of each letter that they articulate.

Word Building

This intervention helps students to fully decode words by systematically directing their attention to each grapheme position within the word (Burns et al., 2017). The focus on the individual letter sounds in a word is critical to promote the formation of accurate and fully represented printed words in memory (Burns et al., 2017). Word building addresses various skill deficits. First, it's an explicit decoding intervention that helps students struggling to learn phonics skills. Second, it is a proficiency intervention in which students practice sounds of letters and letter combinations and generalize that knowledge to words and sentences. Word building is appropriate for students who are beyond 1st grade and are accurate in letter-sound correspondences. In a study with 24

struggling readers ages 7-10, students showed significant improvement in decoding for all grapheme positions, as well as gains on standardized measures of decoding reading comprehension, and phonological awareness as compared to the control group (McCandliss et al., 2003).

Best practices are included in the word building intervention, such as systematic and explicit instruction. Within the intervention, letter sounds and phonics patterns practiced progress strategically from basic patterns to more complex. Students do not progress to subsequent lessons until they reach a performance criterion on the currently practiced skill. Elements of explicit instruction include ensuring sufficient prior knowledge through cumulative review, modeling, and supported practice with standard error correction.

Research Supporting Caregiver Delivered Phonics Interventions

Regardless of caregiver income or formal education, if caregivers are involved, students tend to do better in their academic work and can have a more positive school attitude (Epstein & Sanders, 2002; Galloway & Sheridan, 1994). Therefore, it is advantageous for educators to form partnerships and establish collaboration with caregivers (Epstein & Sanders, 2002). When applicable, caregivers can be involved in teacher and staff training to improve its applicability to the local community. Family-school collaboration has been found beneficial for student outcomes. One meta-analysis showed that family-school collaboration resulted in higher student achievement, improvement in student behavior, and lower absenteeism (Cox, 2005). Home-school

collaboration has also been utilized successfully to improve academic performance (Bermudez & Padron, 1988; Brown & Woods, 2015; Christenson & Conoley, 1992). This collaboration can occur across different systems such as communities, schools and/or classrooms, for those who share in the decision-making process and are trying to achieve common goals for the student (Cowan et al., 2004).

One family involvement strategy is caregiver implemented interventions. Researchers have previously documented the effectiveness of caregiver implemented reading interventions. There are several attributes of effective caregiver implemented interventions. Caregiver implemented reading interventions should target skills that are being taught and practiced at school. Thus, caregiver delivered reading interventions provide additional practice and support that many children need to make progress in their reading skills. Consistency between school and home supports student success (Merga & Mat Roni, 2018); this is perhaps most critical for children who are struggling to acquire basic academic skills such as reading. Reese and colleagues (2010) suggested that struggling readers may catch up to their peers with the use of caregiver delivered reading interventions. When struggling readers receive extra practice at home, they are solidifying the foundation of their reading skills. Erion (2006) identified that caregivers implementing academic interventions have a moderate impact on achievement overall, regardless of treatment features.

There is minimal research documenting the effectiveness of phonics interventions delivered by caregivers. Goldenberg (2001) suggested that caregivers may

play a role in supporting the acquisition of phonics skills and suggested the expansion of existing family literacy programs to include a focus on phonics. The existing research documenting caregiver delivered phonics interventions is described below. The described studies vary in intensity, from universal to targeted or intensive interventions for students struggling with their phonics skills. The studies below also highlight a variety of best practices in phonics instruction.

The first universal study is Reutzel and colleagues (2006). The researchers implemented *Words to Go* caregiver involvement program with 1st grade students to improve their word reading, word writing ability, and criterion-referenced reading test performance. Eight classrooms from two different schools participated in the study, both were high poverty, low performing schools and were a part of the *Reading Excellence Act* grant schools. Once a week, caregivers and students were sent home a new *Words to Go* program lesson, script, and materials, with a list of approximately 20 words to make at home. Caregivers attended brief training workshops, in which the teachers explained how to use the program and the expectations they had for accountability. The program was demonstrated with caregivers acting as the students. The teacher explained why and how phonics instruction significantly affects reading achievement. Caregivers were also told that they would fill out a report once a week on how the program went and if they completed it during the week. Results showed that those who participated in the program read more accurately and wrote fewer misspelled words. State accountability tests and criterion-referenced tests showed that

those who participated in the program outperformed those who did not participate. Researchers concluded that the program effects transferred from the ability to read and write words in isolation to a generalized increase in reading performance and achievement.

The program contained elements of systematic explicit instruction like sequencing skills logically, beginning with the most widely used letters and letter combinations. Caregivers elicited prior knowledge by reviewing the letters needed for the lesson prior to starting. Clear and concise language was used throughout the lessons. Additionally, the researchers also assessed reading and writing when assessing progress. Within this study, phonics was addressed in conjunction with another skill, word writing.

Regtvoort and van der Leij (2007) trained caregivers to implement a computer-based intervention with kindergarteners, focusing on phonemic awareness and letter-sound relationships. The researchers primarily targeted implementation to at-risk children, although a small group of typically achieving students were also included. A total of 73 children participated in the study and they came from a total of 45 schools, with at most six children attending the same school. Due to time constraints, a set of 21 high frequency graphemes were taught: 12 consonants, 5 short vowels, and 4 long vowels. There were cars printed with sentences in the form of a silly question to help the child understand that only slightly changes to a word can greatly change its meaning, which helped promote reading comprehension. The core components of the

intervention consisted of three computerized exercises. The first one targeted letters, the second targeted segmenting and blending, and the last targeted word decoding. The researchers held one training session for all caregivers prior to implementation to help explain the rationale of the intervention. A few weeks after the start of implementation, caregivers could attend a second meeting for counseling and exchanging experiences. Results showed that at-risk and not at-risk children improved their phonemic awareness and letter knowledge skills to such an extent that they made greater gains than the control children who did not receive the intervention.

The intervention was based on the word building intervention described earlier. In this study, word building was modified to also include a focus on phonemic awareness; therefore, this intervention illustrated the best practice of integrating phonics instruction with other reading skills. The intervention implemented in this study was also systematic in its focus on high-utility sounds, and in ordering those sounds so that the most difficult sounds appeared later in the sequence. In addition, within lessons, activities were sequenced from simplest to most complex. Explicit instruction practices were integrated into the computer-based and caregiver implemented aspects of the intervention. Immediate error correction, modeling, and repeated practice were features of the program. In addition, formative assessment was implemented for each student. If the student did not reach the 80% mastery criterion, the caregivers were advised to repeat the lesson.

Van Otterloo and van der Leij (2009) researched an intervention provided in a targeted fashion to at-risk students. The researchers investigated the effects of specific training of caregivers to implement phoneme awareness and letter knowledge practice for students who were at-risk for dyslexia. Thirty kindergarteners were selected to participate in the group that received the intervention, and 27 children were selected as the control group and did not receive any intervention. The researchers utilized the "Sounding Sounds and Jolly Letters" pre-reading program with caregivers as the tutors. The caregivers read a rhyme or a song with focus on the speech sound, then the child was shown the letter while the caregiver introduced the speech sound. The child and caregiver would write down people that they know whose name started with the sound, followed by an articulation exercise with attention to sounding, place of articulation, and manner of articulation. Phoneme blending and identification of both initial and final sounds were trained through several language games that included the use of pictures, card games, and hand dolls. Caregivers who were part of the intervention group attended a meeting prior to the start of the intervention where the materials were presented, the aims of the program were explained, and exercises were demonstrated and discussed. After 6 weeks of implementation, a second meeting was held where the program was presented, instructions were repeated, and questions were answered. The experimental group showed more progress than the control group on letter sound knowledge. The effects on phonemic awareness were not statistically significant as

there was a small sample size, but students in the experimental group showed more progress than the control group on phonemic awareness measures.

The intervention implemented in this study was systematic. For example, the sequence of skills began with easier skills and then progressed to more complex skills. The intervention sessions also began with a simple activity and then progressed to a more complex activity. Elements of explicit instruction were also apparent. For example, the intervention focused on high-utility skills. The program also included presentation of examples and non-examples and distributed practice, both of which allowed the children to use new sounds in a variety of different ways. In addition, this program had an integrated focus, targeting both phonemic awareness and phonics.

Grindle and colleagues (2019) implemented Headsprout Early Reading (HER) Intervention to a group with intensive needs. The HER Intervention targeted phonics and reading fluency. Five 8-11 year old children with Down Syndrome participated in the study. HER contained online lessons (episodes) with the ability to print stories; the printable stories were complementary to the online episodes. Each set of episodes was broken into 5-10 sets that taught a specific phonics pattern and set of words. Each set of episodes had an accompanying e-book. Caregivers were advised to sit next to their child during each lesson to help maintain their focus, provide praise or encouragement, supervise, and prompt their child when needed. The HER Intervention included automated reporting on the student's progress. Caregivers were trained prior to the start of the intervention and were provided an overview of HER. Further training

included examples of episodes, key aspects of implementation, showing the stories, and explaining the automatic data collection system. Caregivers had the chance to ask questions and practice the HER Intervention. Results indicated that all participants demonstrated improvements on standardized reading measures. At baseline, all participants scores in the “at risk” or “some risk” range on subtests of DIBELS. At posttest, it was reduced to three subtests scoring as “at risk” and two subtests as “some risk”.

HER contained various aspects of effective phonics instruction. Within explicit instruction, aspects of the intervention required that students demonstrate prerequisite skills to proceed. HER focused on critical content and skills that would help students become more successful within reading. HER recorded each student’s performance during every episode, and reporting on these data were accessible. HER program provided distributed and cumulative practice for each student through continuous monitoring of the student’s responses and its adaptability to the student’s responses. The researchers also integrated phonics instruction with other reading skills by targeting reading fluency in addition to phonics skills. Additionally, the program was systematic in that students started with simpler episodes and as time went on the practices continued to increase in complexity.

This section described four empirical studies that investigated the benefits of caregiver delivered phonics intervention. These studies demonstrated that caregiver delivered phonics interventions were effective in increasing performance on proximal

assessments and generalization assessments. Participants in these studies were generally in kindergarten and 1st grade, although one study documented intervention provided to older children with disabilities. Across all studies, caregivers were trained prior to the start of the intervention, and some studies had follow-up sessions while caregivers were delivering the intervention (Grindle et al., 2019; Regtvoort & van der Leij 2007; Van Otterloo & van der Leij, 2009). All studies integrated phonics skills practice with another reading skill, such as reading fluency, word writing ability, or phonemic awareness. All the studies were systematic in focusing on simple skills initially and progressing to more complex skills as the intervention continued. All studies included elements of explicit instruction, including ensuring adequate prior knowledge, a focus on critical content and skills, modeling, repeated practice, and immediate feedback.

Purpose

Phonics is a critical early reading skill for supporting long-term reading success (Campbell, 2020; NRP, 2000). There is consensus on the key features of effective phonics instruction and intervention, and caregiver delivered phonics reading interventions reflect the key features. Prior studies in this area varied in terms of the specific intervention used, their use of technology, and the students receiving the intervention (Grindle et al., 2019; Regtvoot & van der Leij, 2007; Reutzel et al., 2006; Van Otterloo & van der Leij, 2009). All authors reported that the interventions were effective in supporting the development of reading skills. Relatedly, the studies

reviewed in the previous section reflected best practices in phonics instruction. Phonics instruction should be integrated with other reading skills, should be systematic and explicit, and should use a synthetic approach. Although the existing research is minimal, researchers have suggested and demonstrated that caregivers can provide effective phonics support at home to support students' phonics skills. Of the elements of effective phonics instruction, explicit instruction is especially appropriate for caregiver delivered reading interventions because explicit instruction is effective and requires minimal training to effectively implement.

The goal of the current study was to analyze the effectiveness of a caregiver delivered phonics intervention which integrated best practices in phonics instruction. Students must develop their foundational reading skills to become proficient readers. Caregiver involvement is one way to help support achievement in this area. It has been shown previously that caregiver involvement can be beneficial for students. The following research questions were investigated in this study:

1. To what extent is a letter sound and basic decoding intervention, delivered by caregivers at home, effective in increasing fluency in reading nonsense words containing practiced sounds?
2. To what extent is a letter sound and basic decoding intervention, delivered by caregivers at home, effective in increasing fluency in reading nonsense words containing all sounds?

3. To what extent is a letter sound and basic decoding intervention acceptable and effective according to caregivers and their children?

Chapter 2: Methods

Research Design

This study utilized a multiple probe design across materials (Horner and Baer, 1978) with four participants. A multiple-probe design was selected because it permits periodic monitoring of performance on future letter sets and collecting maintenance data on past letter sets to ensure the intervention produced the intended effects (Murphy & Bryan, 1980). This design is recommended when baseline data is collected on two or more behaviors or skills and the intervention can be implemented in a staggered fashion (Harrington, 2015). This design allows for the intervention to be implemented once a baseline has been established, and there is no reversal or removal of the intervention (Murphy & Bryan, 1980). Additionally, the design allows for ongoing measurement of the relevant skill and monitoring for generalization across the different processes being probed (Cooper, Heron, & Heward, 2007). Gast and Ledford (2010) also suggested the intermittent data collection of a multiple probe design as an alternative to continuous baseline data, with the benefit of being practical and acceptable to participants. Therefore, the design selected for this study yielded several strengths: intra-subject replication at various timepoints, allowing for continuous implementation of treatment for increased acceptability, and applicability to non-reversible academic skills.

Within this study, a baseline was established for all letter sets across all participants. Probe data were collected for letter sets not currently being taught once per week, or approximately every third data point. Prior to beginning instruction on the next set of letters, a continuous baseline of three data points was once again established for all letter sets that had not yet been taught. The next letter set was introduced when participants reached a criterion for WRC on proximal decodable word assessments at least one time (at least 20 WRC/min at 90% accuracy or better; DIBELS, 2020; Fuller & Fienup, 2018; Richling, Williams, & Carr, 2019) or a maximum number of sessions (10) on the current letter set. A criterion was set to ensure that participants reached a level of mastery in both fluency and accuracy for each letter set.

Participants and Setting

Setting

This study was conducted in a small, rural school district in Minnesota with an enrollment of 2,373 students from kindergarten through 12th grade during the 2021-2022 school year. In this school district, there were three elementary schools with pre-k through 5th grade students enrolled, one middle school with students in 6th through 8th grade, and one high school with students in 9th through 12th grade. The student population of this school district was 90.1% white, and 37% of students participated in the free or reduced-price lunch program during the 2021-2022 school year. The elementary school that the study was conducted in enrolled 486 students in K-5th grade. The student population of this school was 88% white, 19.7% of students qualified for

special education services, and 39.4% of students participated in the free or reduced-lunch program.

Assessment sessions took place at a small table in the hallway outside of the student's classroom. If there were distractions occurring in the hallway, students were brought to a quiet, empty classroom. The first author and participant were the only individuals present at the assessment session, unless interobserver agreement (IOA) was being conducted. When IOA data were collected, a second school staff member was also present. Assessment sessions occurred during times when core academic instruction was not being provided. Intervention sessions were implemented at home. Caregiver interventionists were asked to implement intervention sessions in a quiet area of the house and if possible, at a table.

The participants in this study received 1 hour of reading instruction every day. Instruction started with 30 min of whole group reading at grade level, with a focus on explicit phonics instruction. Whole group instruction focused on grade-level state standards. The other 30 min of reading instruction consisted of a combination of peer tutoring in reading, small group reading instruction, and/or writing. Peer tutoring used the second grade Peer-Assisted Learning Strategies (PALS) protocol (Fuchs et al., 2000). Second grade PALS emphasized reading fluency and reading comprehension. PALS uses a reciprocal peer tutoring structure in which a skilled reader is paired with a less skilled reader, and each student is both the tutor and tutee during each session. Small group reading instruction was provided by the teacher. Small groups included 3-5 students in

each group, with ability-level groupings. Instruction was meant to support whole group instruction but was individualized to students' current ability levels. An additional 5-10 min each day were allocated to independent reading time. During this time, the teacher conducted curriculum-based measures (CBMs) in reading to monitor student skill acquisition.

Participants & Recruitment

Potential participants were identified through teacher nomination. The inclusion criteria included: (a) the child is not identified as an English learner, (b) the child is at the instructional level or better in identifying letter sounds (at least 70% accurate; Gickling & Armstrong, 1978), and (c) the child is in the at-risk range (needing support) on DIBELS Nonsense Word Fluency (NWF; scoring below 41 correct letter sounds [CLS] in the winter of 1st grade, scoring below 54 CLS in the winter for 2nd grade; DIBELS, 2020). First and second grade students were the target population for this study to target early reading skills. A Common Core reading standard for 1st- and 2nd-graders is to know and apply grade-level phonics and word analysis skills in decoding words (Minnesota K-12 Academic Standards in English Language Arts, 2010). Obtaining this skill can help increase student's reading fluency as they are able to decode words accurately and efficiently when reading new texts (Perfetti & Bolger, 2004). Targeting phonics in the earlier grades has been found to be more effective than in later grades (NRP, 2000).

The inclusion criteria were provided to all 1st- and 2nd-grade teachers within the school district after receiving approval from the Institutional Review Board (IRB) and

from school administration. After teachers nominated students they believed would meet inclusion criteria, a recruitment letter and consent form were sent to the parents of all potential participants. Two 1st-grade teachers identified 10 students each, and one second grade teacher identified 10 students, for a total of 30 potential participants. Parents were the interventionists for all potential participants, therefore the term "parents" will be used in the remainder of the Method and Results section of this document. Parent consent forms were returned for five students, four 2nd-graders and one 1st-grader. The researcher completed assent procedures, and after receiving assent, implemented two screening assessments. All participants met the inclusion criteria. The final sample included four students in 2nd grade because the 1st-grade student's parent discontinued communication about proceeding with participation in the study. All the participating students were in the same 2nd grade classroom. One of the students in this study received reading intervention services through Title 1. None of the participants nor their parents had participated in a home-based intervention prior to this study.

Joy was a second grader, female, and 8 years old. She was receiving reading intervention services through Title 1. During the recruitment process, Joy was 75% accurate on the letter sound inventory and read 50 CLS on NWF.

Logan was a second grader, male, and 8 years old. He was not receiving any additional reading intervention outside of daily reading instruction in class. During the recruitment process, Logan was 77% accurate on the letter sound inventory and read 52 CLS on NWF.

Paisley was a second grader, female, and 8 years old. She was not receiving any outside reading interventions outside of the daily reading instruction in class. During the recruitment process, Paisley was 79% accurate on the letter sound inventory and read 53 CLS on NWF.

Ellie was a second grader, female, and 8 years old. She was not receiving any outside reading interventions outside of the daily reading instruction in class. During the recruitment process, Ellie was 80% accurate on the letter sound inventory and read 53 CLS on NWF.

Measures

Pretest

A letter sound inventory was given to each student after parental consent was obtained to confirm that the student met the inclusion criterion of being at the instructional level in identifying letter sounds (at least 70% accurate). The inventory included all lower-case letters in random order. The inventory was untimed, administered individually, and used only once throughout the study. There were three rows of seven lower-case consonants and one separate row of vowels; each row of letters was presented in random order. The students were asked to run their finger under each letter and say the sound of the letter. Each letter sound was considered known if the student provided the correct sound within 3 s.

Prospective students were also administered one Nonsense Word Fluency (NWF) probe from Dynamic Indicators of Basic Early Literacy Skills (DIBELS; University of

Oregon Center on Teaching and Learning, 2020) to ensure that they met the inclusion criterion (within the at-risk range, or below 41 and 54 correct letter sounds [CLS] in the winter for 1st- and 2nd-grade students, respectively). DIBELS materials and administration instructions were used (DIBELS, 2020).

Proximal Decodable Words Assessment & Generalization Measures

Proximal decodable words assessments contained 15 rows of 5 decodable words each. The words were randomly generated through a random word generator app called Word Generator (Salih, 2017). Proximal probes were administered to evaluate fluency and accuracy within nonsense words that included only the letters included within a specific letter set. Proximal probes were developed to be visually similar to NWF probes. The researcher reviewed each word generated and ensured that each word 1) followed a CVC pattern, 2) was considered decodable and could be decoded using the most common letter sounds, and 3) was a nonsense word, not a real word.

Proximal decodable words assessments were generated for each letter set, using only letters included in that letter set. Each probe was 1 page and words was printed in 19-point, Berlin Sans FB Bold font. The words on each proximal assessment were lowercase and evenly spaced. During each assessment session, students were given 1 min to read as many words as they could for each assessment implemented. On the proximal assessment, any common sound a letter made was accepted as correct (i.e., long or short vowels) given possible variations in how parents presented the sounds at home. Words Recoded Correctly (WRC) included words read as isolated sounds or words

blended as a word, if all sounds in the word were correct (DIBELS, 2020). Specifically, WRC, CLS, and accuracy in percentage on WRC were scored according to procedures applied in NWF, and this information was recorded on the examiner's copy (see Appendix A).

Generalization was measured using DIBELS NWF. The researcher administered NWF weekly for each participant. The student was given a student copy with randomly ordered VC and CVC nonsense words, with 15 lines and 5 words in each row. The examiner copy contained the scoring guide for each word to document CLS or WRC. The student's copy did not contain the scoring guide. A clipboard, pen, and timer were also used to facilitate administration and scoring. Students were asked to say the individual letter sounds in each word or read the whole word within 1 min. If the student produced each individual letter sound, it was also scored as a word read correctly (WRC). CLS and WRC were the data derived from this assessment. NWF test-retest reliability is from .75 to .87 and concurrent validity is .36 to .85 when correlated with standardized achievement tests (DIBELS, 2020).

Social Acceptability

All children and caregivers in this study were asked to complete a measure of acceptability and perceived effectiveness. Children were administered the Kids Intervention Profile (KIP; Witt & Elliott, 1983; Appendix B), which contained 8 items rated on a 5-point scale that ranged from 'not at all' to 'very, very much' or 'never' to 'many, many times'. The researcher administered the KIP to child participants at school

by reading each item aloud and had the participant circle or check their response to each item. The researcher also used a clipboard and pen to administer the KIP. Higher scores on the KIP indicated greater intervention acceptability levels, with possible scores ranging from 8 to 40. Questions on the KIP pertained to how well participants enjoyed practicing their letter sounds at home and how effective they perceived practice activities to be. A total score greater than 24 represents an acceptable range (Eckert et al., 2017). Internal consistency of the KIP has been estimated to be .78, test-retest reliability was .68 (Eckert et al., 2017).

Parent interventionists also completed an acceptability rating form. Specifically, a modified version of the Intervention Rating Profile (IRP; Martens & Witt, 1982) was used (Appendix C). Questions were modified to refer to the specific academic intervention used in this study. The IRP included 10 items rated on a 6-point scale with 10 questions asking about the effectiveness and acceptability of the intervention. In the IRP, higher scores corresponded to greater intervention effectiveness and acceptability. Reliability of the IRP is .91 and internal consistency is .88 to .98 (Lane et al., 2009). Each caregiver was given the option to receive either individual access to a Google Form link or a hard copy of the acceptability measure. Each caregiver was instructed to either email the completed form back or send the completed hard copy form back to school with their child.

Materials

All materials needed for implementation were provided by the researcher. Parents were provided with 1) implementation support documents, 2) intervention implementation materials to be used across all letter sets, and 3) letter set materials. All materials were placed in a binder to facilitate ease of use. The researcher also used assessment materials as indicated above.

Implementation support documents. Implementation support documents included an intervention protocol, intervention checklist, and session logs. The intervention protocol included the prescribed session length (e.g., 10-15 min per session) and intervention steps listed sequentially. The materials needed and verbiage used in each step were provided so that the caregivers could reference it with ease throughout each session (Appendix D). The protocol was 3-hole punched and put into the binder.

Intervention checklists were provided which included each step listed in order. Each step was marked with a checkbox for caregivers to mark each time they complete the step during a session. The intervention checklist was to be returned weekly, and caregivers were instructed to complete one checklist per week on the second session that was completed for that week. Sufficient copies were included to facilitate returning one per week throughout the entire study (Appendix E).

Session logs were also provided to caregivers; each log was predated and dates that were identified as a practice day were highlighted. The session logs were half sheets of paper, containing a full week starting on Sunday and ending on Saturday. Like

the intervention checklists, sufficient copies were included to facilitate returning one more week. Each session log included a reminder listed on Friday to return the weekly log and checklist to school (Appendix F). The session logs were 3-hole punched and put into the binder.

Intervention Implementation Materials. These materials included a 11” x 14” white board, one black dry erase marker, an eraser, 10 pieces of blank 8” x 11” paper, and a pencil. The paper was provided as an alternative to the white board. The dry erase marker, eraser, and pencil were all placed in a pencil pouch within the binder for easy access and organization.

Letter Set Materials. Wooden cubes were utilized for each of the letter sets. Three wooden cubes were created for each letter set, with nine letter cubes total used across the study. Wooden cubes were 1.5” on all sides, and stickers were applied to each side, with one letter on each sticker. Within each letter set, two cubes included only consonants, which were written in blank ink. Each letter set included eight unique letters, for 24 letters total (x and q were excluded). Each letter set included six to seven consonants; with the letter sets that included seven consonants, two consonants would only appear on one die. In each letter set, one cube included only vowels. Vowels were written in red ink, and each letter set included one or two vowels. Therefore, vowels were repeated on the vowel cube. There were eight letters total in each letter set. Each letter set was also written on a 5” x 8” white index card, the letters were written in two

rows to allow for all eight letters on a single index card. Letter set materials were placed in a Ziploc bag.

Intervention Procedures

The intervention procedures were based on principles of explicit instruction described by Archer and Hughes (2011). Explicit instruction facilitated a scripted, efficient, and effective intervention approach. The protocol reflected several specific explicit instruction practices, including breaking down complex skills into smaller structural units, providing step-by-step demonstration, and using clear and concise language (Archer & Hughes, 2011). Intervention procedures were also aligned with word boxes procedures described by Joseph (2000), specifically the procedures related to sounding out and then recoding CVC words. Practice in decoding and recoding words has been shown to be effective, particularly for students who struggle to acquire these skills (Byrne & Fielding-Barnsley, 2000).

The intervention steps were as follows: 1) Review of Letter Sounds, 2) Review of Decoding Procedure, 3) Creating and Reading Decodable Words, 4) Reading the Decodable Words List, and 5) Identifying Real or Nonsense Words. The intervention steps were implemented by the identified parent and the participating student three times a week for 10-15 min each session. Parents were asked to implement sessions in a quiet area of the home, ideally at a table.

Review of Letter Sounds. Each intervention session began with the parent reviewing each letter sound in the set with their child to ensure they had sufficient prior

knowledge to participate in later tasks. The parent took out the white 5” x 8” index card that was in the intervention binder, which included the letters included in the current letter set. The parent said, “We are going to practice our letter sounds. Point to each letter and say the sound.” The child said the sound of each letter, with the parent prompting their child to point as needed. Standard error correction and feedback were also used. If a response was correct, the parent would respond, “Good, ____ makes the /__/ sound.” If response was incorrect or the child was not able to provide the letter sound, the parent would say “This letter makes the /__/ sound. What sound?” After the child provided the correct sound, the parent would say, “Good, ____ makes the /__/ sound.”

Review of Decoding Procedure. The parent took out the three cubes that were in the intervention binder and modeled to their child how to work with the manipulatives. The parent rolled the cubes and said, “I’m going to make a word. I will roll the cubes, then I will put the vowel in the middle. The vowel is the one that is red. Then, I will put the other cubes on either side. I will then sound out each letter then say the whole word.” The parent lined up the cubes with the vowel in the middle, sounded out each letter that was rolled, and blended the sounds together to make a word. The parent then said, “Now it’s your turn. Roll the cubes and put the vowel in the middle. Once you put the cubes together, say the sound of each letter then say the whole word.” Parents were instructed to demonstrate this step once, but they had the option to demonstrate it again if their child did not understand.

Creating and Reading Decodable Words. The parent instructed the child to roll the cubes again and place the vowel in the middle. The parent said, “Now sound out the word that you made.” The child used the decoding procedure to sound out and read the word. The parent wrote the word on the 11” x 14” white board or a blank piece of paper if preferred. If the child made an error on individual sounds or in blending the word, the parent said, “I hear the /_/, /_/, and /_/ sounds in the word __. The word is __. Say the sounds and repeat the word.” These procedures were repeated until there were 8-10 words listed on the white board or paper.

Reading the Decodable Words List. The parent placed the word list shown on the white board or a piece of paper in front of the child and removed the cubes from view. The parent said, “Point to each word and say the whole word out loud.” The child said each whole word, although they could still sound out the word in their head. If the child made an error, the parent said, “I hear the /_/, /_/, and /_/ sounds in the word __. The whole word is __. Can you say the sounds and repeat the whole word?” If the child said the word correctly but still sounded the word out, the parent said, “Good job saying the sounds, but remember to only read the whole word.” The word list was read at least once; the parent could repeat this step if the child made several errors or was not fluent in reading the words as whole words.

Identifying Real or Nonsense Words. After reading the list of words, the parent and their child went through the list again to identify whether each word was a real or nonsense word. The parent said, “Point to each word and tell me if it’s a real word or

not a real word." As the child did this, the parent confirmed by saying, "Yes, that is a real word," or, "Yes, that is a not a real word." If the child identified the word incorrectly as being a nonsense word, the parent said, "That is a real word because I hear the sounds /_/, /_/, and /_/. Say the word and say if it's a real or not real word." If the child identified the word incorrectly as being a real word, the parent said, "That is not a real word. Can you say the word again and say if it's a real or not real word?"

Parents were instructed to complete the session log after each session, recording that a session was completed and the length of the session.

Procedures

After receiving approval from the University's IRB, approval was sought from the school administrator. Then, recruitment for potential participants started. The inclusion criteria were sent out to all 1st- and 2nd-grade teachers within the approved school. Once teachers nominated potential participants, parental consent forms and a cover letter containing a brief description of the study was sent home with the students. Once parental consent was obtained, the researcher obtained assent from the potential participants by explaining the study to each of the participants. After obtaining assent, the researcher conducted the screening measures to ensure each participant met the inclusion criteria. A schedule for weekly assessments was arranged with each participant's teacher to avoid missing core instruction time.

Baseline Procedures

Baseline levels of performance were established concurrently on the first letter set for each of the four participants. Baseline assessments were conducted in three sessions per week. Each student completed 1-min probes on the first letter set three times per week and on the second and third letter sets once each week. Baseline data were collected for a minimum of three consecutive sessions or until a stable or decreasing trend was established. Baseline data points were graphed individually for each participant as CLS and WRC. NWF was administered once a week and was also graphed.

Intervention Training

Prior to the implementation of the intervention, each family was asked to identify who would primarily implement the intervention. All families identified a parent as the primary interventionist. All parents were trained individually on the procedures, dosage, and intervention materials in a 30-min session. Each parent was given the option of meeting at their child's school or via Zoom to complete the training session. All parents opted to meet at their child's school for training. The training session was scheduled two days prior to the start of intervention implementation. Intervention materials were sent home on the day the training session was completed.

Introduction and Rationale

The researcher explained the importance of phonics intervention and how it relates to students' academic success. The researcher also explained that parent involvement can have a positive impact on academic success and suggested several best practices for

intervention, including finding a quiet area of the home to implement intervention (if possible) to reduce distractions.

The researcher showed and explained each item that the family would receive and how to utilize it during their intervention sessions. The researcher let the parents know that the only change in their materials would be the letter cubes and explained the process for receiving the next set of letter cubes and how the researcher would communicate the starting date for the next set of letters.

Introduction to Materials and Modeling Materials

After reviewing the contents of the binder, the researcher explained and then modeled each step of the intervention. The researcher defined standard error correction and modeled the standard error correction verbiage. The researcher also explained when the interventionist (parent) would use standard error correction, then review the intervention checklist and intervention log and explained how and when to complete them. The researcher also explained the importance of maintaining intervention fidelity and dosage.

The researcher described and showed the letter cubes. The researcher then articulated the letter sounds and asked the parent to repeat each sound to ensure consistency in the sounds produced.

Scaffolding Practice and Wrap-up

The parent and the researcher completed a practice session, where each took turns being the interventionist and went through each step. The researcher played the role of

the interventionist first to model the intervention. The researcher attempted to make mistakes when acting as the student to help the parent practice implementing standard error correction. The researcher gave immediate feedback to the parent during the session related to missed intervention elements or articulation of letter sounds.

The practice sessions continued until the parent implemented the intervention procedures with 95% accuracy according to the intervention checklist (Borrelli, 2011). At the end of the training session, the researcher reviewed the materials that were in the binder and asked if there were any questions or concerns at that time. Each parent was sent home with materials to implement the intervention on the first day of implementation.

Intervention Implementation

The student started the intervention phase once stable baseline performance was demonstrated on the proximal decodable words assessments for the first letter set and the parent had been trained. The parent implemented the intervention at home, three times a week for 10-15 min each session. At the end of the week, parents sent the completed intervention checklist and log back to school and the researcher would collect the completed forms. If there were no completed forms returned, an email reminder was sent to parents in which they were asked to send the completed forms back to school as soon as possible. The researcher would check the completed forms to ensure fidelity and dosage. The researcher followed up regarding any missing steps or

dosage. The researcher also sent emails to parents every other week to check in on implementation and ask for any questions or feedback.

Introducing Subsequent Letter Sets

The next letter set was introduced when participants reached a criterion for WRC on proximal decodable word assessments (at least 20 WRC/min at 90% accuracy or better; DIBELS, 2020; Fuller & Fienup, 2018; Richling et al., 2019) at least one time or the maximum number of sessions (10) on the current letter set. A criterion was set to ensure the participants reached a maximum level of fluency and accuracy for each letter set within the "minimal risk" range on DIBELS. When a participant approached the criterion for the current letter set or the maximum number of sessions, consecutive proximal decodable words assessment probes were administered for all letter sets for a minimum of three assessment sessions. Parents received an email indicating that a new set of manipulatives would be sent home and providing instructions regarding when to start the next letter set. The maximum number of sessions was exceeded four times during the study; this was due to delays in communication with parents, delays in distribution of materials, and delays in establishing a baseline for subsequent letter sets.

Assessment and Treatment Integrity

The researcher implemented the weekly assessments, and another school psychologist conducted fidelity checks. The researcher provided training to the observer for approximately 30 min at the beginning of the study on completing the fidelity checklist provided by DIBELS NWF, which outlines the assessment procedures (See

Appendix G). The observer completed the form independently while observing the researcher implement the assessment. The observer rated at least 33% of the sessions for each student across baseline and intervention phases, roughly once per week. Each step was marked “pass” if the step was implemented correctly or “needs practice” if the step was implemented incorrectly or not at all. At the end of each checklist, spaces were provided for the observer to mark the total number of steps completed correctly during the session and to calculate the percentage of steps completed. The total number of items correctly implemented were divided by the total number of items and multiplied by 100 (Kennedy, 2005). Assessment fidelity was 100% for each student.

To ensure treatment fidelity, the researcher conducted a live session viewing of the parent delivering the intervention, once per each letter set for a total of three live sessions throughout the study for each caregiver-participant dyad. Across all participants, 10.3 % of sessions were observed (9.7-10.7% for each participant) of the intervention sessions. The researcher scheduled the live session through Zoom or Google Meet and completed the fidelity session approximately one week after the start of the new letter set. The researcher watched the parent deliver the intervention steps and checked off each step that was completed on the intervention checklist. If there was less than 90% fidelity within the live session, the researcher discussed with the parent the step(s) missed and modeled each step correctly for the parent. If deemed necessary, an individual training meeting would be held for additional practice, although this was not necessary during the current study.

Data Analysis

To answer the first research question, effectiveness in increasing accuracy and fluency in decoding nonsense words containing practiced sounds, the researcher utilized visual analysis and baseline corrected Tau to analyze the proximal decodable assessments data (Tarlow, 2016). A visual analysis of the graphed data of each participant's performance on the proximal decodable word assessments was conducted. Visual analysis was based on observations of level, trend, variability, and latency of change of data across phase changes from baseline to treatment for each word set across participants (Plevnick & Ferreri, 2013). The trend is the direction or slope of the data, which can range from negative to neutral to positive (Kazdin, 2019). Changes in the trend across phases are observed. The change in level is defined as the change in the central tendency of the data from one phase to another (i.e., baseline to intervention); the final datapoints in the first phase are compared to the initial datapoints of the next phase (Kazdin, 2019). Variability is defined as the range of data points around the mean, this can be completed by drawing a best-fit line through the data points. If there are data points that are close to the line, variability could be considered low if there are many data points that deviate then variability is high (Kazdin, 2019). Latency is defined as the amount of time between the onset of a phase and observed changes in performance. Baseline corrected Tau will be used for statistical analysis of proximal decodable assessment data. Baseline corrected Tau has several benefits, including distributional assumptions, good statistical power, and conceptually similar to other

methods that are familiar to investigators (Tarlow, 2017). Baseline corrected Tau is bounded between -1 and +1, in which the effect size indicates the strength and direction of the effect of the intervention. Effect size .90 or more would mean a large effect, between .70 and .90 are moderate effects, and below .70 for a small or questionable effect (Vannest & Ninci, 2015).

To answer the second research question, effectiveness in increasing accuracy and fluency in decoding nonsense words containing all sounds, the researcher analyzed NWF data in WRC, CLS, and percent WRC. In addition, the research investigated changes in risk status based on NWF data, using DIBELS benchmarks at the start of the study (Winter) compared to the end of the study (Spring). This provides a more generalized indicator of progress, and a student's risk status based on criterion-referenced benchmarks provides helpful information regarding the likelihood of future reading achievement

To answer the last research question regarding the acceptability and effectiveness of the decoding intervention according to parents and students, the researcher evaluated the KIP and IRP data that was obtained at the end of the study. When analyzing the social acceptability forms, the researcher indicated that the lower ratings, 1, would indicate the least favorable view of the intervention. Meaning, 1 would be given for the "not at all", "never", or "strongly disagree" on the KIP and IRP. Conversely, a 5 would be given for the "very, very much" and "many, many times" for

the KIP and 6 would be given for the “strongly agree” response in the IRP. Two items were reverse coded and is reflected within the results and discussion.

Chapter 3: Results

All participants started in the at-risk range of the DIBELS benchmark goals (2020) based off the NWF assessments that were delivered prior to baseline data. Overall, all participants changed from the at-risk status to either at risk (red range) or some risk (yellow range) or minimal risk (green range) status at the end of the study. Each participant improved in both CLS and WRC based off the NWF generalization measure.

Joy

Joy and their parent implemented all sessions at home over the course of 13 weeks across all letter sets. Joy’s parent implemented 100% of possible sessions at the intended frequency of three times per week – 13 sessions for letter set #1, nine for letter set #2, and nine for letter set #3. The maximum number of sessions was exceeded for letter set #1 due to delays in obtaining consistent baseline data for letter sets #2 and #3 along with a delay in distribution of materials being sent home. Joy’s parent did not report minutes of dosage on their logs that has highlighted days for the sessions to be completed by a month view and a weekly view. Joy’s parent was observed once per letter set to evaluate implementation fidelity, for a total of three live sessions. Joy’s parent delivered the intervention with 100% fidelity; therefore no feedback or re-training had to occur across all letter sets. Joy’s parent returned all weekly intervention fidelity checklists which also indicated 100% fidelity.

Joy's performance on proximal assessments in WRC across three letter sets is shown in Figure 1, with descriptive data shown in Table 1. Baseline results across letter sets indicated a level of performance well below the criterion of 20 WRC. For each letter set, no trend was observed in baseline, and the data showed a minimal amount of variability. After intervention sessions began for letter set #1, the level of performance increased slightly from the baseline level, although the trend remained flat. Beginning at the fifth datapoint in the intervention phase, there was an increasing trend. The criterion WRC was reached in the final two sessions of the phase, and Joy's performance remained generally above the criterion, flat, and minimally variable during the maintenance phase. When letter set #2 was introduced, the level of performance did not increase immediately, but an increasing, variable trend began after the third datapoint. Joy's performance exceeded 20 WRC by the eighth datapoint. In maintenance, performance was minimally variable, above the criterion, and showed a positive trend. Finally, for letter set #3, a positive trend was immediately evident, and Joy met the 20 WRC criterion at the seventh datapoint. Effect size analyses indicate a moderate to large effect for WRC that was statistically significant for letter sets 1 and 3. Specifically, Tau was large for letter set 1 (Tau = 0.65, $p = .002$), moderate and non-significant for letter set 2, and large for letter set 3 (Tau = .73, $p < .001$). No baseline correction was required for any letter set.

Joy's performance on proximal assessments in CLS across all letter sets are shown in Figure 2. The average and range of performance across all phases for

performance is shown within Table 2. Baseline across all letter sets showed a level of performance within the "at risk" range on the DIBELS benchmark goal. For each letter set, there was no trend observed in baseline, and the data show minimal variability. Once intervention sessions began for letter set #1, the level of performance increased from baseline level, and the trend remained positive. From the second to the third data point, there was a drop in performance, but afterward an increasing trend resumed. There was no criterion set for CLS, but Joy maintained a performance within the "some risk" range for letter set 1 from datapoint 12 through maintenance (54 CLS in winter and end of school year). When letter set #2 was introduced, the level of performance did not increase immediately, but a positive trend was evident beginning with the 4th datapoint. Joy's performance exceeded into the "some risk" range on the 7th data point and continued to increase. By the 9th datapoint, Joy's performance was in the "some risk" range and the data showed a generally flat trend. In maintenance, Joy's performance was minimally variable, within the "some risk" range and into the "minimal risk" range in maintenance and showed a positive trend. For letter set #3, a positive trend was evident, and Joy fell within the "some risk" range by the 4th datapoint. Joy's performance ended within the "minimal risk" range. Effect size analyses indicated a moderate to large effect for CLS across letter sets. Tau was moderate for letter set 1 (Tau = .59, p = .004), large for letter set 2 (Tau = .64, p =.004), and moderate for letter set 3 (Tau = .49, p = .008). No baseline correction was needed for any of the letter sets.

Joy's performance on the NWF generalization assessment is shown in Figures 3 and 4. Joy's level of performance was in the at-risk range at the start of intervention in both WRC and CLS. Joy's performance shows a consistent, positive trend with minimal variability, such that Joy's performance was in the minimal risk range according to WRC and minimal risk range according to CLS by the end of intervention. According to the spring benchmarks, Joy's performance was in the minimal risk range for both CLS and WRC. Joy's initial performance on the NWF assessment was 29 CLS and 7 WRC, and her ending performance on the NWF assessment was 68 CLS and 22 WRC. Joy's performance increased by 39 CLS and 15 WRC from the beginning to the end of the study.

Joy completed the KIP with the researcher as an indicator of perceived acceptability and effectiveness. Joy's total score on the KIP was a 32, indicating a generally positive perception of acceptability and effectiveness. There was little variability in their responses to KIP items (Table 3). Joy's parent completed the IRP. Joy's parent's responses yielded a score of 59 out of 60 total possible points, indicating a high level of acceptability. Joy's parent responded consistently across all items on the IRP.

Paisley

Paisley and their parent implemented 100% of the sessions at home over the course of 13 weeks across all letter sets, although Paisley was absent for one progress monitoring session. Paisley's parent implemented 100% of the possible sessions at the intended frequency of three times per week – 11 sessions for letter set #1, 11 sessions

for letter set #2, and eight for letter set #3. Maximum sessions criterion was exceeded for letter sets #1 and #2 due to obtaining baseline data for subsequent letter sets (set #2 and #3) and a delay in sending materials home to parents. Paisley's parent reported 15 minutes per session, for 450 minutes of intervention across all letter sets. Paisley's parent was observed once per letter set to evaluate implementation fidelity, for a total of three live sessions. Paisley's parent delivered the intervention with 100% fidelity and did not miss any of the steps for each fidelity sessions, therefore no feedback or re-training occurred. Paisley's parent returned all weekly intervention fidelity checklists which also indicated 100% fidelity.

Paisley's performance on proximal assessments in WRC across letter sets is shown in Figure 5, with descriptive data provided in Table 1. Baseline data across letter sets indicated a level of performance below the criterion of 20 WRC. For each letter set, a neutral trend was observed in baseline, and the data showed a minimal amount of variability. After intervention session began for letter set #1, Paisley's performance was variable, increasing slightly then dropping to baseline levels. Beginning at the 3rd datapoint, Paisley's performance showed an increasing trend through the rest of the intervention phase. The WRC criterion of 20 WRC was reached in the last three sessions of the phase, and Paisley's performance remained at or above the criterion, flat, and minimally variable during the maintenance phase. When intervention sessions began for letter set #2, the level of performance was similar to baseline and did not show an immediate change. Beginning at the 6th datapoint, Paisley's performance began to

increase rapidly. By the 9th datapoint, Paisley's performance met or exceeded the criterion, and a positive trend was observed throughout the maintenance phase. Lastly, for letter set #3, an immediate change in trend was observed. The criterion of 20 WRC was met by the 6th datapoint, exceeding 20 WRC. Effect size analysis indicate a moderate to large effect for WRC that was statistically significant across letter sets. Specifically, was Tau moderate for letter set #1 (Tau = .59, p = .02), large for letter set #2 (Tau = .63, p =.009), and large for letter set #3 (Tau = .71, p < .001). Tau was used for effect size analyses across all letter sets within Paisley's performance.

Paisley's performance on proximal assessments in CLS across letter sets is shown in Figure 6, with descriptive data provided in Table 2. Baseline results for letter set #1 showed higher performance than the baseline performance for letter set 2 and 3. Across all letter sets, baseline had some variability, with an increasing trend on letter set #1 and a decreasing trend on letter sets #2 and #3. Baseline performance fell within the "at-risk" range across letter sets. After intervention sessions started for letter set #1, the trend was initially difficult to differentiate from the baseline, as performance continued to increase at a similar rate. After the 3rd datapoint, the trend appeared to accelerate with minimal variability. Maintenance data initially showed a negative trend, but then flattened and began to increase. Throughout the maintenance phase, Paisley's performance was in the "some risk" range. After intervention was introduced for letter set #2, the data remained at a similar level and showed a variable trend. Baseline data showed a decreasing trend into the intervention phase. The data showed an increasing

trend beginning at the 6th datapoint. The data showed a flatter but still positive trend during the maintenance phase. Performance met the "some risk" status range by the 9th datapoint and through the maintenance phase. The last data point fell within the "minimal risk" status for letter set #2. Lastly, for letter set #3, once intervention was initiated, there was an immediate change to a positive trend, which was maintained throughout the intervention phase. CLS was within the "at-risk" range during baseline but achieved a quick increase to the "some risk" range by the 4th datapoint. Last 3 data points for letter set #3 fell within the "minimal risk" status. Effect size analyses indicated a small to large effect for CLS across letter sets. Analysis showed that Tau was large for letter set 1 (Tau = .62, p =.009) and large for letter set 3 (Tau = .65, p <.001). Tau for letter set #2 was not statistically significant but was small. Tau was used for analysis across all letter sets within Paisley's performance data.

Paisley's performance on the NWF generalization assessment is shown in Figure 7 and 8. Paisley's level of performance was in the some risk range at the start of the intervention on both WRC and CLS. Paisley's performance in WRC showed a consistent, positive trend with minimal variability. Paisley's performance in CLS showed a positive trend initially, followed by three consecutive datapoints displaying a negative trend, then followed by a positive trend with minimal variability during the remainder of the study period. According to the spring benchmarks, Paisley's performance was in the minimal risk range for both WRC and CLS. Paisley's initial performance on the NWF assessment was 49 CLS and 11 WRC, with her ending performance on the NWF

assessment being 70 CLS and 23 WRC. Paisley's performance increased by 21 CLS and 12 WRC from the beginning to the end of the study.

Paisley completed the KIP with the researcher as an indicator of perceived acceptability and effectiveness of the intervention. Paisley's total score on the KIP was a 32, indicating a generally positive perception of the acceptability and effectives. There was some variability in their responses to the KIP items, particularly item 4 had a response that was out of the normal range amongst the participants (Table 3). Paisley's parent completed the IRP. Paisleys' parent scored the intervention with a 54 out of 60 total possible points, indicating a high level of acceptability. Paisley's parent responded consistently across all items on the IRP.

Logan

Logan and their parent implemented 100% of the sessions at home over the course of 13 weeks across all letter sets. Logan's parent implemented 100% of possible sessions at the intended frequency of three times per week – 12 sessions for letter set #1, eight for letter set #2, and eight for letter set #3. The maximum number of sessions criterion was exceeded for letter set #1 due to baseline data being collected for subsequent letter sets (set #2 and #3) and a delay in sending materials home. Logan's parent did not consistently report minutes per session on their logs, but these data ranged from 10-15 min (mean = 11.5 min). Logan's parent was observed once per letter set to evaluate implementation fidelity, for a total of three live sessions. Logan's parent delivered the intervention with 100% fidelity and did not miss any of the steps for each

fidelity session. Therefore, no feedback or re-training occurred during the intervention phase. Logan's parent returned all weekly intervention fidelity checklists, although they were returned bi-weekly rather than weekly. This indicated 100% fidelity.

Logan's performance on proximal assessments in WRC across all three letter sets are shown in Figure 9, with descriptive data provided in Table 1. Baseline results across all letter sets show a level of performance below the 20 WRC criterion. For letter set #1, there was no trend observed and minimal variability during baseline. After intervention sessions began for letter set #1, variability increased, so there was no evident change in trend or level from baseline. From the 3rd datapoint, the slope began consistently positive, and that trend continued until the end of the intervention phase. The 20 WRC criterion was met on the 12th datapoint. Logan's performance was more variable during the maintenance phase and did drop below the criterion, but performance increased to a level above the criterion by the end of the maintenance period. For letter set #2, baseline showed a decreasing trend and minimal variability. Once intervention sessions started, the level of the data did not change immediately, but by the 4th datapoint, a steep positive trend was observed, and performance was above the baseline level. Logan met the 20 WRC criterion on the 7th datapoint. Logan's performance remained above the criterion throughout the maintenance phase. Lastly, for letter set #3, baseline showed a decreasing trend with some variability. Once intervention started, a positive trend was immediately evident, and Logan exceeded the criterion by the 6th datapoint. Effect size analyses indicated moderate to large effects for WRC that were statistically

significant across letter sets. Specifically, Tau was moderate for letter set 1 (Tau = .49, p = .025), large for letter set 2 (Tau =.74, p <.001), and large for letter set 3 (Tau = .65, p < .001). Baseline corrected Tau was used for letter set 2 because the baseline trend was negative and statistically significant. Baseline corrected Tau was not used on letter set 1 or 3, as the *p* value was not significant.

Logan's performance on proximal assessments in CLS across letter sets is shown in Figure 10, with descriptive data provided in Table 2. Baseline results across letter sets indicate a low level of performance scoring within the "some risk" range, with baseline on letter set #1 showing variability but an increasing trend overall. Baseline data in letter sets #2 and #3 showed a decreasing trend prior to intervention. In the intervention phase for letter set #1, the data were initially variable and did not show a change in level. However, an increasing trend began at the 4th datapoint. Logan maintained a "some risk" range status throughout the maintenance phase on letter set #1. When intervention was initiated for letter set #2, the level initially did not change, but a positive trend was apparent beginning with the 2nd datapoint. The data showed a flatter but still positive slope with minimal variability during the maintenance phase. Logan's performance was in the "some risk" range through the maintenance phase of letter set #2. The last datapoint for letter set #2 fell within the "minimal risk" range. Lastly, for letter set #3, once intervention was initiated, a positive trend was observed immediately, achieving the "some risk" range status after the 3rd data point. The last 3 datapoints for letter set #3 fell within the "minimal risk" status range. Effect size analysis

indicated a large and statistically significant effect for CLS across letter sets. Tau was large for letter set 1 (Tau - .63, $p = .003$), large for letter set 2 (Tau = .77, $p < .001$), and large for letter set 3 (Tau = .72, $p < .001$). Baseline corrected Tau was used for letter set 2 and 3 due to a negative and statistically significant baseline trend.

Logan's performance on the NWF generalization assessments is shown in Figure 11 and 12. Logan's level of performance was in the "at risk" for WRC and "some risk" for CLS range at the start of the intervention. Logan's performance showed a consistent, positive trend with some variability, such that Logan's performance was in the "minimal risk" range for both CLS and WRC by the end of the intervention, WRC was nearly in the "minimal risk" range. Logan's initial performance on the NWF assessment was 53 CLS and 12 WRC, and his ending performance on the NWF assessment was 70 CLS and 25 WRC. Logan's performance increased by 17 CLS and 12 WRC from the beginning to the end of the study.

Logan completed the KIP with the researcher as an indicator of perceived acceptability and effectiveness. Logan's total score on the KIP was a 30, indicating a generally positive perception of acceptability and effectiveness of the intervention. There was little variability in their responses to the KIP items (Table 3). Logan's parent completed the IRP. Logan's parent scored the intervention at a 60 out of 60 total possible points, indicating a high level of acceptability. Logan's parent responded consistently across all items on the completed IRP (Table 4).

Ellie

Ellie and their caregiver implemented 100% of the sessions at home over the course of 13 weeks across all letter sets. Ellie's caregiver implemented 100% of possible sessions at the intended frequency of three times per week – 11 sessions for letter set #1, nine for letter set #2, and eight for letter set #3. Ellie's caregiver did not report minutes of dosage on their weekly logs. Ellie's caregiver was observed once per letter set to evaluate implementation fidelity, for a total of three live sessions. Ellie's caregiver delivered the intervention with 100% fidelity and did not miss any of the steps for each fidelity session, therefore no feedback or re-training occurred across all letter sets. Ellie's caregiver returned all weekly intervention fidelity checklists which also indicated 100% fidelity.

Ellie's performance on proximal assessments in WRC across letter sets are shown in Figure 13, with descriptive data provided in Table 1. Baseline results across letter sets indicated a level of performance below the criterion of 20 WRC. For each letter set, the data showed variability. Letter set #1 showed a neutral trend, whereas letter sets #2 and #3 showed a decreasing trend. Baseline for letter set #3 had the most variability. Baseline data for letter set #1 were variable initially, but the last two baseline points were consistent. After intervention started for letter set #1, performance was highly variable, and the level of performance overlapped with baseline levels. Beginning at the 3rd datapoint, the trend was positive and showed minimal variability. Ellie met the criterion in the 10th datapoint. Performance decreased to below the 20 WRC criterion at the start of the maintenance phase. Subsequently, performance showed a consistent,

positive trend until the end of the study. When intervention began for letter set #2, the level of performance did not immediately change. Progress increased steadily. Starting with the fourth datapoint, a steep positive slope was observed, and the 20 WRC criterion was met on the 8th datapoint. Effects were not shown evidently until datapoint 3, and performance increased and continued until criterion was reached. Performance remained minimally variable and plateaued at 25 WRC for the remainder of the study. After intervention sessions began for letter set #3, performance quickly increased and continued until the 20 WRC criterion was met on the 5th datapoint. Effect sizes for WRC were calculated and showed a small to moderate effect across letter sets. Tau was small for letter set #2 (Tau = .11, p = .012), and moderate for letter set #3 (Tau = .69, p <.001). Tau was small but not statistically significant for letter set #1. The baseline trend was not statistically significant for any letter set.

Ellie's performance on proximal assessments in CLS across all letter sets are shown in Figure 14, and descriptive data are shown in Table 2. Baseline for letter set #1 shows no apparent trend and a moderate amount of variability. Baselines for letter set #2 and #3 showed consistent negative trends. Baseline for letter set #3 had the most variability. When intervention sessions started for letter set #1, an immediate positive trend was observed. Ellie maintained performance in the "some risk" range throughout the maintenance phase. Once intervention started for letter set #2, performance was immediately higher than baseline and continued to increase as the intervention session progressed. Performance was within the "some risk" range after datapoint #5.

Performance was well above the "some risk" range through maintenance. After intervention session began for letter set #3, performance increased immediately and at a rapid pace until the 4th datapoint. After the 4th datapoint, the trend was still positive but flatter. Effect size analysis indicate a small to moderate effect across CLS letter sets**.** Specifically, Tau was moderate for letter set 1 (Tau =.58, p = .012) and was small and not statistically significant for letter sets #2 and #3. No baseline corrections were needed due to baseline trend being not statistically significant across letter sets.

Ellie's performance on the NWF generalization assessment is shown in Figure 15 and 16. Ellie's level of performance was in "at risk" range at the start of intervention in both WRC and CLS. Ellie's performance shows a consistent, positive trend with minimal variability, such that Ellie's performance was in the minimal risk range according to WRC and CLS spring benchmarks by the end of the intervention phases. Ellie's initial performance on the NWF assessment was 47 CLS and 13 WRC, and her ending performance on the NWF assessment was 68 CLS and 24 WRC. Ellie's performance increased by 21 CLS and 11 WRC from the beginning to the end of the study.

Ellie completed the KIP with the researcher as an indicator of perceived acceptability and effectiveness. Ellie's total score on the KIP was 29, indicating they found the intervention to be acceptable and effective overall. There was variability within their responses to the KIP items; in particular, Ellie reported that they did "not at all" want to work more on the intervention (item 4), which was also outside the response range of other participants (Table 3). Ellie's parent completed the IRP. Ellie's

parent scores the intervention at a 44 out of 60 total possible points, indicating a high level of acceptability. Ellie's parent responded consistently across all items on the completed IRP (Table 4).

Chapter 4: Discussion

Phonics is a critical early reading skill, and the key components of effective phonics instruction have been identified. Those key features include systematic, explicit, and synthetic phonics instruction that is integrated with instruction on other reading skills. Several studies have documented caregiver delivered reading intervention that largely reflect these key features. These studies have shown that caregivers can provide effective phonics instruction at home to help increase phonics skills. This study was proposed to contribute to the limited existing research. Specifically, the purpose of this study was to analyze the effectiveness of a caregiver delivered phonics intervention using a multiple probe design across materials. Social validity according to caregivers and students was also measured.

Across all participants, findings showed that the intervention was effective in supporting growth in phonics skills on proximal and generalization measures. The first research question used proximal assessments to measure whether the intervention was effective in increasing accuracy and fluency in reading nonsense words containing practiced sounds. All students showed an increase in performance and met mastery criterion on each letter set. Although effects were often not observed immediately, the effects were replicated across letter sets and students. Delay in response of the effects

may be expected since students were identified as at-risk, and they are still developing their recoding and decoding skills. Additionally, students generally required fewer sessions to meet the criterion on subsequent letter sets. Intervention effects on proximal assessments may be due various factors. The intervention included several best practices within phonics instruction, these include containing elements of explicit instruction, being systematic, and integrating other skills. In addition, parents were trained prior to the start of the intervention. Relatedly, there was a high degree of fidelity to procedures and expected dosage across participants and letter sets. Maintenance assessments demonstrated that students typically continued to perform above the criterion after intervention on a letter set concluded.

The second research question pertained to generalization assessments, which were used to measure the effectiveness of the intervention in reading nonsense words containing all sounds. DIBELS NWF was administered weekly to measure generalization. All students started within the “at risk” range, and all were in the “minimal risk” range at the end of the study. Specifically, student gains in NWF ranged from 17-39 CLS and 11-15 WRC. The expected improvement for WRC was 2 and 0-8 (dependent on risk status) for CLS, all participants exceeded the rate of improvement. This data was monitored using a non-experimental AB design, so they should be interpreted with caution. However, they provide some evidence that the phonics intervention effects were generalizable.

The last research question examined the acceptability and effectiveness of the intervention according to parents and their children. Overall, all parents and students found the intervention to be acceptable. No known studies have systematically investigated the acceptability of a parent-delivered phonics intervention. One study has investigated acceptability in an unstructured, qualitative way (Reutzel et al., 2006), and these results are consistent with those findings. Positive parent feedback is consistent with the high-quality implementation observed in this study. Fidelity of implementation and dosage was excellent as measured through self-reported data (weekly logs and checklists) and observations of live sessions. Similar to prior research, parents received support prior to and throughout the implementation phase. All parents attended a training session as previously described. Additionally, support during the intervention included primarily follow-up emails and live observations with feedback as needed. Parents communicated minimally with the researcher and required little feedback, which is consistent with the high dosage and implementation fidelity observed. Based on these findings, it seems that parents can deliver phonics interventions that integrate elements of effective phonics instruction when provided with appropriate support. Additionally, it is possible for parent delivered phonics interventions to support the development of specific phonics skills as well as overall phonics achievement.

Limitations

The findings of this study should be interpreted in the context of its limitations. First, this study included a relatively homogenous sample of second graders who

identified as white and did not have an identified educational disability. However, the students in this study do not represent the broader population of second grade students in the United States. Implementing this intervention with additional groups of students is needed to increase the generalizability of these findings.

Second, fidelity was collected in a relatively small proportion of studies. Three total sessions were observed per parent throughout the study, one for each letter set, which was 10.3% of total sessions. Additional implementation fidelity and dosage data were collected through self-report, which may be prone to biased reporting. It is possible that parents did not implement the sessions with fidelity outside of the live sessions. In addition, parents may have implemented the intervention more or less than prescribed and reflected on logs. The researcher attempted to maintain communication with parents to support consistent implementation. Although parents generally did not respond to these communications, they consistently returned logs and checklists requested by the researcher. Future research should attempt to collect implementation fidelity data more frequently and minimize reliance on self-report fidelity and dosage data.

Third, information on social acceptability may be biased due to the parents/children potentially responding in a socially desirable way. This effect may have been exacerbated by the researcher administering the assessments. Fourth, words used within the proximal decodable word assessments contained some uncommon real words and some that don't follow standard phonics rules. A sample of 33% of the

proximal decodable word assessments used were analyzed, and 35% of the words were either uncommon real words or phonetically irregular.

Lastly, the criterion that was used to determine when participants moved onto to the subsequent letter set was violated multiple times. This was due to collecting baseline data for the following letter sets, delays in communicating with parents about materials being sent home, or delays in getting materials to parents prior to the start of the intervention for the next letter set.

Implications for Research and Practice

Findings from this study provided evidence that a caregiver delivered phonics intervention is a positive strategy, contributing to the existing literature of both phonics and parent delivered interventions. This study also provided evidence that parents can implement interventions that include best practices in phonics instruction with fidelity and to support their child's achievement. In addition, this evidence suggested that the intervention implemented in this study was acceptable to caregivers and students. Although the findings of this study were promising, future research should investigate parent delivered phonics interventions with other samples, ideally with more diverse samples, to promote generalizability of the findings. Future research may also investigate caregiver delivered phonics interventions that more explicitly connect to classroom instruction, which may increase intervention effectiveness. Additionally, future research could investigated implementation by other familial and nonfamilial caregivers, such as siblings, grandparents, or childcare providers. The minimal amount

of training needed to implement this intervention facilitates use by a range of individual's in the student's life.

The results of this study also have implications for practice. Findings of this study were consistent with previous research showing that caregivers can deliver interventions with fidelity when provided adequate training and support. This study suggested that caregivers followed the intervention protocol as prescribed and with adequate dosage. In many school settings, it may be appropriate to provide support to caregivers to implement systematic interventions outside of school to support services provided during the school day.

The intervention the researcher designed and implemented within this study was effective based on the results of proximal and generalization measures. It was also acceptable to both caregivers and students. All students and their parents indicated high levels of acceptability, generally indicating that the intervention was useful, effective, and enjoyable. Therefore, the specific intervention protocol used within this study may be appropriate for educators to apply. However, given limitations previously identified, students should be closely monitored while participating in the intervention to ensure its effectiveness in a specific situation.

Conclusion

The home literacy environment and a range of informal and formal activities have a significant impact on reading achievement. Given the significant importance of phonics to reading achievement, it is important to identify effective practices for

supporting the development of phonics skills, especially for students who are struggling to develop these skills. A small body of research has documented that formal interventions may be implemented in the home by caregivers to support the development of phonics skills in addition to related literacy skills. This study documented caregiver implementation of an intervention package focused mostly on phonics skills to second graders struggling with phonics. Caregivers implemented the intervention with fidelity and good dosage and found it to be an acceptable intervention. At the same time, students also found the intervention to be acceptable and showed growth in phonics skills and a decreased risk level on generalization assessments. These encouraging findings support that there is potential for formal activities implemented in the home to improve the phonics achievement of students.

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Table 1

Proximal Decodable Words Assessment Average and Range for WRC/min

	Baseline		Intervention		Maintenance	
			Joy			
	Aver.	Range	Aver.	Range	Aver.	Range
Letter set #1	6.2	6-7	9.5	7-20	21.2	19-22
Letter set #2	13.1	7-8	13.6	7-22	23	22-24
Letter set #3	21.1	7-9	18.2	9-23	N/A	N/A
			Paisley			
Letter set #1	6.2	6-7	16.5	12-20	21.6	21-24
Letter Set #2	8	7-8	14.1	8-23	24.3	24-25
Letter Set #3	8.23	7-9	18.7	9-26	N/A	N/A
			Logan			
Letter set #1	9.6	9-10	14.5	9-20	20.9	19-23
Letter set #2	9.8	9-13	15.8	9-23	24.3	24-25
Letter set #3	9.7	7-14	18.8	10-27	N/A	N/A
			Ellie			
Letter set #1	12.8	12-14	15.9	11-21	20.8	19-23
Letter set #2	11.6	9-15	15.7	9-25	25	25
Letter set #3	8.8	7-11	18.8	10-27	N/A	N/A

Note. Cells that contain “N/A” indicate that an average or range was not computed.

Table 2

Proximal Decodable Words Assessment Average and Range for CLS

	Baseline		Intervention		Maintenance	
		Joy				
	Aver.	Range	Aver.	Range	Aver.	Range
Letter set #1	28.6	25-32	38.5	30-54	59.8	53-64
Letter set #2	25.2	24-29	40.7	26-61	47.4	28-69
Letter set #3	27.4	26-30	54.7	29-75	N/A	N/A
		Paisley				
Letter set #1	47.25	43-48	59	50-65	63.2	60-68
Letter Set #2	24.2	18-28	39.5	22-63	66	64-69
Letter Set #3	29.5	24-40	55.8	29-72	N/A	N/A
		Logan				
Letter set #1	40.4	38-43	50.4	42-61	61.5	57-67
Letter set #2	43.5	36-51	49.4	36-63	66	64-69
Letter set #3	42.8	37-49	57.8	40-72	N/A	N/A
		Ellie				
Letter set #1	49.4	48-52	54.3	49-61	60.9	58-65
Letter set #2	50	45-53	55.6	46-67	69.3	68-70
Letter set #3	37.3	28-45	55.6	30-71	N/A	N/A

Note. Cells that contain “N/A” indicate that an average or range was not computed.

Table 3

KIP Responses for All Participants

	Participant				
Item	Joy	Paisley	Logan	Ellie	Median
1: sounding out and reading words	3	4	3	3	3
2: sounding out and reading words at home	4	3	4	3	3.5
3: times when you did not want to work at home	4	5	4	5	4.5
4: when you wished you could work more	3	2	3	1	2.5
5: how much do you like practicing at home	4	4	3	3	3.5
6: it helps you at home	5	4	4	4	4
7: has your reading improved	4	5	4	5	4.5
8: has your reading gotten worse	5	5	5	5	5
Total	32	32	30	29	

Note. Items #3 and #8 were reversed coded, responses shown reflect the reverse coded. Scores above 24 indicate an acceptable intervention.

Table 4

IRP Responses for All Caregivers

	Participants				
Item	Joy's Caregiver	Paisley's Caregiver	Logan's Caregiver	Ellie's Caregiver	Mean
1: felt positively about implementing	6	5	6	4	5.25
2: suggest intervention to other parents	6	5	6	4	5.25
3: good way to teach at home	6	5	6	4	5.25
4: steps were manageable	6	5	6	4	5.25
5: effective choice for teaching at home	6	5	6	4	5.25
6: willing to use this in the future	6	5	6	4	5.25
7: sessions length was reasonable	6	6	6	5	5.75
8: liked the procedures in the intervention	6	6	6	5	5.75
9: training was reasonable	6	6	6	5	5.75
10: beneficial for my child	5	6	6	5	5.5
Total	59	54	60	44	

Figure 1

Joy's Proximal Decodable Word Assessments Performance on WRC across Letter Sets

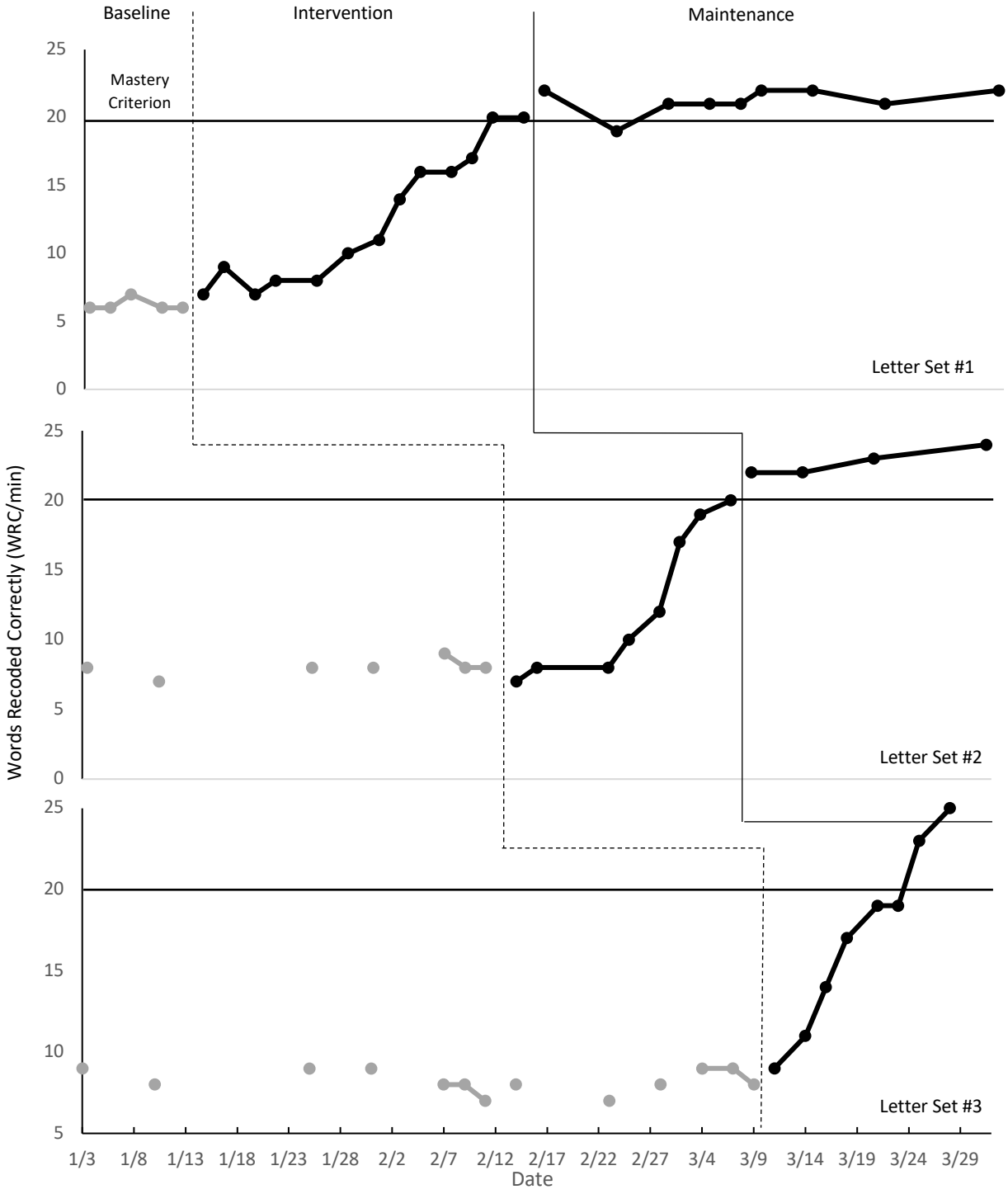


Figure 2

Joy's Proximal Decodable Word Assessments Performance on CLS Across Letter Sets

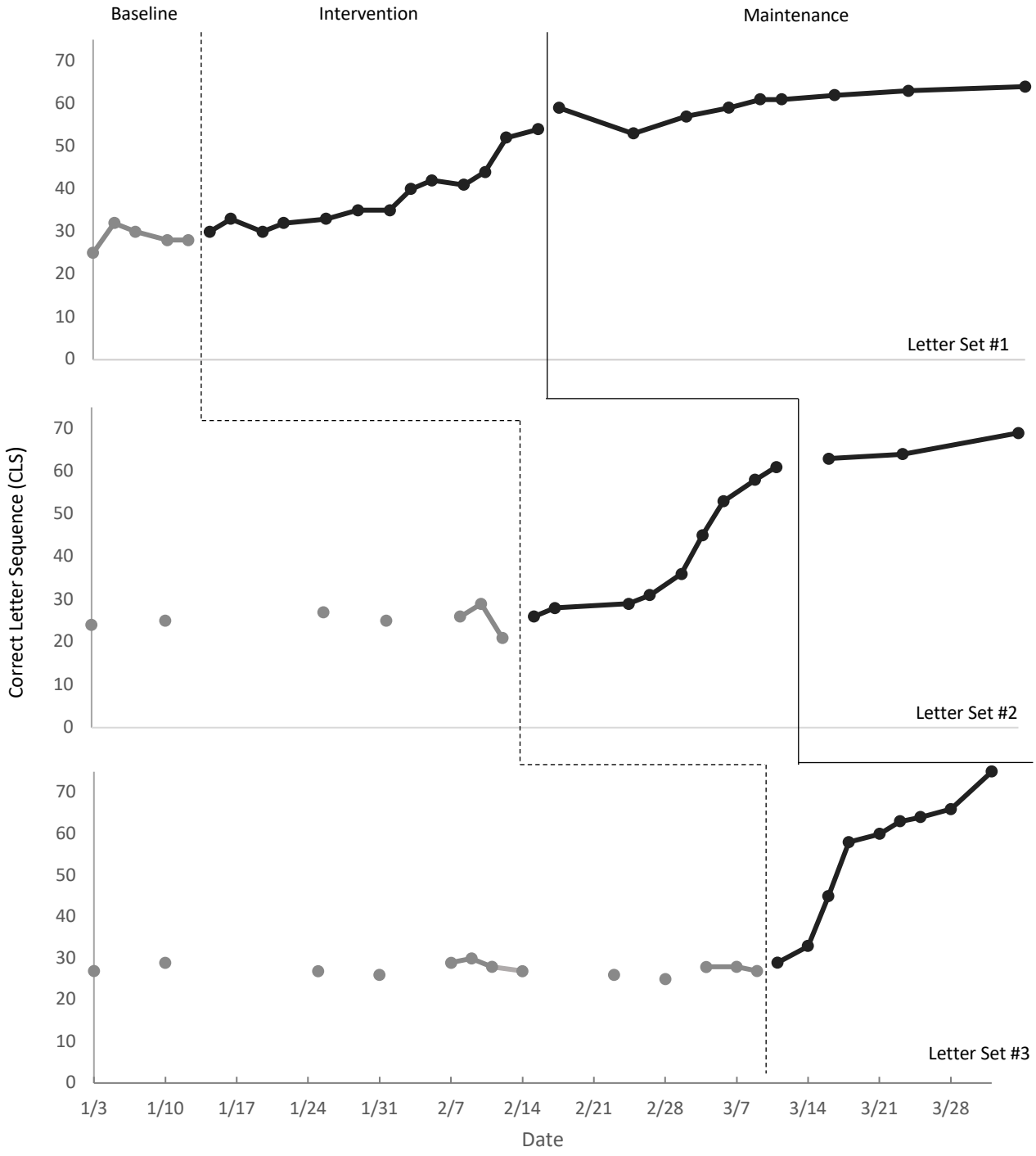
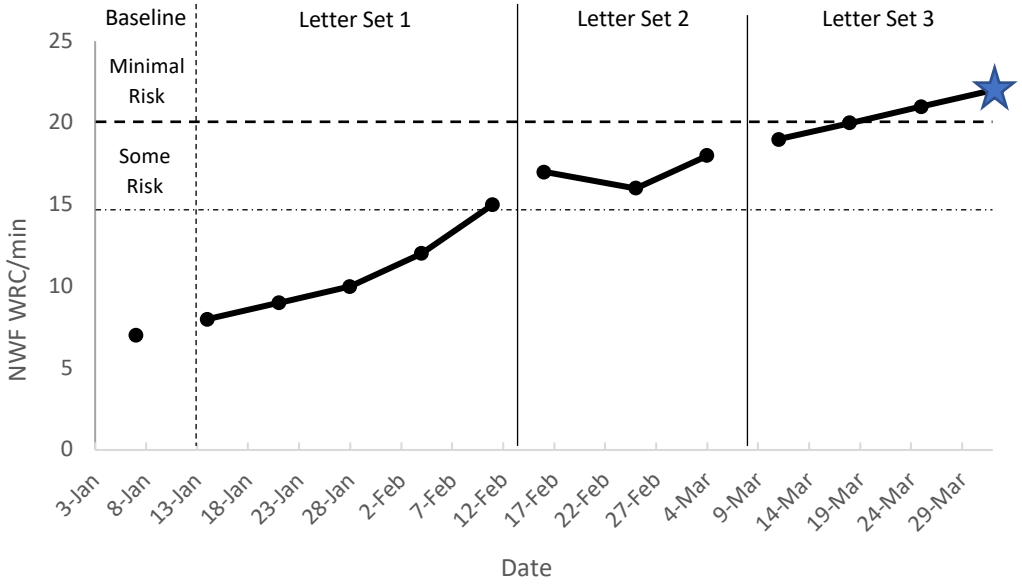


Figure 3

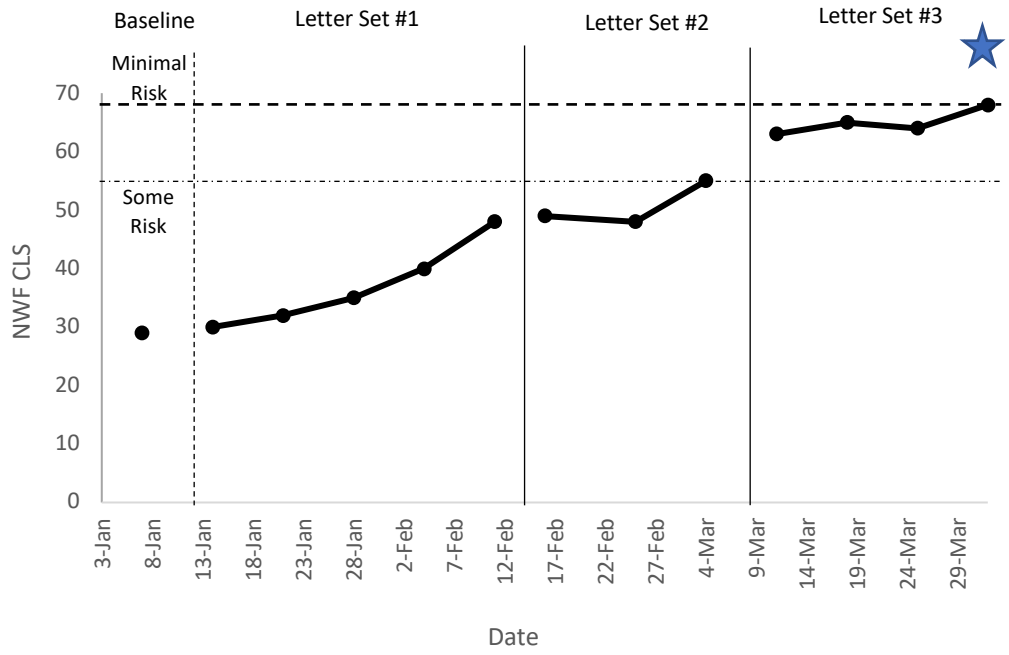
Joy's WRC Performance on Generalization NWF Probes through all the letter sets



Note. Star indicates the spring of 2nd grade minimal risk target.

Figure 4

Joy's CLS Performance on Generalization NWF Probes Through All Letter Sets



Note. Star indicates the spring of 2nd grade minimal risk target.

Figure 5

Paisley's Proximal Decodable Word Assessments Performance on WRC across Letter Sets

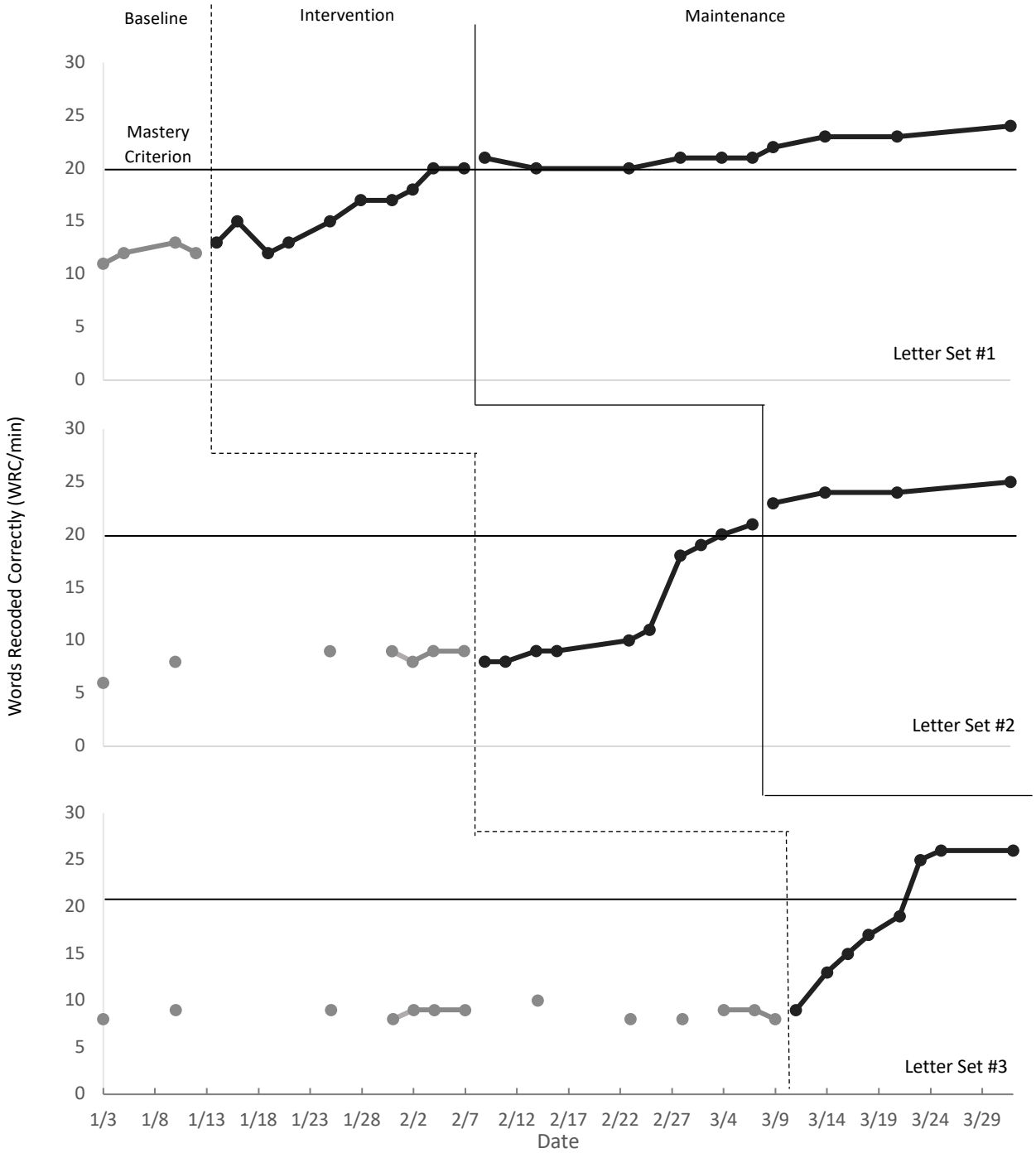


Figure 6

Paisley's Proximal Decodable Word Assessments Performance on CLS Across Letter Sets

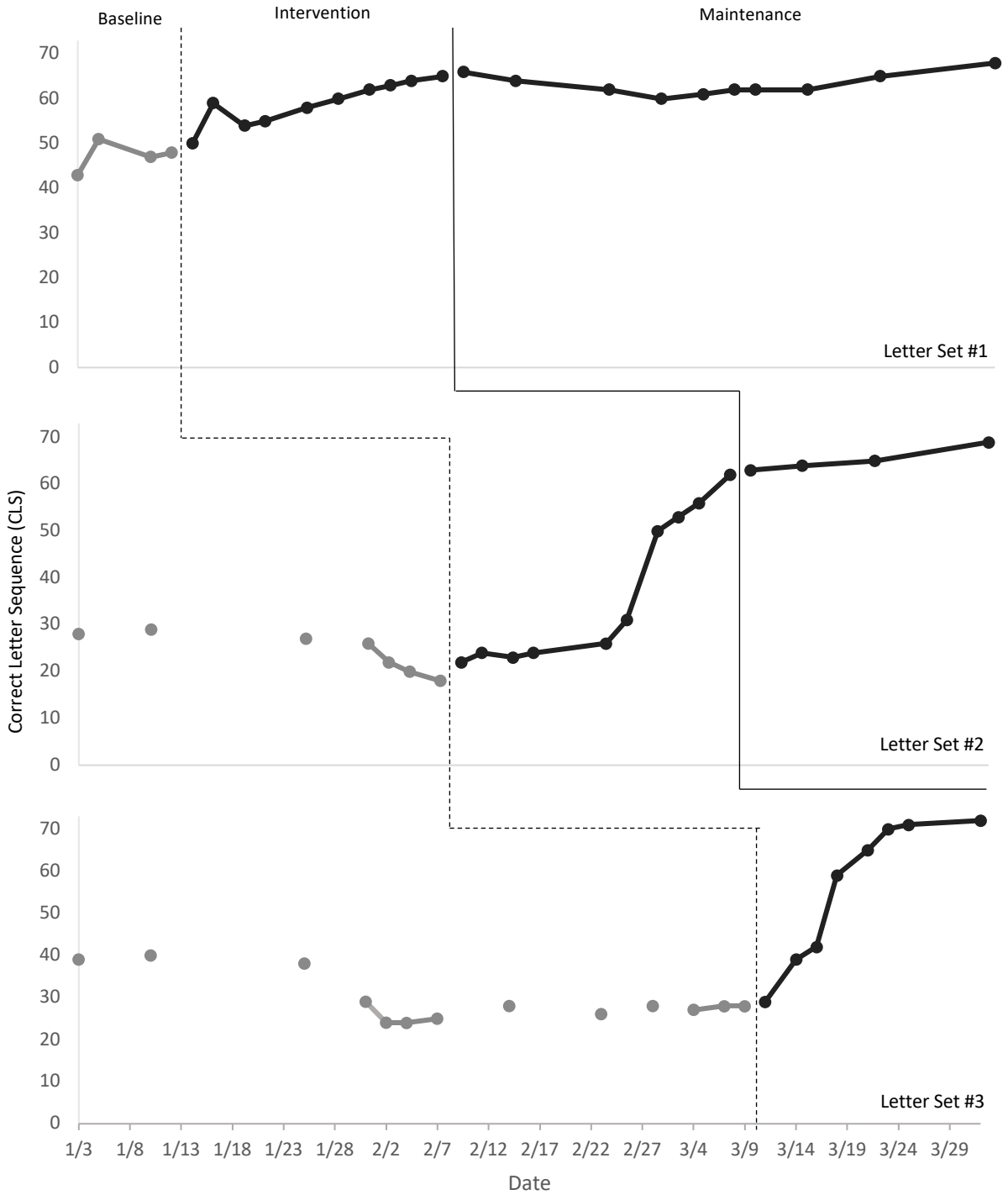


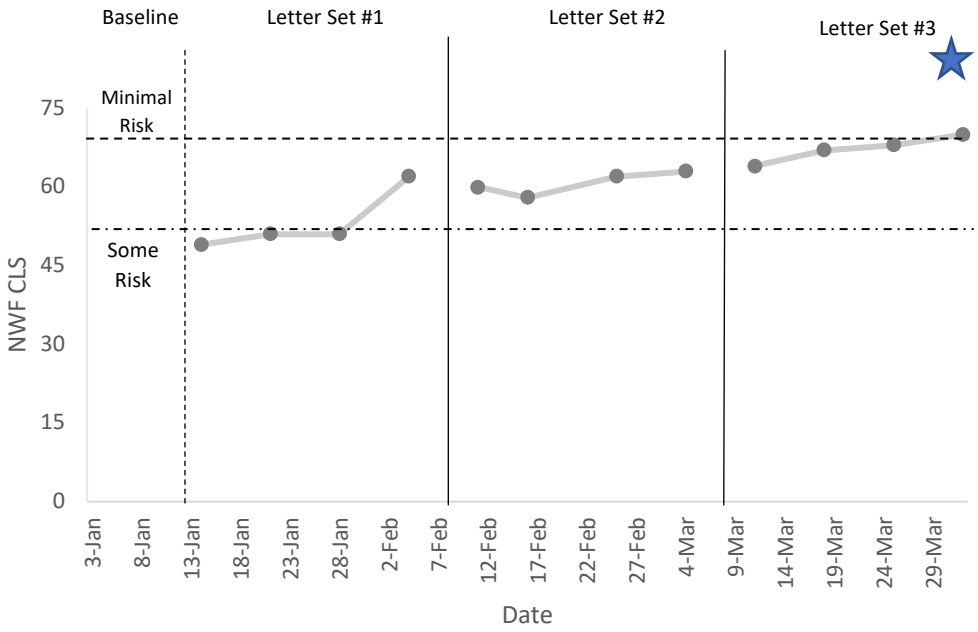
Figure 7

Paisley's WRC Performance on Generalization NWF Probes through all the letter sets

Note. Star indicates the spring of 2nd grade minimal risk target.

Figure 8

Paisley's CLS Performance on Generalization NWF Probes through all the letter sets



Note. Star indicates the spring of 2nd grade minimal risk target.

Figure 9

Logan's Proximal Decodable Word Assessments Performance on WRC across Letter Sets

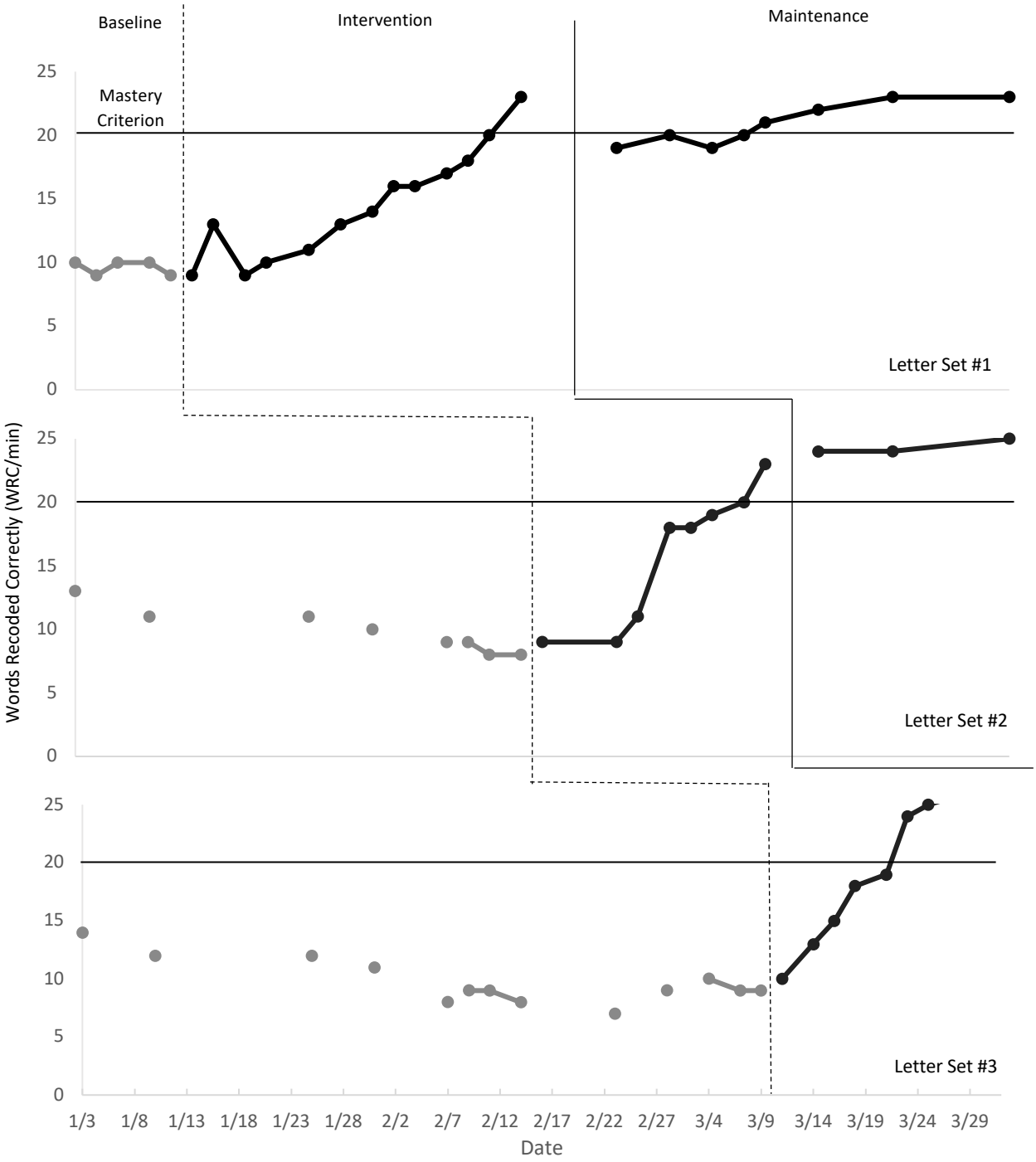


Figure 10

Logan's Proximal Decodable Word Assessments Performance on CLS Across Letter Sets

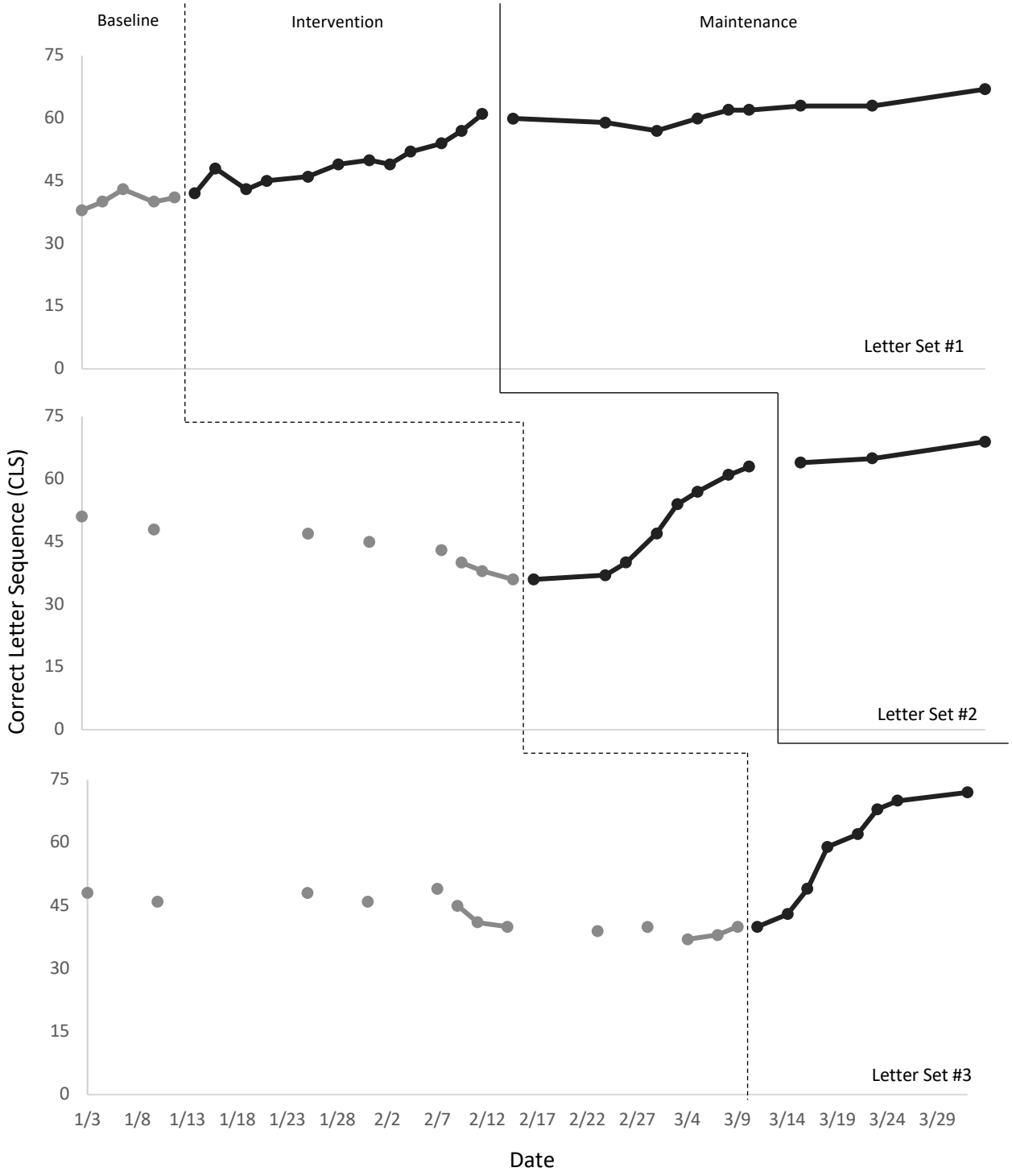
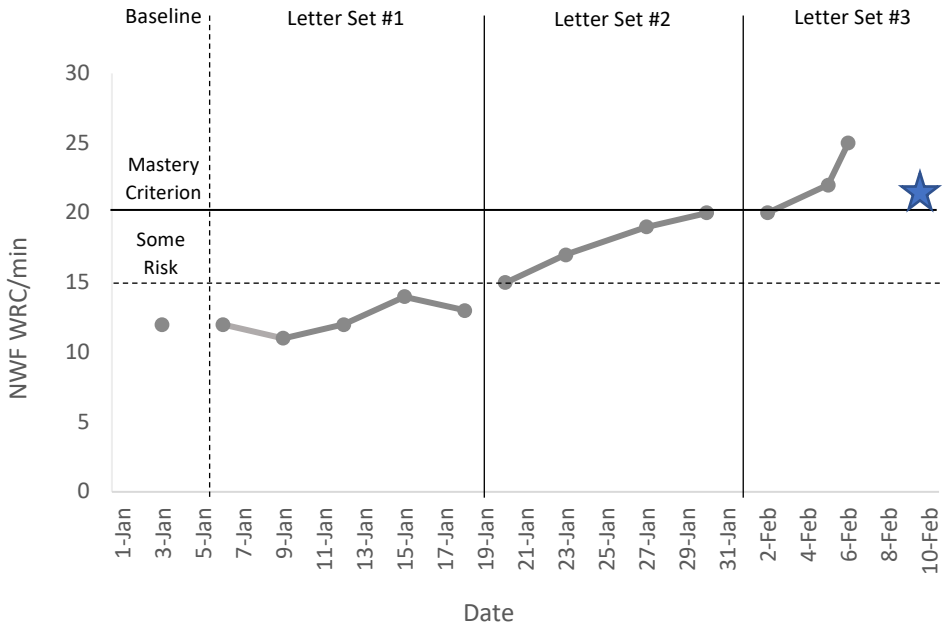


Figure 11

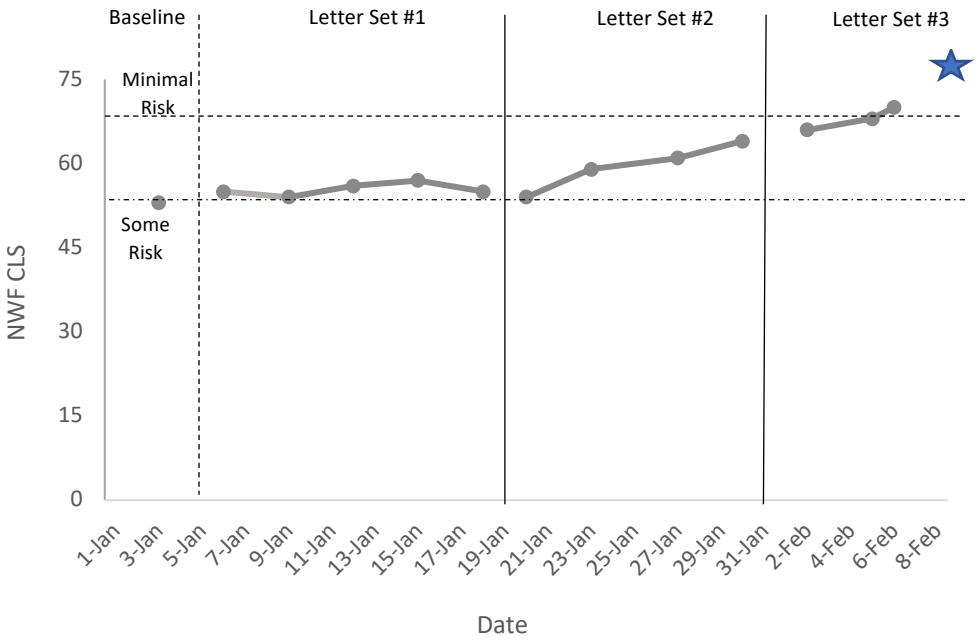
Logan's WRC Performance on Generalization NWF Probes through all the letter sets



Note. Star indicates the spring of 2nd grade minimal risk target.

Figure 12

Logan's CLS Performance on Generalization NWF Probes Through All Letter Sets



Note. Star indicates the spring of 2nd grade minimal risk target.

Figure 13

Ellie's Proximal Decodable Word Assessments Performance on WRC across Letter Sets

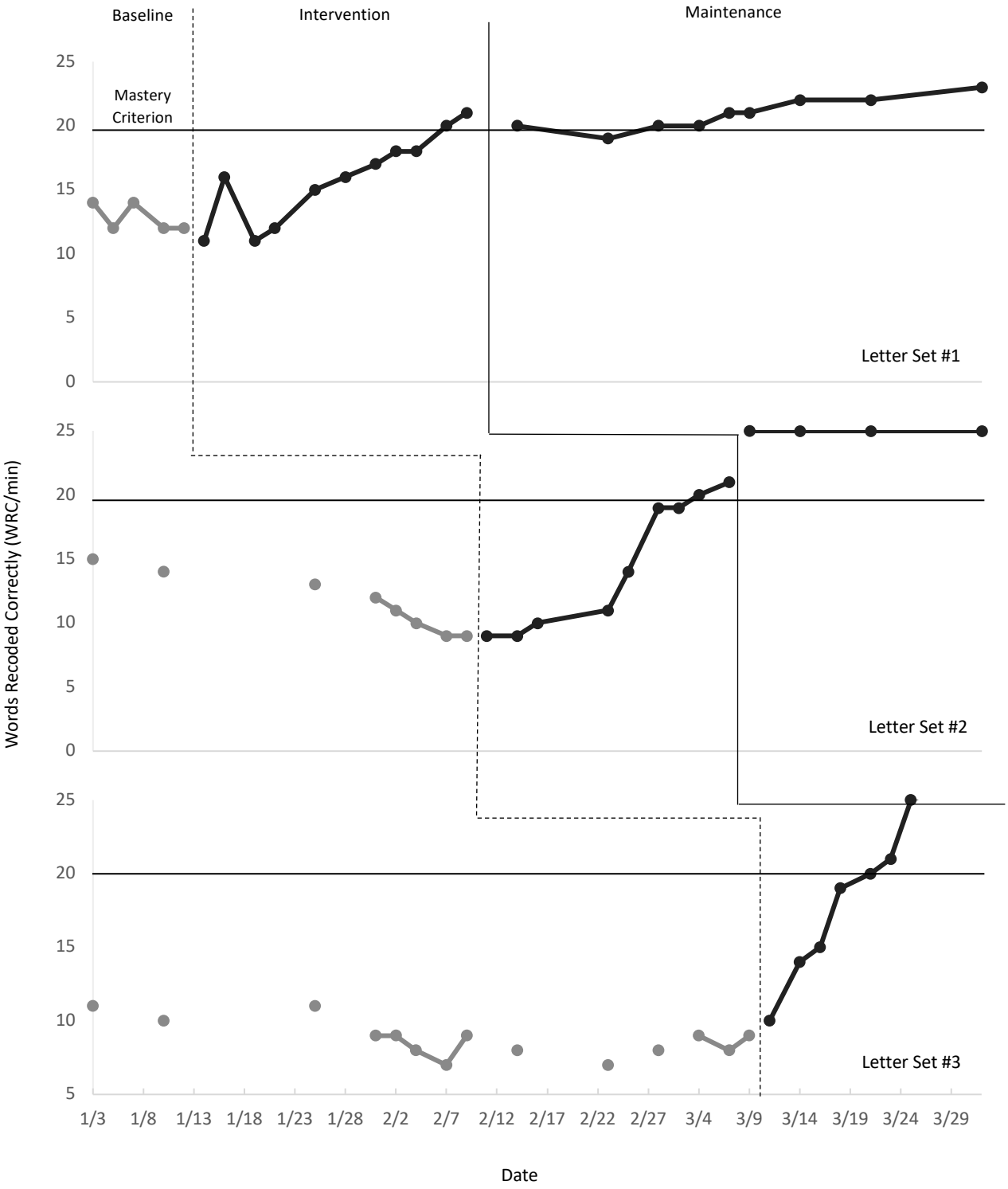


Figure 14

Ellie's Proximal Decodable Word Assessments Performance on CLS Across Letter Sets

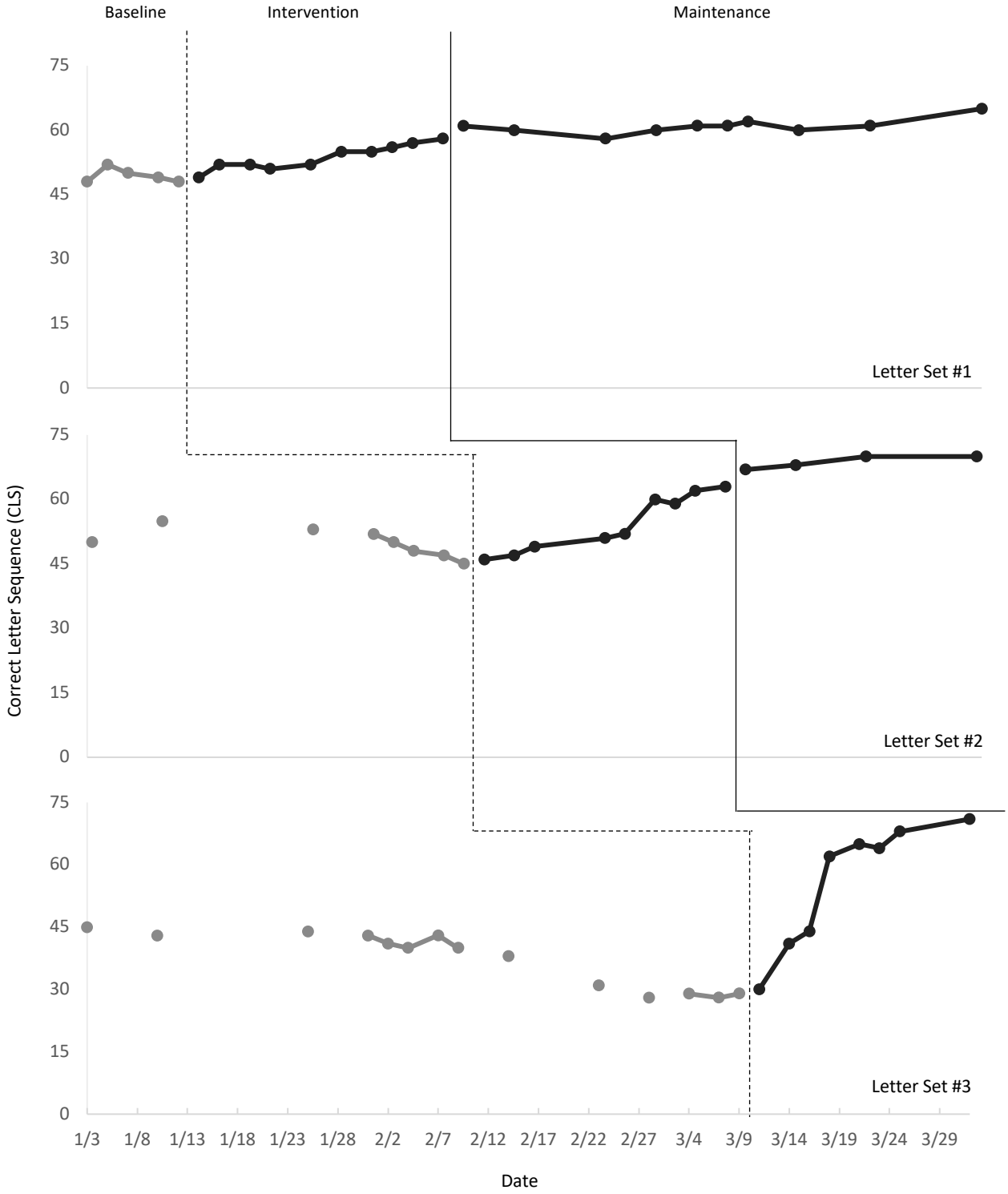
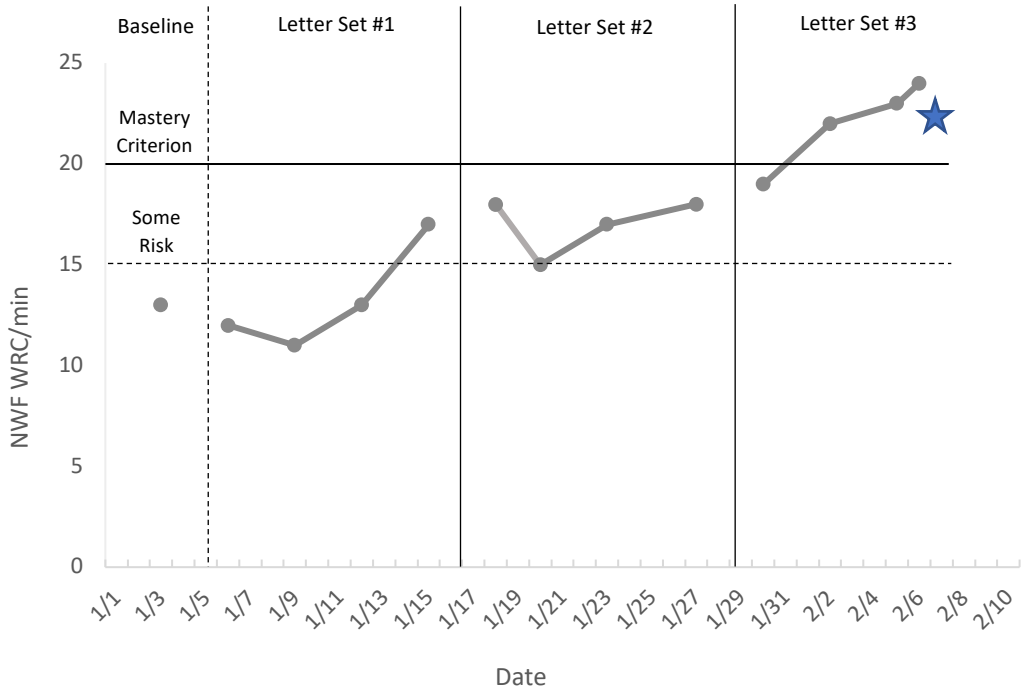


Figure 15

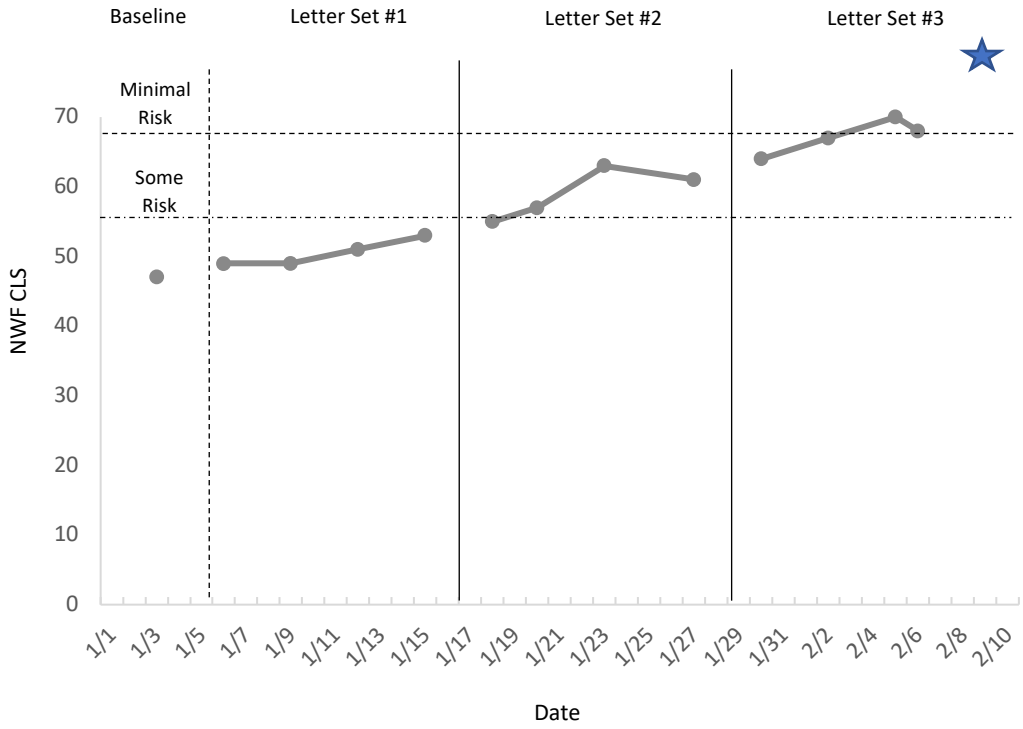
Ellie's WRC Performance on Generalization NWF Probes through all the letter sets



Note. Star indicates the spring of 2nd grade minimal risk target.

Figure 16

Ellie's CLS Performance on Generalization NWF Probes Through All Letter Sets



Note. Star indicates the spring of 2nd grade minimal risk target.

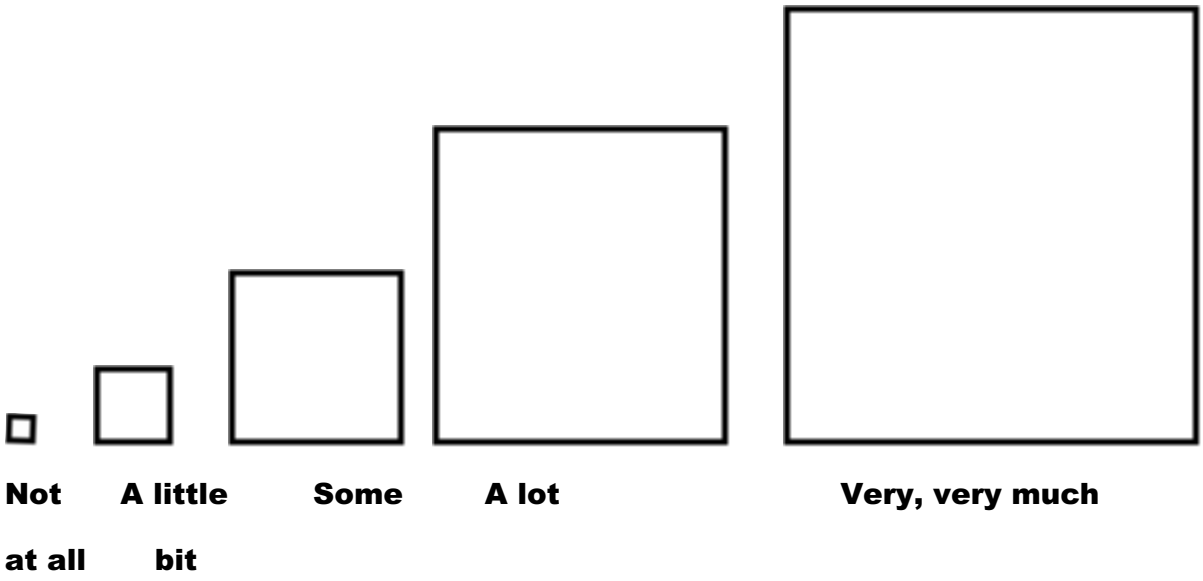
Appendix A

hak	las	sal	kay	hap
lah	sah	hay	laz	sap
yaz	yah	sak	pak	pas
haz	las	lah	kay	pah
kaz	laz	sah	yah	yas
lah	pas	las	hak	sap
aly	pah	lah	sah	laz
sah	yas	lak	sap	haz
sap	hak	las	sal	yaz
kay	laz	haz	hay	yak
hap	kaz	yah	kas	yas
zak	zap	kay	haz	kyl
yak	hay	yah	hap	ply
yap	kas	kal	laz	pah

Appendix B

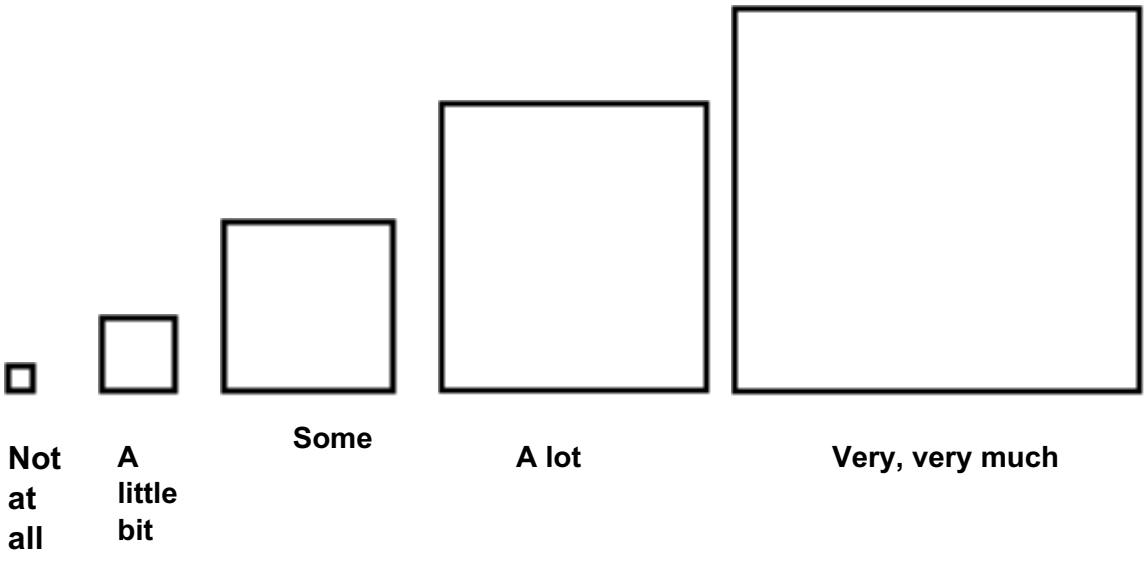
Question #1

How much do you like sounding out and reading words?



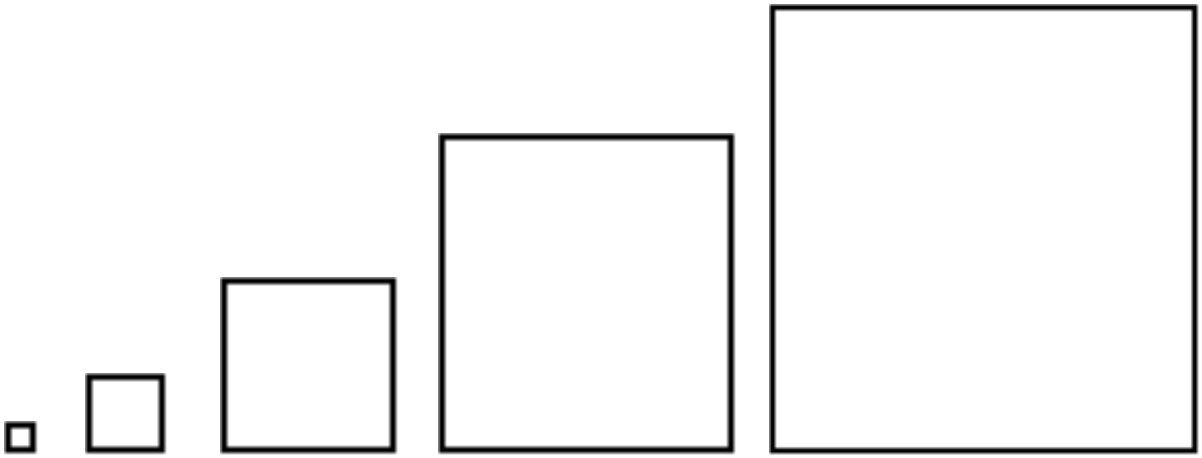
Question #2

How much do you like sounding out and reading words at home?



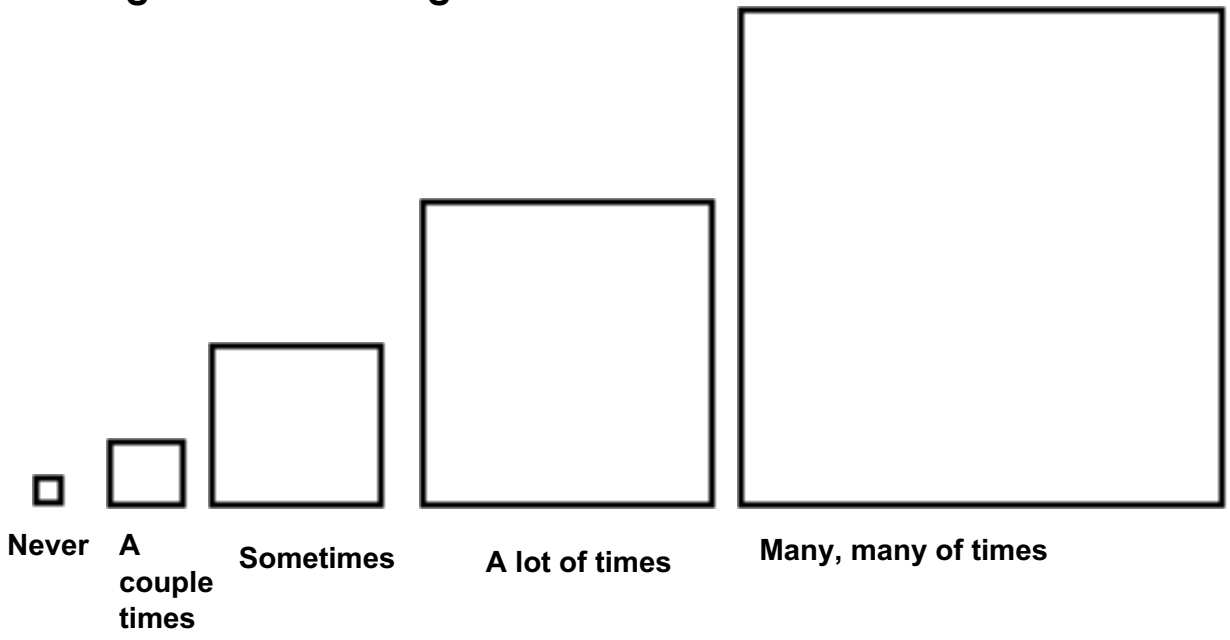
Question #3

Were there times when you did not want to sound out and read words at home?



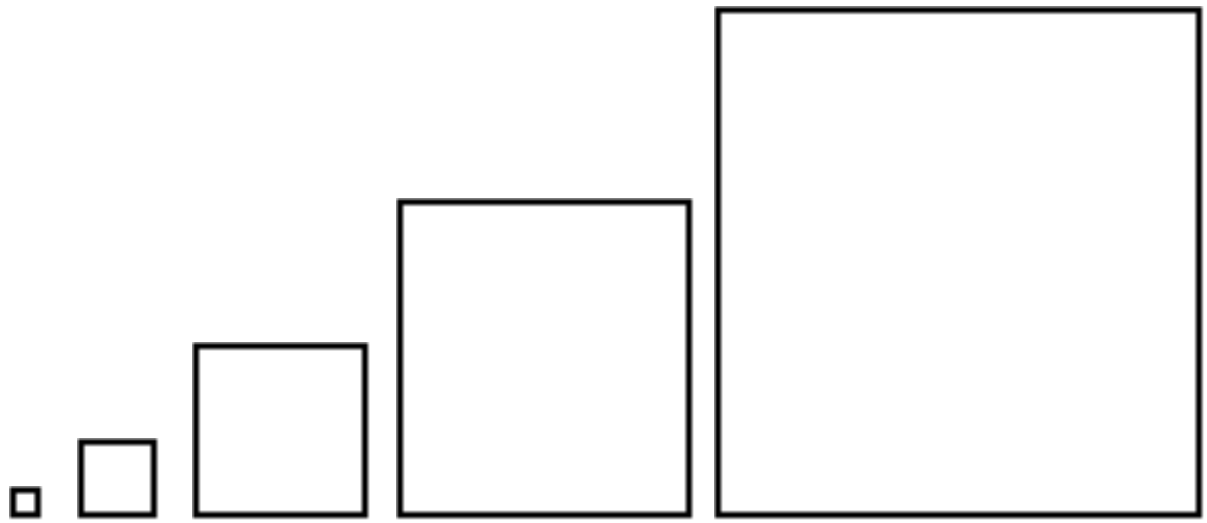
Question #4

Were there any times when you wished you could work more on sounding out and reading words at home?



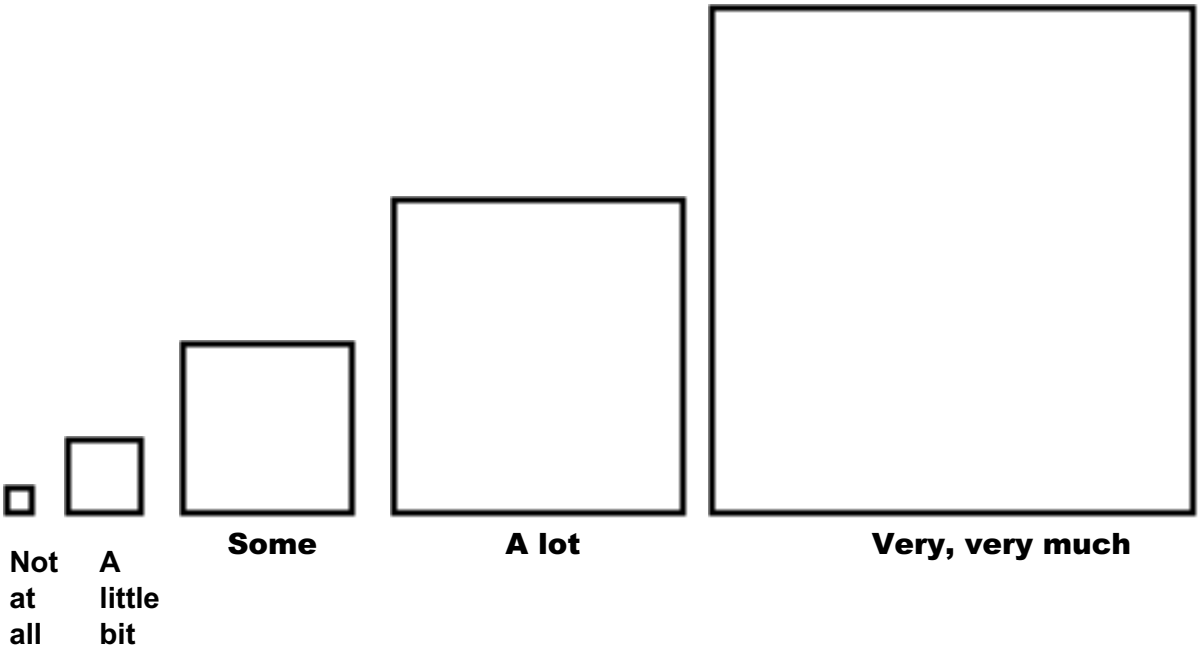
Question #5

How much do you like practicing sounding out and reading words at home?



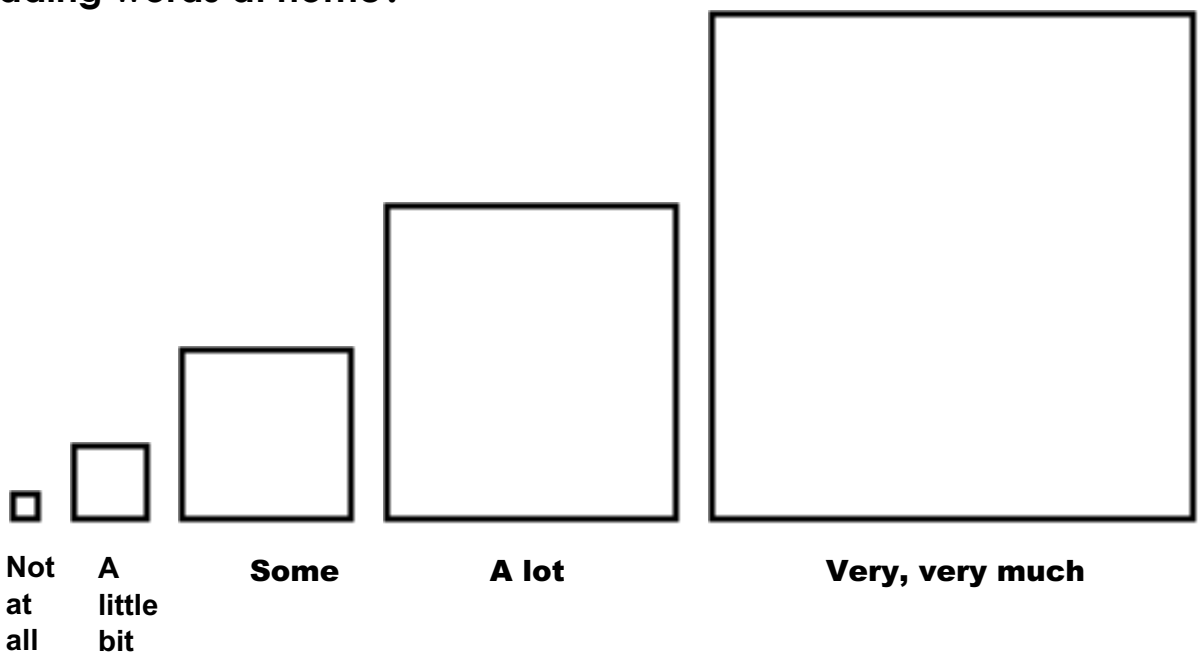
Question #6

How much do you think it helps you when you sound out and read words at home?



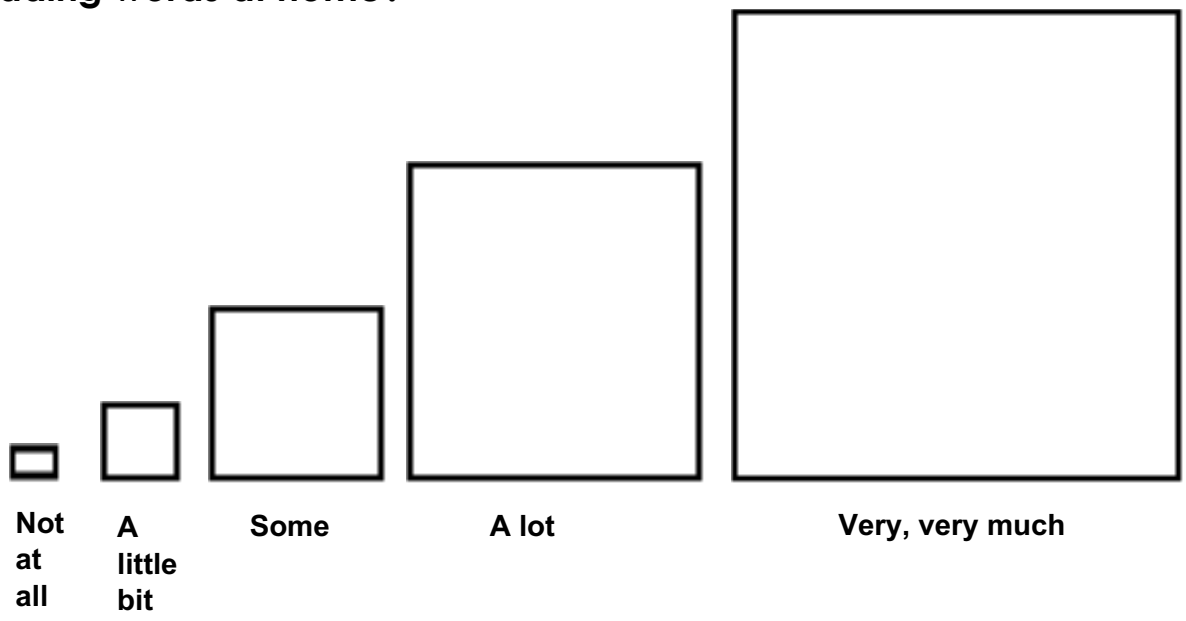
Question #7

Do you think your reading has improved from sounding out and reading words at home?



Question #8

Do you think your reading has gotten worse from sounding out and reading words at home?



Appendix C

Intervention Rating Profile

The purpose of this questionnaire is to obtain information about the intervention that you had given with your child. Please check the box that best describes your agreement or disagreement with each statement.

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
1. I felt positively about implementing this intervention with my child at home.						
2. I would suggest the use of this intervention to other parents.						
3. This intervention was a good way to teach my child letter sounds at home.						
4. The intervention steps were manageable.						
5. This intervention was an effective choice for teaching my child letter sounds at home.						
6. I would be willing to use this intervention in the future.						
7. The intervention session length was reasonable.						
8. I like the procedures used in this intervention.						
9. Training for this intervention was reasonable.						
10. Overall, this intervention was beneficial for my child.						

Thank you!

Appendix D

INTERVENTION PROTOCOL

1. Review of letter sounds
   a. Take out index card with the first letter set
   b. Point to index card and say “We are going to practice out letter sounds. Point to each letter and say the sound.”
   c. Have your child point to each letter and articulate the sound – prompt them if needed
   d. Provide standard error correction if needed
      i. If response was correct, respond with, “Good, ____ makes the /__/ sound.”
      ii. If response was incorrect or your child was not able to provide the letter sound, respond with “This letter makes the /__/ sound. What sound?”

2. After your child provides the correct sound, say “Good, __ makes the /__/ sound.”

3. Modeling of Cubes

   e. Take out 3 cubes
      iii. Point to the cubes and say “I’m going to make a word. I will roll the cubes, then I will put the vowel in the middle, the vowel is the one that is red. Then, I will put the other cubes on either side. I will then sound out each letter then say the whole word.”
      iv. Roll the cubes, place the vowel in the middle, sound out each letter on the cube out loud then blend the whole word together out loud
   f. Child’s turn
      v. Say “Now it’s your turn. Roll the cubes and put the vowel in the middle. Once you put the cubes together, say the sound of each letter then say the whole word.”
      vi. Have your child roll the cubes and allow them to place the vowel in the middle. Have them sound out each letter and then have them say the whole word.
      vii. Complete this step once – but model again if needed

4. Creating and reading words

g. Instruct your child to roll the cubes again, have them place the vowel in the middle and say “Now sound out the word that you made.”
h. Have your child sound out each letter, they do not need to say the whole word
i. Take out the white board and dry erase marker **OR** blank piece of paper and pencil/pen
j. Write the word that your child had made and successfully sounded out on the white board or piece of paper
k. Have your child roll the cubes again and complete each step thereafter until there are 8-10 words listed
l. Provide standard error correction given if needed
viii. If your child makes an error, say “I hear the /_/, /_/, and /_/ sounds in the word __. The word is __. Now you say the sounds and repeat the word.”

5. Reading the words list
m. Put the cubes to the side, place the word list that was created in front of your child
n. Say “Point to each word and say the whole word out loud”
o. Have your child point to each word and say the <u>whole word</u> out loud. If they sound out each word, remind them to say the whole word out loud by say “Good job saying the sounds, but remember to only read the whole word.”
p. Have your child go through the whole list once. If your child makes multiple errors or is not fluent within this step, repeat reading the words list again
q. Provide standard error correction if needed
ix. If your child makes an error, point to the word say “I hear the /_/, /_/, and /_/ sounds in the word __. The whole word is __. Can you say the sounds and repeat the whole word?”

6. Identifying real or nonsense words
r. After your child has read through each word on the list, start at the top of the list again and point to the first word and say “Point to each word and tell me if it’s a real word or not a real word”
s. Have your child read each word and state if it is a real word or a nonsense word.
t. After each word that your child identifies, confirm if it is a real word by saying “Yes, that is a real word” or “Yes, that is not a real word”
x. If your child identifies the word incorrectly as being a nonsense word, say “that is a real word because I hear the sounds /_/, /_/, and /_/. Say the word and say if it’s a real or not real word.”
xi. If your child identifies the word incorrectly as being a real word, say “that is not a real word. Can you say the word again and say if it’s a real or not real word?”
u. Provide standard error correction if needed
xii. If your child makes an error, point to the word say “I hear the /_/, /_/, and /_/ sounds in the word __. The whole word is __. Please say the sounds and repeat the word.”

Complete steps from “Creating and Reading Words” until “Identifying Real or Nonsense Words” until the either 10 minutes minimum or 15 minute maximum is reached

Appendix E

INTERVENTION CHECKLIST

1. Review of letter sounds

- ❑ Take out index card with the first letter set
- ❑ Point to index card and say “We are going to practice out letter sounds. Point to each letter and say the sound.”
- ❑ Child points and says each letter sound
- ❑ Provide error correction if/when needed
- ❑ Correct items were used

2. Modeling of Cubes

- ❑ Take out 3 cubes
- ❑ Point to the cubes and say “I’m going to make a word. I will roll the cubes, then I will put the vowel in the middle, the vowel is the one that is red. Then I will put the other cubes on either side. I will then sound out each letter then say the whole word.”
- ❑ Model: Roll the cubes one time, build the word, sound it out, then say the whole word
- ❑ Give cubes to the child and say “Now it’s your turn. Roll the cubes and put the vowel in the middle. Once you put the cubes together, say the sound of each letter then say the whole word.”
- ❑ Child completes steps with cubes
- ❑ Correct items were used

3. Creating and reading words

- ❑ Instruct your child roll the cubes again, have them place the vowel in the middle and say “Now sound out the word that you made.”
- ❑ Prompt your child if needed
- ❑ Take out white board and dry erase marker OR blank piece of paper and pencil/pen
- ❑ Write the word that your child made and successfully sounded out on the white board or piece of paper
- ❑ Repeat step 3 procedures until there are 8-10 words listed

- ❑ Provide error correction when needed
- ❑ Correct items were used

4. Reading the words list

- ❑ Put the cubes to the side, place the word list that was created in front of your child
- ❑ Say “Point to each word and say the whole word out loud”
- ❑ Prompt your child point to each word and say the whole word out loud
- ❑ If they sound out a word, remind them to say the whole word out loud
- ❑ Provide error correction if needed.
- ❑ If your child shows difficulty reading the words, you may repeat the procedures under step 4
- ❑ Correct items were used

5. Identifying real or nonsense words

- ❑ Start at the top of the list again and point to the first word and say “point to each word and tell me if it’s a real word or not a real word”
- ❑ Provide error correction when needed if the child reads a word incorrectly
- ❑ After each word that your child identifies, confirm if it is a real word by saying “Yes, that is a real word” or “Yes, that is not a real word”
- ❑ Provide error correction if child identifies the word incorrectly if needed
- ❑ Correct items were used

- ❑ Document session length and date in log

Appendix F

January 2022

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
2	3	4	5	6	7 Send materials back to school!
9	10	11	12	13	14 Send materials back to school!
16	17	18	19	20	21 Send materials back to school!
23	24	25	26	27	28 Send materials back to school!
30	31				

Week of: January 10th					Please mark the session length on the days that you completed the activity	
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
9	10	11	12	13	14	15

Appendix G

Nonsense Word Fluency Fidelity Checklist

Pass	Needs practice	
☐	☐	1. Holds clipboard and timer so student cannot see what is recorded.
☐	☐	2. Places student copy in front of the student.
☐	☐	3. Performs standardized directions verbatim, including the correction procedure when appropriate.
☐	☐	4. Starts timer after saying ***"Begin"***.
☐	☐	5. Follows along and marks the scoring book as the student responds.
☐	☐	6. Administers acceptable prompts correctly, if appropriate.
☐	☐	7. Applies scoring rules consistently and correctly.
☐	☐	8. Applies the discontinue rule correctly, if appropriate.
☐	☐	9. At the end of 60 seconds, puts a bracket (]) after the last sound provided and says ***"Stop"***.
☐	☐	10. Accurately determines and records the correct letter sounds produced and words read correctly within 60 seconds. Score is within 2 points of the expert examiner.