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THE EFFECTS OF COMPUTER ASSISTED INSTRUCTION
ON EARLY LITERACY SKILLS OF YOUNG CHILDREN
WHO ARE HISPANIC/LATINO

BY

JOSEPH J. ARMENDAREZ

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT
OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN PSYCHOLOGY

UNIVERSITY OF RHODE ISLAND

2019

DOCTOR OF PHILOSOPHY DISSERTATION

OF

JOSEPH J. ARMENDAREZ

APPROVED:

Dissertation Committee:

Major Professor Gary Stoner

Paul Bueno de Mesquita

Theresa Deeney

Nasser H. Zawia

DEAN OF THE GRADUATE SCHOOL

UNIVERSITY OF RHODE ISLAND

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ABSTRACT

Many student academic challenges are due to difficulties developing reading skills; therefore prevention efforts are relevant for school psychologist and educators. One promising avenue for addressing reading acquisition problems, via effective reading instruction, is Computer Assisted Instruction (CAI). There is, however, still a need for more research addressing costs and benefits for populations such as Hispanic/Latino and/or English Language Learners (H/L-ELL). The primary aim of this research was to determine the extent to which the CAI reading intervention, Headsprout Early Reading (HER), produces meaningful improvements in reading acquisition and performance among students who are low performing readers and identified as H/L-ELL. A secondary aim was to understand socio-cultural factors for Hispanic and Latino students using a CAI. This study utilized a non-concurrent multiple baseline design across participants. Participants consisted of 6 kindergarten and 8 first grade students. Seven parents returned a series of brief questionnaires that assessed demographic information, parent reading beliefs, and bilingual dominance. The HER program's effectiveness for each individual was scored across five criteria and then classified as either one of the following descriptors: No Effects, Mild Effects, Moderate Effects, and Strong Effects. The results demonstrated stronger evidence for the HER program when students decoded real words followed by decoding nonsense words. For example, on the Phoneme Segmentation Fluency measure, there were strong effects found for 50% of kindergarten students, and strong effects found across 75% of first-grade students. Across the Nonsense Word Fluency measure, there were one out of six kindergarten students (i.e., 16%) who showed strong effects, whereas across first-grade students there were four out of eight students

(i.e., 50%) who showed strong effects. Overall results suggested that the HER intervention appeared more effective for first-grade students rather than for kindergarten students. In addition, descriptive socio-cultural demographic information highlighted the need to explore these factors in future practice and research when examining CAI use with H/L-ELL students. Given the importance and relevance of reading to children's development, it is imperative to understand the benefits of promising and cost-effective, computer-based reading interventions among H/L-ELL children in the US.

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PREFACE

This dissertation was prepared in manuscript format with the intention of submission to the following journal: *Journal of Applied School Psychology*.

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PUBLICATION STATUS

Title: The Effects of Computer Assisted Instruction on Early Literacy Skills of Young Children who are Hispanic/Latino

Potential Journal for Submission: Journal of Applied School Psychology

Authors: Joseph J. Armendarez, M.A. & Gary Stoner, Ph.D.¹

¹University of Rhode Island, Psychology Department, Chafee Hall, 142 Flagg Road, Kingston, RI 02881

Corresponding Author:

Joseph J. Armendarez, M.A.; University of Rhode Island, Psychology Department, Chafee Hall, 142 Flagg Road, Kingston, RI 02881

Introduction and Statement of the Problem

Reading proficiency of fourth-grade students in the United States is dangerously low. In 2015, the National Assessment of Educational Progress (NAEP) reported only 36% of fourth-grade students were reading at or above proficiency level. For numerous students who do not meet proficiency levels problematic outcomes can often occur, such as: (a) grade retention (Jimerson & Ferguson, 2007; Willson & Hughes, 2006), (b) low rates of high school completion (DePaoli et al., 2015; Reschly, 2010), and (c) learning difficulties in mathematics and spelling (Slot, van Viersen, De Bree, & Kroesbergen, 2016).

Although low reading proficiency is a problem for many students, this problem disproportionately affects Hispanic/Latino and/or English Language Learners (H/L-ELL; Reardon & Galindo, 2009; Sonnenschein & Sun, 2017). According to NAEP, the fourth-grade national reading performance was “at or above proficiency” for 46% of Caucasian students, compared to only 21% of Hispanic/Latino students and 8% of English Language Learners. To improve in reading, students need additional support. One promising avenue to address early reading problems is Computer Assisted Instruction (CAI). Given there is research evidence to suggest that CAIs demonstrate effectiveness for the general student population, CAI technology may hold promise in increasing the requisite emergent literacy skills among the largest growing US ethnic minority group, H/L-ELL students (Barac & Bialystok, 2012; Cheung & Slavin, 2012; US Census Bureau, 2014).

Research on reading interventions for H/L-ELL students is also relevant for school psychologists because the Hispanic/Latino population in the U.S. has nearly

doubled since 2000 (Flores, 2017). During the 2013-2014 academic school year, Hispanic/Latino students represented 25% of total enrollment, and 7.7% were considered English Language Learners (US Department of Education, 2015). When entering into school, many young Hispanic/Latino children lag behind their non-Hispanic/Latino peers on recognizing letters, counting numbers, and reading sight words aloud in books (Alvarez, Michaels, Hurtado, Roldan, & Duran-Graybow, 2016; Gandara & Orfield, 2012). Other significant educational concerns are that H/L-ELL students often experience reading delays or difficulties in later elementary grades (D'Angiulli, Siegel, & Maggi, 2004; Swanson, Orosco, & Lussier, 2012). Several studies examining the academic readiness gap between Hispanic/Latino children and their Caucasian counterparts have found a large portion of the variance (i.e., 25-50%) was accounted for by race/ethnicity variables (Sonnenschein et al., 2012; Sonnenschein & Sun, 2017).

With such a large portion of this population reading below proficiency, it is important to explore using innovative interventions. Understanding the effectiveness of CAIs on emerging readers will provide insight into a tool that could be useful for H/L-ELL students. While CAI has been found to be effective in improving reading with non-H/L-ELL students, studying its use with H/L-ELL students may elucidate socio-cultural factors that influence an H/L-ELL student's response to a CAI so that more responsive interventions can be developed. To understand how CAIs might influence reading, the foundations of oral language and emergent literacy for H/L-ELL populations will be presented first. For a review on monolingual oral language and emergent literacy development, see Appendix B. Next, the critical sociocultural considerations for H/L-ELL populations, followed by a presentation of the research on CAIs for emergent

reading development among monolingual and H/L-ELL students will be presented. This will demonstrate the need for the present study, which will examine the effects of a CAI on reading for H/L-ELL students.

Oral Language and Emergent Literacy Development in H/L-ELL Populations

Research in this area supports the theory that monolingual infants develop oral language at the same rate as bilingual infants (Pearson, Fernández, & Oller, 1993), but in school-age children there are differences that can affect oral language and emergent literacy. The dominant home language between a parent and child, for example, has been found to be a correlate of oral language proficiency (Durgunoglu & Goldenberg, 2011). Such that, when bilingual (English/Spanish) children hear more English in the home, then there is often less growth in Spanish oral language. Bialystok (2008) found that the average vocabulary was significantly lower for ELLs in both languages than for monolinguals. However, other research in this area has found that ELLs demonstrate less vocabulary only within one language but this quantity hinges upon the exposure and frequency of use across environments as children develop (Poulin-Dubois, Bialystok, Blaye, Polonia, & Yott, 2013).

In addition to oral language growth, Tabors and Patton (2014) described a developmental sequence that ELL children face when entering into an environment that does not use their dominant language. First, ELL students try to use the first language (L1) but may find that this is not meeting their communicative needs. An ELL student may go through a period of silence while they are receptively observing interactions in the second language (L2). Lastly, ELL children may attempt to use the non-dominant L2 but may present with vocabulary, grammar, and syntax errors. Similarly, emergent

literacy research has found there is interference of L1 when learning to read in L2, possibly due to differences in grammar (Anderson, 1999). With effective instruction, however, language interference is often found to dissipate at later elementary grades (Bialystok, 2002; Bialystok, McBride-Chang, & Luk, 2005; Polanco & Baker, 2018).

There is evidence of both cross-language and within-language effects on oral language and emergent literacy skills. Gottardo and Mueller (2009) found that for 79 ELL Spanish children assessed between first and second grades, English vocabulary and word-decoding skills predicted second grade English reading comprehension. Similarly, Manis, Lindsey, and Bailey (2004) conducted a longitudinal study of 251 Spanish-speaking ELL participants and found that the transfer of expressive language skills was stronger within language rather than between the Spanish and English languages (Manis et al.). Specifically, expressive Spanish language skills measured in kindergarten contributed the most unique variance for predicting second grade Spanish reading comprehension, whereas English phonological awareness measured in kindergarten contributed the most unique variance for English reading comprehension in second grade (Manis et al.).

Regarding cross-language effects, Miller et al. (2006) longitudinally measured a sample of 1,531 ELL kindergarteners to third grade students and found that early English skills predicted literacy in Spanish, as well as, early Spanish language skills predicted English emergent literacy skills. Moreover, Pollard-Durodola and colleagues (2016) completed an intervention study on 138 ELL students primarily from low SES families. They found that Spanish oral language competency was a predictor of English oral language skills. Similarly, another study examining 130 pre-school Spanish-speaking

ELLs found that Spanish vocabulary predicted growth in PA skills across both English and Spanish languages (Anthony et al., 2009). And, in third- and fourth-grades, Chamot and El-Dinary (1999) found that Hispanic ELL students' semantic Spanish and English knowledge facilitated their abilities to answer study items correctly. The evidence for within and cross-language effects is strong for the connection to emergent literacy skills.

The quality of oral language development is also important for academic outcomes. For instance, Oades-Sese, Esquivel, Kaliski, and Maniatis (2011) analyzed academic achievement and oral language skills among economically disadvantaged ELL preschool students and found the following levels of bilingualism and oral language proficiency: (1) Spanish-dominant speaker (i.e., High Spanish proficiency but low English proficiency); (2) English-dominant speaker (i.e., High English proficiency but low Spanish proficiency); (3) Balanced-bilingual (i.e., Proficient in both English and Spanish); (4) Mixed-bilingual (i.e., Limited proficiency in both English and Spanish); and (5) Low-bilingual (i.e., Minimal proficiency in two languages). Upon assessing these profiles, Oades-Sese et al. then predicted academic growth two years later and found that low-income ELL students who were identified in preschool as Spanish-dominant speakers, compared to children labeled as Low-bilingual speakers, had significant academic gains two years later. Oades-Sese et al. also found that students who did not attain oral language proficiency in either Spanish or English preschool exhibited lower academic functioning two years later. These findings reflect the complexity and diversity of language development for ELL children.

The overall evidence on reading suggests that individuals who have well-established oral language foundations, irrespective of the language type, are more likely

to improve in language skills than those who do not (August, Shanahan, & Escamilla, 2009; Bialystok, 2008; Farver, Xu, Lonigan, & Eppe, 2013; Oades-Sese & Li, 2011). Emergent literacy skills and oral language abilities are critical areas for ELL students (Gonzalez et al., 2016; Manis, Lindsey, & Bailey, 2004) and underscore the importance of providing language-rich environments across home and school as well as utilizing high-quality academic supports (Hart & Risley, 1995; Soifer, 1999).

In summary, the relationship between skill learning in one language and the other language is complex, and teaching H/L-ELL students cannot necessarily be treated the same as teaching a monolingual English student (Branum-Martin, Tao, Garnaat, Bunta, & Francis, 2012). And, while there is often a steady progression of oral language in a first language, the acquisition of a second language can alter oral language and emergent literacy development in school-age children (August et al., 2009; Durgunoglu & Goldenberg, 2011; Tabors & Patton, 2014). Consequently, ELL students may be slower than monolingual peers at acquiring emergent literacy skills (Archer & Hughes, 2011). However, understanding oral language and emergent literacy development can assist educators and caregivers in knowing if an intervention for H/L-ELL students is needed (Bialystok et al., 2005).

Socio-cultural considerations. Previous research that attempts to explain early reading concerns for H/L-ELL highlight several associated factors, such as: (a) culture (Balee, 2016; Boyer, 2012; Knight & Wiseman, 2006; Kroeber & Kluckhohn, 1952); (b) literacy experiences (D'Angiulli et al., 2004; Farver et al., 2013; Swanson et al., 2012); (c) socio-economics status of parents (Arzubiaga, Rueda, & Monzó, 2002); and parent interest/child motivation in literacy-related activities (Arnold, Zeljo, Doctoroff, & Ortiz,

2008; Farver et al., 2013; Sonnenschein & Munsterman, 2002).

Culture is defined as the set of underlying principles that guide social interactions between individuals or groups of people and are based upon patterns of inherently agreed upon behaviors. These principles shape social and environmental factors that promote literacy development (Balee, 2016; Boyer, 2012; Kroeber & Kluckhohn, 1952). When a culture reflects a language differing from a dominant population this may serve as a barrier to acquisition of emergent literacy skills (Balee). For instance, young H/L-ELL children have less experiences with or knowledge of a dominant culture within a school (Hoff, 2013; Hus, 2001; Reese & Goldenberg, 2006). Furthermore, a lack of parent English proficiency coincides with a lack of in-home academic support in English (Arias & Morillo-Campbell, 2008). Among the parents of H/L-ELL students, those who are more acculturated might instill pre-academic skills at a faster rate than parents who are less acculturated (Farver et al., 2013).

The culture of family involvement in education may also pose challenges. Families who immigrated to the U.S. from another country may align more with literacy practices rooted in their country's educational practices (Camarota, 2016; Loera, Rueda, & Nakamoto, 2011; Ogbu, 1990), or feel a level of frustration due to not knowing the best way to help their child with the dominant culture's literacy practices. Hispanic/Latino parents may feel less comfortable participating in their children's education, due to not knowing the dominant language or not wanting to question the teacher's authority (Loera et al., 2011; Wong & Hughes, 2006). Longitudinal evidence, however, suggests Hispanic/Latino parents do want their children to be successful in educational spheres but lack the necessary skillset on how to promote their child's

education (Ada & Zubizarreta, 2001).

In addition to culture and experience, socioeconomic status (SES) is a consistent predictor of oral language development and can indirectly affect emergent literacy skills (for a review see Appendix B). SES here is defined in terms of a parent's education level, type of occupation, and income (Arnold & Doctoroff, 2003; McLoyd, 1998). Children from lower SES backgrounds experience less exposure to words and experiences than children who come from middle to high SES homes, which can have deleterious effects on reading comprehension skills in later grades (Hart & Risley, 1995). The occupational demands of many H/L parents often include more domestic work that requires longer hours and more laborious effort (Bureau of Labor Statistics, 2015). Parents with higher demands in domestic-related work "increases, children's reading motivation decreases" significantly (Arzubiaga et al., 2002, p. 238). Other early school and home factors that may contribute to differences in academic skills include experience in early childhood education. For instance, although Hispanic/Latino populations represent the largest US poverty group, only approximately half enter into early childhood education programs (Alvarez et al., 2016; Gandara & Orfield, 2012). High quality early childhood education has been shown to be an effective predictor of school readiness and show the greatest effects in children from lower SES backgrounds (Ramey & Ramey, 2004).

Although formal reading instruction primarily occurs at school with a child and teacher, the home environment is an important area to consider for reading instruction. Loera and colleagues (2011) found that H/L parents could indirectly affect their child's educational practices through their beliefs about family involvement in education. Their study focused on first- and second-generation low-income families from Mexico and

Central America. They asked children to complete reading motivation scales while parents completed a survey that addressed beliefs about their involvement in reading and schooling. Results showed that parent involvement was positively associated with a child's reading motivation on several subscales (i.e., Efficacy, Challenge, Involvement, and Social), suggesting that parents can be involved in children's education through their approaches to learning. H/L-parents who, for example, instill a strong work ethic to earn an education or value persistence can motivate a child to overcome cultural and language barriers (Loera et al.). Regardless of language, parents who are involved in reading practices are more likely to foster positive literacy outcomes (Arnold et al., 2008; Mendez, 2010), and Loera et al. highlight the effects H/L parent can have on learning approaches.

Considering the complexity of oral language and emergent literacy development among H/L-ELL students as well as socio-cultural factors, bilingual and non-bilingual teachers in the classroom need tools and supports to support early literacy. The use of Computer Assisted Instruction for Reading (CAI) as an effective education complement is worth examining given its promising use among monolingual students (Cassady, Smith, & Thomas, 2017; Cheung & Slavin, 2012).

Computer Assisted Instruction (CAI) for Reading

The ubiquity of computers and other media devices (e.g., tablets) in US classrooms and schools provides an opportunity for readers presenting with reading difficulties to utilize computerized programs to reinforce learning principles (Alvermann, 2013). The numerous studies on the effects of CAI show its effectiveness in supporting emergent literacy skills. A review conducted in 2002 analyzed research since 1990 and

found a small effect size ($d = .19$) across 75 studies on emergent literacy skills (Blok, Oostdam, Otter, & Overmaat, 2002). In a review 10 years later, Cheung and Slavin (2012) examined 84 studies ($N = 60,553$) that met standards of a high-quality methodology and found a small positive effect size ($d = .16$) on reading outcomes. To place the small effect size into context as compared to teacher-directed lessons, educational research suggests teacher-directed lessons fall between .20 and .40 effect size (Petty, 2009). With these effect sizes in mind, there is research support to use a CAI as an accompaniment, not as a substitute, to teacher-directed reading instruction.

There is also evidence from large-scale research that certain CAI programs contribute to greater gains in emergent literacy skills than similar activities delivered not through CAI (Macaruso, Hook, & McCabe, 2006; Macaruso & Rodman, 2011). Examining the CAI called Lexia, Macaruso and colleagues (2006; 2011) tested Lexia across ten 1st grade classrooms and six ELL kindergarten classrooms against a control group who engaged in similar non-CAI reading instruction. Results demonstrated that the treatment group significantly outperformed the control group on some emergent literacy skills (i.e., phonological awareness skills, phonics). When examining the readers who demonstrated the greatest phonological awareness deficits, effect sizes for group differences of emergent reading skills were classified as strong compared to the moderate effect sizes found among the study's entire sample (Macaruso & Rodman). These results demonstrate that a CAI was a beneficial complement for ELL students, particularly for the lowest-performing students.

In addition to Macaruso and Rodman's (2011) findings, significant improvement in emergent reading skills using the Imagine Learning CAI reading software was found

for a large sample ($n = 1490$) of ELL kindergarten and first grade students (Cassady et al., 2017). For kindergarteners, there was growth in vocabulary, and for first-graders, the CAI implementation increased phonological awareness, phonics, text comprehension, and vocabulary, when compared to the control groups (Cassady et al.). Compared to previous research, this study was of a larger scale and highlighted that CAIs can benefit ELL students in the classroom when regularly implemented by the teacher. Furthermore, the National Reading Panel has discussed the importance of including foundational skills in technology-based reading interventions as a supplement to traditional training in reading instruction (2000). The promise of CAI for H/L-ELL students' emergent literacy scaffolding is therefore strongly supported.

Headsprout Early Reading research. A CAI specifically developed to mirror principles of early reading instruction is the *Headsprout Early Reading* (HER) program (Layng, Twyman, & Stikeleather, 2003; Layng et al., 2002). The HER program systematically and explicitly teaches the reading skills phonemic awareness, phonics, fluency, vocabulary, and comprehension through a total of 80 episodes. The first 40 episodes focus on decoding and segmenting, while the last 40 episodes focus on vocabulary, reading fluency, and comprehension. The HER program also adapts to students' performance and allows students to work at their own pace while providing immediate feedback for answers (Layng et al., 2003; Layng, Twyman, & Stikeleather, 2004b, 2004a). The HER program is designed to incorporate the hallmark features of high-quality instruction, such as: (a) providing multiple response opportunities, (b) reduction in errors, (c) progress displayed visually, (d) direct engagement, (e) and developmentally appropriate practices for learning (National Association for the

Education of Young Children, Washington, 2009; Walberg & Twyman, 2013). As such, there is a growing body of research examining the effects of this well-designed CAI.

The Department of Education's Institute of Educational Sciences' What Works Clearinghouse (WWC), the national organization charged with reviewing and evaluating current education intervention tools, reviewed Headsprout and stated that it produces "possibly efficacious" effects on oral language and print knowledge (US Department of Education, 2009). Studies show its effectiveness across populations. In a randomized pre-post experimental design of print knowledge and ability to comprehend print conventions and oral language skills among 62 pre-school age, Huffstetter et al. (2010) showed that an eight-week intervention influenced literacy gains. Included in this sample were 52 African American, 10 Hispanic children, and 27 children were learning English as a second language. Across conditions, participants completed 30 minutes of the HER program across eight weeks each school day. Students in the experimental condition completed the HER program, while controls completed a computerized math intervention. Overall, only significant gains in outcome measures were found for the experimental group who used the HER program, suggesting that it is not only computer-assisted instruction but intentionally designed CAI that supports growth.

Additional positive evidence for the HER program showed that even minimal exposure to HER has effects on emergent literacy (Twyman, Layng, & Layng, 2011). In this study, students were selected from a school which was 23% Hispanic/Latino, 74% African American, 2% Native American or Asian, and 1% Caucasian. With 90% of the students qualified for free or reduced lunch, this school presented multiple risk factors for low literacy scores. It was therefore not surprising that the majority of fourth grade

students (i.e., 70%) were not considered proficient readers (Twyman et al.). In a sample of 35 kindergarten students and 30 first grade students, children were randomly divided into an experimental group who completed between 41 and 80 HER episodes and a control group who participated in non-CAI supplementary emergent reading instruction. As measured by letter-word identification and grade-level measures of basic reading skills, those students who completed at least half of the HER episodes showed greater instructional educational benefits than the control group. This study also showed that there was no negative instructional effects for students who completed the HER program.

Contrary to results by Huffstetter et al. (2010) and Twyman et al. (2011), Kreskey and Truscott (2015) tested the HER program among a sample of 102 kindergartners who were at-risk for reading failure and who completed at least 25 HER program episodes. There were a total of 51 students in the control group. Thirty-three percent of the participants were categorized as economically disadvantaged, 18% were in early intervention programs, 6% as H/L, and 2% were identified as ELL. The intervention and control groups were also matched on age, income, and literacy skills, and then their performance on curriculum-based measures of emergent literacy was compared. This study found a significant difference in one of the DIBELS' subtests (i.e., Nonsense Word Fluency) in favor of the control group but with a small effect size. Kreskey and Truscott concluded no educational benefit for using the HER program within their sample but suggested the need to explore additional teaching strategies and home-school partnerships, which could have potentially increased the chance of finding educational benefits.

Moreover, in a recent systematic review of the HER program, which included

research across individuals with disabilities (Clarfield & Stoner, 2005; Cullen, Alber-Morgan, Schnell, & Wheaton, 2014; Whitcomb, Bass, & Luiselli, 2011) and individuals living in Wales (Tyler, Hughes, Beverley, & Hastings, 2015), evidence from six studies that tested the HER program showed positive effects on the following emergent literacy skills: phonics, vocabulary, and fluency/comprehension. These findings should be interpreted with caution, as the majority of these studies did not meet the WWC's requirements without reservations (Rigney, Hixson, & Drevon, 2019).

In sum, well-designed reading CAI tools designed to mirror high-quality, differentiated instruction can serve as a learning supplement to affect reading performance (Campuzano, Dynarski, Agodini, & Rall, 2009; Cheung & Slavin, 2012; Huffstetter et al., 2010; Macaruso & Rodman, 2011); however, further evidence is needed to understand the educational benefits of CAIs (Campuzano et al., 2009; Kreskey & Truscott, 2015). The current body of research evidence on CAIs with H/L-ELL populations is limited and requires an extended understanding of the positive effects on emergent literacy skills, especially when taking into account socio-cultural factors. To date, there are no published research articles that focus primarily on H/L-ELL and socio-cultural factors related to using the HER program. For a summary table of the literature pertaining to HL-ELL students and CAIs, see Appendix A.

Purpose of this Study

The primary aim of this study is to determine the extent to which a CAI reading intervention, HER, produces meaningful emergent literacy improvements among students who are low performing readers and identified as either Hispanic/Latino and/or ELL. A secondary aim is to better understand the systemic factors among Hispanic/Latino

families that influence outcomes of the HER program. Specifically, the following questions will be addressed: (1) What are the emergent literacy outcomes associated with using computerized assisted instruction among students who are Hispanic/Latino and/or ELL? (2) To what extent are socio-cultural factors (i.e., level of bilingualism, child motivation, and parent attitudes) associated with outcomes of the HER program in Hispanic/Latino and/or ELL families?

Method

Participants

A total of 14 students participated in the Headsprout Early Reading (HER) intervention and were recruited through a school district in the New England area through professional referral. Students consisted of 6 kindergarten students and 8 first-grade students and were identified by their teachers as the lowest-performing readers in their class. Students were eligible if families were from the following ethnic backgrounds: Mexican, Cuban, Puerto Rican, Dominican, Central American, Colombian, Chilean, Uruguayan, Paraguayan, Ecuadorian, Peruvian, or Spanish (Taylor, Lopez, Martínez, & Velasco, 2012). The school district's demographics for this study was largely Hispanic/Latino (64%; Great Schools, 2019). Also, 81% were low-income families and 24% were English Language Learners (Great Schools).

Classroom information. The kindergarten and first-grade classrooms did not use a published reading curriculum for instruction; rather, reading instruction was based on teacher created classroom lessons based on the state reading and literacy standards. The study participants were students in 2 Kindergarten classrooms of 14 and 17 students, and 2 first-grade classrooms consisting of 25 and 26 students. Students completed the interventions only during small group instructional times in order to ensure that group instructional time was not missed. Students came from classrooms where the teachers and the teacher-aides spoke in English.

Age. The group's mean age was 6 years and 6 months ($SD = 0.70$), with a minimum age of 5 years and 11-months and a maximum age of 7 years and 7 months. For kindergarten students, the mean age was 6 years and 1 month ($SD = 0.56$; age range = 5

years, 11 months – 6 years, 8 months), and for the first grade students the mean age was 6 years and 10 months ($SD = 0.55$; age range = 6 years, 3 months – 7 years, 7 months).

Table 1

Demographic Information			
	Full Sample	Kindergarten	First Grade
<i>n</i>	14	6	8
Age			
Mean	6 years; 6 months	6 years; 1 month	6 years; 10 months
<i>SD</i>	7 months	6 months	6 months
Range	5 years; 11 months - 7 years; 7 months	5 years; 11 months - 6 years; 8 months	6 years; 3 months - 7 years; 7 months
Sex			
Male	9	5	4
Female	5	1	4

Design

This study employed a non-concurrent multiple baseline design across participants. This design is recommended for use in school settings because students can enter into the study at any time and the researcher does not have to wait until all participants are enlisted to start trials. Participants were randomly assigned to predetermined baseline conditions of different lengths of time. The baseline condition was the measurement days of reading probes (i.e., emergent literacy fluency measures) completed before students entered into the intervention phase. Students were randomly assigned to one of these conditions (i.e., 3, 5, and 7 measurement days), and while in the intervention period each student completed a reading probe at least once per academic week.

Within random assignment of baseline conditions for kindergarten, the 3-probe baseline condition, the 5-probe baseline condition, and the 7-probe baseline condition

each had two students. Within baseline conditions for first grade, four students were randomized to the 3-probe condition, two students were randomized to the 5-probe condition, and two students were randomized to the 7-probe condition.

Procedures

Four upper-level undergraduate student research assistants and one school psychology doctoral student completed the HER training available on the software's website, which reviewed proper administration and use of the program. Before starting, study administrators completed background-screening measures required by the school district. Each study administrator attempted to complete assessment measures with the same student; however, due to scheduling factors research assistants could not always work with the same student.

Headsprout Early Reading Intervention. The HER program is designed to increase emergent reading and reading comprehension skills. There are 80 episodes in total, with the first 40 episodes focusing on decoding and segmenting emergent literacy skills, and the last 40 episodes focus on vocabulary, reading fluency, and comprehension. Specifically, episodes 1-23 focus on segmenting and blending sounds which comprise real and made-up words, then episodes 24-40 focus on developing these by practicing at a slightly quicker pace. The next 41-56 episodes focus on learning multiple sounds in an episode and practice segmenting and blending compound words. Lastly, the final 57-80 episodes focus on comprehension and fluency. The program adapts to students' performance and allows them to work at their pace. The recommended usage is 30 minutes a day at least three times a week (Layng et al., 2002).

Child participation. During baseline, each child verbally reviewed the study with

an administrator and assented to a series of interactive games that are designed to teach them how to read, as well as responding to a series of questions about reading practices. Children were informed of the classroom rules and any incentives or risks for completing the study. Upon verbal assent, each child completed pre-assessment measures that assessed their level of English and Spanish language vocabulary, their reading motivations, and Dynamic Indicators of Basic Early Literacy Skills (i.e., Initial Sound Fluency [K only], Phoneme Segmentation Fluency, Nonsense Word Fluency, & Oral Reading Fluency [1st only]).

Students completed baseline measures during the school day at a rate of two to three days per week. Pre-determined baseline conditions were randomly assigned to students (i.e., 3 vs. 5 vs. 7 baseline probes). Due to delays with the internal review board for the school district, this study did not start until the mid-school year (February) and thus baseline probes were adjusted to 3 days to allow for more time in the intervention phase. When students entered into the intervention phase, the HER lessons were completed in a classroom setting three times per week and each student completed the intervention reading probe every 4-5 days. All students engaged in the HER intervention approximately 70-80 minutes per week. Kindergarten students completed on average 12.33 HER program episodes (range = 8-17). First-grade students completed on average 15.75 episodes (range = 10-23).

Parent participation. Parents received a packet of information in English and Spanish to review and sign before starting the study. Each parent spoke with the principal researcher over the phone to discuss the packet that would be sent home in his or her child's backpack. Parents received a packet of information to review and sign before

starting the study. This packet included HER information and parent measures. Seven parents completed the measures (2 fathers, 5 mothers) and among these measures, all were completed in Spanish. The mean age of the seven parents was 36 years and 7 months ($SD = 9.21$).

Child Measures

Dynamic Indicators of Basic Early Literacy Skills (DIBELS). Measures included in the DIBELS assessment target reading development quickly and efficiently. These can be administered in approximately one minute and include alternate forms for repeated testing. The respective DIBELS measure depended on the grade level (e.g., kindergarten vs. first-grade) for each participant. Kindergarteners completed Initial Sound Fluency (ISF), whereas first-graders completed Oral Reading Fluency (ORF). Both grades completed Phoneme Segmentation Fluency (PSF) and Nonsense Word Fluency (NSF).

Peabody Picture Vocabulary Test – Fourth Edition (PPVT-IV). The PPVT-IV (Dunn & Dunn, 2007) were administered to assess receptive vocabulary skills and word knowledge. The test requires participants to select from a set of four pictures the correct picture that matches the verbal stimulus given by the experimenter. The PPVT demonstrates adequate internal consistency reliability ($\alpha = .94-.95$), alternate form reliability ($\alpha = .89$), and test-retest reliability ($\alpha = .93$). Criterion-related concurrent and predictive validity are moderate to strong ($\alpha = .50-.79$). The Test de Vocabulario en Imágenes Peabody (TVIP; Dunn, Padilla, Lugo, & Dunn, 1986), the PPVT-IV Spanish language equivalent was also administered. The TVIP demonstrates adequate reliability ($\alpha = .80-.95$) and small to moderate concurrent validity ($\alpha = .25$ to $.56$).

The following descriptors were used for the following standard scores: < 70 Extremely Low, 70-84 Moderately Low, 85-115 Average, 116-130 Moderately High, and >131 Extremely High. A paired-samples t-test was conducted to compare the PPVT English and PPVT Spanish scores. There was a significant difference between PPVT English ($M = 74.93$, $SD = 12.18$) and PPVT Spanish ($M = 95.64$, $SD = 13.98$) scores, $t(13) = 3.75$, $p = .002$. Each case uses a gender-specific pseudonym for descriptive results.

Table 2

PPVT English and Spanish Standard Scores and Percentiles by Grade

	Spanish Standard Scores	Percentiles	English Standard Scores	Percentiles
<i>K grade</i>				
Jacob	96	39	79	1
Jeffery	105	63	81	3
Adan	95	37	63	1
David	96	39	67	1
Laura	57	0.2	82	12
Joseph	102	55	81	10
<i>1st grade</i>				
Michelle	107	68	61	0.5
Chris	102	55	54	0.1
Alex	75	5	82	12
Janet	90	25	86	18
Jennifer	108	70	84	14
Edgar	105	63	85	16
Kevin	99	47	89	23
Anita	102	55	55	0.1

Elementary Reading Attitude Survey (ERAS). The ERAS (McKenna & Kear, 1990) is a 20-item measure that assesses reading attitudes across two domains (recreational and academic) in approximately 10 minutes. The total score is comprised of the sum of recreational and academic reading scores, with higher scores indicating more positive reading attitudes, and is reported to demonstrate moderate to high internal consistency

(McKenna & Kear). The total group score was in the Average range ($M = 43$, $SD = 26$).

The mean of kindergarten grade scores ($M = 40$, $SD = 19$) and first-grade scores ($M = 44$, $SD = 32$) was also in the Average range. Each case uses a gender-specific pseudonym for descriptive results.

Table 3

ERAS Standard Scores and Qualitative Descriptor by Grade

	ERAS Standard Scores	ERAS Qualitative Descriptor
<i>K grade</i>		
Jacob	31	Average
Jeffery	37	Average
Adan	46	Average
David	40	Average
Laura	15	Below Average
Joseph	75	Above Average
<i>1st grade</i>		
Michelle	92	Above Average
Chris	2	Below Average
Alex	72	Above Average
Janet	28	Below Average
Jennifer	78	Above Average
Edgar	37	Average
Kevin	31	Average
Anita	18	Below Average

Parent Measures

Bilingual Dominance Scale (BDS). The BDS (Dunn & Fox Tree, 2009) assesses the dominance of Spanish and English using 12 questions that address language use across a variety of situations. Scores can range between -30 to +30, with scores outside of ± 10 indicating dominance of a particular language. Spanish scores were negative numbers and English scores positive numbers. Scores were then added together to obtain the final score. Parents who scored between -30 and -10 were considered Spanish-dominant parent, whereas parents who scored between +10 and +30 were considered

English-dominant parent, and scores between -9 and +9 were considered as a Balanced Bilingual parent.

The results from the Bilingual Dominance Scale showed that parents who completed the measures were primarily Spanish dominant. For instance, scores from the bilingual dominance scale found that the majority of respondents ($n = 6$) were Spanish-dominant speakers and one parent was considered a Balanced-bilingual speaker. Each case uses a gender-specific pseudonym for descriptive results.

Table 4

Parent of:	Spanish Score	English Score	Calculated Total Score	Descriptor
Jacob	-25	+6	-19	Spanish-dominant
Joseph	-24	+4	-20	Spanish-dominant
Michelle	-26	+6	-20	Spanish-dominant
Alex	-18	+11	-7	Balanced-bilingual
Jennifer	-27	+6	-21	Spanish-dominant
Edgar	-18	+7	-11	Spanish-dominant
Kevin	-24	+10	-14	Spanish-dominant

Parent Reading Belief Inventory (PRBI). The PRBI measures beliefs about reading to children and identifies whether parents endorse items that would be conducive to their child's language development and emergent literacy skills at home. Parents elected to complete either the Spanish or English version of the PRBI at home (DeBaryshe, 1990; Rodríguez, Hammer, & Lawrence, 2009). The PRBI measures parental beliefs about reading to their child and is divided into the following subscales: teaching efficacy ($\alpha = .73$), positive affect ($\alpha = .85$), verbal participation ($\alpha = .83$), reading instruction ($\alpha = .63$), knowledge base ($\alpha = .82$), resources ($\alpha = .79$), and environmental input ($\alpha = .50$). Higher scores on the PRBI indicated greater reading practices, with the highest score equal to 168. Authors of the PRBI and Spanish translated

version of the PRBI provided written electronic consent for using this instrument.

The total mean for the PRBI was 130.71 ($SD = 9.78$). To provide a contextual understanding of these scores related to each student, the scores were categorized based on a median split and considered either low or high parental beliefs. Three parents were categorized as low parent reading beliefs (total score = < 130), and four parents who were categorized as high parent reading beliefs (total score = > 131).

Results

This section begins with a presentation of individual results for the 6 kindergarten students, followed by the 8 first grade students. Each case uses a gender-specific pseudonym. Also provided is descriptive information on the Headsprout Early Reading (HER) program episode scores, demographics, and parent measures, where received. For each grade level, results are introduced with a summary table listing the criteria used to determine whether the HER program was effective or ineffective. The DIBELS measure of Nonsense Word Fluency was selected as the primary indicator for the criteria listed in Table 5 to examine intervention effectiveness. This measure was selected because it was similar to the emergent reading exercises used in the HER program. Also, using nonsense words here eliminates the potential for English language familiarity as a confounding variable. Results of the Initial Sound Fluency (K grade only), Phoneme Segmentation Fluency, and Oral Reading Fluency (1st grade only) DIBELS measure are presented in Appendix C as secondary indicators to provide additional information about the student's emergent reading skills. Where applicable, the socio-cultural information (i.e., PPVT, ERAS, PRBI, and demographics) also provides a framework for each student's reading profile. The last section of the results provides summative information across all participants.

Data Analyses

The first criterion used to examine changes in reading skills from baseline to intervention. Here, the treatment mean was calculated using the end of treatment phase data points that were equal in number to the baseline data points for each respective condition. For example, if a participant was in the three-baseline probe condition, then

the mean was calculated for the final three probes collected in the treatment phase. A second criterion compared the intervention outcomes to available DIBELS national norms and identified whether the student's scores fell into one of the following descriptive categories: above benchmark, below benchmark, or at-risk (Kaminski, Cummings, Powell-Smith, & Good, 2008).

The third criterion examined non-overlapping data between the baseline and intervention phases. Specifically, the baseline phase's highest score served as the cutoff point for any intervention score to be categorized as an improvement relative to the baseline scores. The total number of data points that were categorized as an improvement were then divided by the total number of intervention data points, resulting in the ratio score of treatment effectiveness or ineffectiveness. Treatment effectiveness or ineffectiveness was categorized using the following descriptors: Highly Effective = > 90% non-overlapping data points, Effective = 70-89%, Mild Effectiveness = 50-69%, and Ineffective = <50% (Scruggs & Mastropieri, 1998).

The fourth criterion compared the baseline slope to the intervention slope to examine the weekly rate of change. This was calculated for each phase by using the formula $(y_2 - y_1 / x_2 - x_1)$ to obtain the slope. This calculation yields the weekly average rate of change in the student's reading skills. This score was then used to determine if the student's rate of improvement during intervention was greater or less than her/his baseline performance. The final criterion was used to determine whether each student's weekly rate of change for the intervention phase constituted inadequate, moderate, or accelerated growth. The growth profiles were based on the scores necessary to move from an "intensive instruction warranted" profile to either a "strategic or benchmark

instruction warranted” profile for each individual (Kaminski et al., 2008) and was based on change from the middle of a school year (15th week) to three weeks prior to the end of a traditional school year (33rd week).

Across these five analyses, the following descriptors were used to derive an ineffectiveness or effectiveness judgment for each student: Strong effects = 4-5 criteria met, Moderate effects = 3 criteria met, Minimal effects = 2 criteria met, and No Effect = 0-1 criteria met. To address the first research question and examine the effectiveness of using the HER program among students who are H/L-ELL, the analyses previously described and listed in the table below were conducted for each participant’s Nonsense Word Fluency scores. It is recommended that the reader use Table 5 and 14 as a guide for when a treatment criterion was met or not met.

Kindergarten Students

Table 5

Kindergarten Data Analysis Criteria for Nonsense Word Fluency Scores

Criterion Category	Description of Analysis	Criterion not met	Criterion met
1. Mean Comparison	Each student's mean reading performance during the baseline and treatment phases, then the baseline to intervention averages were compared to determine if intervention was quantitatively greater than baseline score.	Intervention mean is less than baseline mean	Intervention mean greater than baseline mean
2. National Norm Comparison	Then the intervention mean was compared to national averages. The following descriptors will be used: above benchmark, below benchmark, and at-risk.	Below Benchmark NWF = 15-27 At-Risk NWF = 0-14	At or Above Benchmark NWF $\geq$ 28
3. DIBELS Percentage of Nonoverlapping data points (PND)	A non-overlapping data point analysis identifies the number and percentage of intervention phase data points that are above the highest point in the baseline phase. Treatment effectiveness or ineffectiveness was determined based on the following descriptive criteria: > 90% Highly Effective, 70-89% Effective, 50-69% Mild Effectiveness, and <50% Ineffective (Scruggs & Mastropieri, 1998).	Ineffective = <50%	Highly Effective = > 90% Effective = 70-89% Mild Effectiveness = 50-69%
4. Slope Comparison	The weekly rate of change for the baseline and intervention phases was calculated by using the formula $(y_2 - y_1 / x_2 - x_1)$ to obtain the slope, which is the difference between the last and the first of the respective baseline and intervention scores divided by the difference between the number of data points. This calculation yields the average rate of weekly change (improvement or decline) for the student's DIBELS scores.	Baseline slope is greater than intervention slope	Intervention slope is greater than baseline slope
5. Slope Weekly Change	The intensive learning profile for a student at the middle year is 5 or less correct letter sounds. To obtain the growth profiles the formula $(y_2 - y_1 / x_2 - x_1)$ was used with the denominator as the time variable (33-18) and numerator as each profile's growth. Numerators used are: Inadequate = (14-5); Moderate range lower bound = (15-5) and upper bound = (24-5); and Adequate = (25-5).	Inadequate Intensive = <0.6	Moderate Intensive to Strategic = 0.67 – 1.27 Accelerated Intensive to Benchmark = > 1.33
Classification		4-5 criteria met = Strong effects 3 criteria met = Moderate effects 2 criteria met = Minimal effects 0-1 criteria met = No Effect	

Note: NWF = Nonsense Word Fluency.

Student #1 – Jacob. At the time of the study, Jacob was a 5-year-old kindergarten male who completed 12 HER episodes, with an episode response accuracy that ranged between 57 to 93% correct responding ($M = 79\%$). He completed 3 reading probes in the baseline period and 11 weeks in the HER program. Demographic information indicated he comes from a home where 3 people live, including Jacob and both parents who are married. The family income was less than \$15,000 per year, and his father reported he is 40-years-old and has earned a technical degree as his education level. Jacob's family is originally from the Dominican Republic and Spanish was reported as the primary language spoken in the home. Information from the Bilingual Dominance Scale (BDS) identified his father as a Spanish-dominant speaker. Based on her completion of the Spanish version of the Parent Reading Belief Inventory (PRBI), results suggested he held high parent reading beliefs (PRBI total = 140).

Primary indicator analysis (Nonsense Word Fluency). For Nonsense Word Fluency, Jacob's average sounds read per minute increased from 2.33 at baseline to 14 at treatment. Compared to national data, Jacob's mean scores for the intervention phase fell in the "at-risk" range. Regarding non-overlapping data points, Jacob's scores were categorized as effective, with 82% of treatment data points (i.e., 9 of 11) that did not overlap with baseline. The baseline slope was -0.5 nonsense words lost per week, whereas the treatment slope was steeper and positive with Jacob gaining 1.6 nonsense words per week. His treatment slope score fell into the accelerated range of growth. Based on this analysis, Jacob's Nonsense Word Fluency scores met four out of the five criteria, indicating strong effects of the HER program.

Table 6

Jacob's Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Effective
4 - Slope Comparison	+
5 - Slope weekly gain	Accelerated
Total	Strong Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met.
Red = criteria was not met.

Figure 1. Jacob's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Jacob's scores on the measure of receptive vocabulary indicated he has a greater receptive vocabulary in Spanish than in English. He scored at the 39th percentile in the measure of Spanish receptive vocabulary compared to the 1st percentile for English receptive vocabulary. Jacob's total reading attitude score was in the average range and typical of other students his age.

Summary. Based on these findings there appear to be strong effects for the Nonsense Word Fluency measure on Jacob's understanding of letter-sound correspondence and decoding skills. He completed the average amount of HER episodes for kindergarten students in this study. Jacob demonstrated an average range of

motivation to read, and his receptive vocabulary skills were stronger in Spanish than in English. Based on the primary analysis, the HER program appeared to be a beneficial education complement to Jacob’s understanding of letter-sound correspondence and decoding skills.

Student #2 – Jeffery. Jeffery was a 6-years-old kindergarten male who completed 11 HER episodes. His episode response accuracy ranged between 88 to 97% ($M = 93\%$). Jeffery completed 5 reading probes in the baseline phase and participated in 9 weeks of the HER program. Jeffery’s parents did not complete their respective measures.

Primary indicator analysis (Nonsense Word Fluency). Jeffery’s average sounds read per minute increased from 5.40 at baseline to 15.80 at treatment. Compared to national data, Jeffery’s mean treatment score was in the “at-risk” range. Regarding non-overlapping data points, his treatment score was categorized as mild effectiveness, with 56% of treatment data points (i.e., 5 of 9) that did not overlap with baseline data points. The baseline slope was 2.75 nonsense words gained per week, whereas the treatment slope was nearly flat with 0.13 nonsense words gained per week. Jeffery’s treatment slope fell into an inadequate range of growth. Based on this analysis, his Nonsense Word Fluency intervention scores met two out of the five criteria, indicating minimal effects for the HER program.

Table 7

Jeffery’s Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Mild Effectiveness
4 - Slope Comparison	-
5 - Slope weekly gain	Inadequate
Total	Minimal Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met.

Figure 2. Jeffery's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Scale. Jeffery's scores on the measure of receptive vocabulary demonstrated greater skills in Spanish than in English. For instance, he scored at the 63rd percentile in the measure of Spanish receptive vocabulary compared to the 3rd percentile for English receptive vocabulary. Jeffery's total reading attitude was in the average range and typical of other students his age.

Summary. Based on these findings there appear to be minimal effects of the HER program on his understanding of letter-sound correspondence and decoding skills. He completed slightly below the average amount of HER episodes for kindergarten students in this study. Jeffery demonstrated an average range of motivation to read, and his receptive vocabulary skills were stronger in Spanish than in English. Based on the primary analysis, he may require additional one-to-one individualized interventions in order to increase his understanding of letter-sound correspondence and decoding skills.

Student #3 – Adan. Adan was a 6-year-old kindergarten male. He completed 17 HER episodes, with an episode response accuracy that ranged between 83 to 99% ($M = 93\%$). He completed 5 reading probes in the baseline condition and participated in 12 weeks of the HER program. Adan’s parents did complete their respective measures.

Primary indicator analysis (Nonsense Word Fluency). Adan’s average sounds per minute increased from 8.40 at baseline to 17.60 at treatment. Compared to national data, Adan’s mean score for the treatment phase was “below benchmark.” Regarding non-overlapping data points, Adan’s treatment score was categorized as ineffective, with 25% of treatment data points (i.e., 3 of 12) that did not overlap with baseline data points. The baseline slope was 1.75 nonsense words gained per week, whereas the treatment slope was less steep at 0.36 nonsense words gained per week. Adan’s treatment slope fell into an inadequate range of growth. Based on this analysis, Adan’s Nonsense Word Fluency scores met one out of the five criteria, indicating there were no effects of the HER program.

Table 8

Adan’s Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	Below Benchmark
3 - Non-overlapping data points	Ineffective
4 - Slope Comparison	-
5 - Slope weekly gain	Inadequate
Total	No Effect

Note. + positive change, = no change, - negative change. Green = criteria was met. Red = criteria was not met.

Figure 3. Adan's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Adan's scores on the measure of receptive vocabulary found that he had greater skills in Spanish than in English. For instance, he scored at the 37th percentile in the measure of Spanish receptive vocabulary compared to the 1st percentile for English receptive vocabulary. Adan's total reading attitude was in the average range and typical of other students his age.

Summary. Based on these findings there appears to be little to no effects on the Nonsense Word Fluency measure after participating in the HER program. He completed HER program episodes above the average for kindergarten students in this study. Adan demonstrated an average range of motivation to read, and his receptive vocabulary skills were stronger in Spanish than in English. Based on the primary analysis, he may require additional one-to-one individualized interventions in order to increase Adan's understanding of letter-sound correspondence and decoding skills.

Student #4 – David. David was a 6-year-old kindergarten male. He completed 10 HER episodes, with an episode response accuracy that ranged between 76 to 95% ($M = 88\%$). David completed 7 reading probes in the baseline condition and participated in 9

weeks of the HER program. David's parents did complete their respective measures.

Primary indicator analysis (Nonsense Word Fluency). David's average sounds read per minute increased from 3.14 at baseline to 5.29 at treatment. Compared to national data, David's treatment score was in the "at-risk" range. Regarding non-overlapping data points, David's treatment score was ineffective, with 10% of treatment data points (i.e., 1 of 10) that did not overlap with baseline data points. The baseline slope was 0.33 nonsense words gained per week, whereas the treatment slope was similar at 0.44 nonsense words per week. His treatment slope fell into an inadequate range of growth. Based on these analyses, his Nonsense Word Fluency scores met two out of the five criteria, indicating minimal effects of the HER program.

Table 9

David's Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Ineffective
4 - Slope Comparison	+
5 - Slope weekly gain	Inadequate
Total	Minimal Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met.

Figure 4. David's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. David's scores on the measure of receptive vocabulary found that he has greater skills in Spanish than in English. For instance, he scored at the 39th percentile in the measure of Spanish receptive vocabulary compared to the 1st percentile for English receptive vocabulary. David's total reading attitude was in the average range and typical of other students his age.

Summary. Based on the primary analysis there appear to be minimal effects of the HER program on David's understanding of letter-sound correspondence and decoding skills. He also completed slightly below the average amount of HER episodes for kindergarten students in this study. David demonstrated an average range of motivation to read, and his receptive vocabulary skills were stronger in Spanish than in English. Based on the primary analysis, he may require additional one-to-one individualized interventions in order to increase David's understanding of letter-sound correspondence and decoding skills.

Student #5 – Laura. Laura was a 5-year-old kindergarten female. She completed 8 HER episodes, with an episode response accuracy that ranged between 76 to 97% ($M = 90\%$). She completed 3 reading probes in the baseline condition, and she participated in

10 weeks of the HER program. Laura’s parents did not complete their respective measures.

Primary indicator analysis (Nonsense Word Fluency). Laura’s average sounds read per minute decreased from 20.67 at baseline to 10 at treatment. Compared to national data, Laura’s treatment score was in the “at-risk” range. Regarding non-overlapping data points, Laura’s treatment score was categorized as ineffective with 0% of treatment data points (i.e., 0 of 10). The baseline slope was -2.00 nonsense words lost per week, whereas the treatment slope was steeper at 1.22 nonsense words gained per week. Laura’s treatment slope fell into the moderate range of growth. Based on this analysis, Laura’s Nonsense Word Fluency scores met one out of the five criteria, indicating no effect of the HER program.

Table 10

Laura’s Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	-
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Ineffective
4 - Slope Comparison	+
5 - Slope weekly gain	Inadequate
Total	No Effect

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met.

Figure 5. Laura's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Scale. Laura's scores on the measures of receptive vocabulary found she has greater skills in English than in Spanish. She scored at the 12th percentile in the measure of English receptive vocabulary compared to the 0.2nd percentile for Spanish receptive vocabulary. Laura's total reading attitude was in the below-average range and less typical than students her age.

Summary. Based on these findings there appear to be no effects of increasing Laura's understanding of letter-sound correspondence and decoding skills. She completed the least amount of HER episodes for kindergarten students. Laura demonstrated a below average range of motivation to read, and her receptive vocabulary skills were stronger in Spanish than in English; both vocabulary standard scores were on the lower end of development. Based on the primary analysis, she may require additional one-to-one individualized interventions to increase Laura's understanding of letter-sound correspondence and decoding skills.

Student #6 – Joseph. Joseph was a 6-year-old kindergarten male. He completed 7 reading probes in the baseline condition and 7 weeks of the HER program. In total,

Joseph completed 16 HER episodes. His episode response accuracy percentages ranged between 84 to 99%, ($M = 94\%$). Demographic information gathered from Joseph's mother stated he comes from a home where five people are living in the home, with at least one biological parent who lives in the home, and the family makes less than \$30,000 per year. Joseph's mother is 36-years-old, her education level is a technical degree, and she is married. Joseph's family is originally from the Dominican Republic and Spanish is the primary language spoken in the home. Information from the Bilingual Dominance Scale (BDS) identified his mother as a Spanish-dominant speaker. Based on her completion of the Spanish version of the Parent Reading Belief Inventory (PRBI), results suggested she held low parent reading beliefs relative to others in this study sample (PRBI total = 118).

Primary indicator analysis (Nonsense Word Fluency). Joseph's average sounds read per minute increased from 5.86 at baseline to 17.14 at treatment. Compared to national data, Joseph's treatment score was in the "below benchmark" range. Regarding non-overlapping data points, Joseph's treatment score was categorized as ineffective, with 20% of treatment data points (i.e., 2 of 10) that did not overlap with baseline. The baseline slope was 0.33 nonsense words gained per week, whereas the treatment slope was steeper at 3.11 nonsense words gained per week. His treatment slope fell into the accelerated range of growth. Based on this analysis of Joseph's Nonsense Word Fluency, his scores met three out of the five criteria, indicating there were moderate effects of the HER program.

Table 11

Joseph's Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency

1 - Mean absolute value	+
2 - National Norm Comparison	Below Benchmark
3 - Non-overlapping data points	Ineffective
4 - Slope Comparison	+
5 - Slope weekly gain	Accelerated
Total	Moderate Effects

Note. + positive change, = no change, - negative change. Green = criteria was met.
Red = criteria was not met.

Figure 6. Joseph's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Joseph's scores on the measure of receptive vocabulary found greater skills in Spanish than in English. For instance, Joseph scored at the 10th percentile on the measure of English receptive vocabulary compared to the 55th percentile for Spanish receptive vocabulary. Joseph's total reading attitude was in the above-average range and more typical of other students than his age.

Summary. Based on these findings there were moderate effects of the HER program on Joseph's understanding of letter-sound correspondence and decoding skills. He completed more than the average amount of HER episodes for kindergarten students in this study. Joseph demonstrated an above-average range of motivation to read, and his receptive vocabulary skills were stronger in Spanish than in English. Based on the primary analysis, the HER program appeared to be a beneficial education complement to

Joseph's understanding of letter-sound correspondence and decoding skills.

Kindergarten group summary. Strong effects of the HER intervention were demonstrated for only one student (i.e., Jacob). There were moderate effects of the HER intervention found for one student (i.e., Joseph), and minimal effects of the HER intervention for two (i.e., Jeffery; David). No effects of the HER intervention was the conclusion for two students (i.e., Adan; Laura). Overall the results will be synthesized and reviewed in the discussion section. The following section will present results for first-grade students.

Table 12

Group Summary for Kindergarten Student Outcomes for Nonsense Word Fluency

K grade Students	<i>M</i>	National Norm	Non-overlapping data points	Slope	Slope weekly gain	Primary Indicator Analysis Outcome	HER Episodes Completed/ <i>M</i> %*
1. Jacob	+	At-Risk	Effective	+	Accelerated	Strong Effects	12 (79%)
2. Jeffery	+	At-Risk	Mild Effectiveness	-	Inadequate	Minimal Effects	11 (93%)
3. Adan	+	Below Benchmark	Ineffective	-	Inadequate	No Effect	17 (93%)
4. David	+	At-Risk	Ineffective	+	Inadequate	Minimal Effects	10 (88%)
5. Laura	-	At-Risk	Ineffective	+	Inadequate	No Effect	8 (90%)
6. Joseph	+	Below Benchmark	Ineffective	+	Accelerated	Moderate Effects	16 (93%)

Note. *M* = Mean. *M*% = Average score across episodes. **Green** = criteria was met. **Red** = criteria was not met.

Table 13

Kindergarten's Student and Family Demographic Variables

Grade/ Student	Age in years	Gender	Ethnicity	Total students in classroom	Home Variables	Home Bilingual Dominance Scale
<i>K</i>						
#1 Jacob	5	Male	Dominican	17	<i>Family size = 3</i> <i>Income = \$15,000</i> <i>Married = Yes</i> <i>Father's reported</i> <i>education = Technical</i> <i>Degree</i> <i>Father's age = 40 years</i>	Spanish- dominant
#2 Jeffery	6	Male	H/L	17	unknown	unknown
#3 Adan	6	Male	H/L	17	unknown	unknown
#4 David	6	Male	H/L	17	unknown	unknown
#5 Laura	5	Female	H/L	14	unknown	unknown
#6 Joseph	6	Male	Dominican	14	<i>Family size = 5</i> <i>Income = \$30,000</i> <i>Married = Yes</i> <i>Mother's reported</i> <i>education = Technical</i> <i>Degree</i> <i>Mother's age = 36 years</i>	Spanish- dominant

First Grade Students

Table 14

First Grade Data Analysis Criteria for Nonsense Word Fluency Scores

Type of Analysis	Description	Criterion not met	Criterion met
Mean Comparison	Each student's mean reading performance during the baseline and treatment phases, then the baseline to intervention averages were compared to determine if intervention was quantitatively greater than baseline score.	Intervention mean is less than baseline mean	Intervention mean greater than baseline mean
National Norm Comparison	Then the intervention mean was compared to national averages. The following descriptors will be used: above benchmark, below benchmark, and at-risk.	Below Benchmark NWF = 47-57 At-Risk NWF = 0-46	At or Above Benchmark NWF $\geq$ 58
DIBELS Percentage of Nonoverlapping data (PND)	A non-overlapping data point analysis identifies the number and percentage of intervention phase data points that are above the highest point in the baseline phase. The number/percentage of non-overlapping data points between the baseline and treatment phase was calculated with following descriptive criteria: > 90% Highly Effective, 70-89% Effective, 50-69% Mild Effectiveness, and <50% Ineffective (Scruggs & Mastropieri, 1998).	Ineffective = <50%	Highly Effective = > 90% Effective = 70-89% Mild Effectiveness = 50-69%
Slope Comparison	The weekly rate of change for the baseline and intervention phases was calculated by using the formula $(y_2 - y_1 / x_2 - x_1)$ to obtain the slope. This calculation yields the average rate of weekly change (improvement or decline) for the student's correct letter sounds read.	Baseline slope is greater than intervention slope	Intervention slope is greater than baseline slope
Slope	To obtain the growth profiles the formula $(y_2 - y_1 / x_2 - x_1)$ was used with the denominator as the time variable (33-18) and numerator as each profile's growth. Numerators used are: Inadequate = (14-5); Moderate range lower bound = (30-29) and upper bound = (49-30); and Accelerated = (50-30). These calculations provide growth profiles based on prior research.	Inadequate Intensive or less = <0.06	Moderate Intensive to Strategic = 0.07 – 1.33 Accelerated = > 1.40
Classification		4-5 criteria met = Strong effects 3 criteria met = Moderate effects 2 criteria met = Minimal effects 0-1 criteria met = No Effect	

Note: NWF = Nonsense Word Fluency.

Student #7 – Michelle. Michelle was a 7-year-old first-grade female. She completed 3 reading probes in the baseline condition and participated in 10 weeks of the HER program. She completed 13 HER episodes, with an episode response accuracy percentages that ranged from 80-95% ($M = 92\%$). Demographic information gathered from Michelle's mother stated she comes from a home where there are five people in the home, and the family makes less than \$15,000 per year. Michelle's mother is 27-years-old, her education level is a high-school education, and she is currently not married. Her family is originally from the Dominican Republic and Spanish is the primary language spoken in the home. Information from the Bilingual Dominance Scale (BDS) identified her mother as a Spanish-dominant speaker. Based on her completion of the Spanish version of the Parent Reading Belief Inventory (PRBI), results suggested she held high parent reading beliefs (PRBI total = 143).

Primary indicator analysis (Nonsense Word Fluency). Michelle's average sounds read per minute increased from 3.33 at baseline to 20.67 at treatment. Compared to national data, Michelle's treatment score fell into the "at-risk" range. Regarding non-overlapping data points, her treatment score was categorized as effective, with 75% of treatment data points (i.e., 9 of 12) that did not overlap with baseline data points. The baseline slope was -1.5 nonsense words lost per week, whereas the treatment slope was steeper with 1.5 nonsense words gained per week. Michelle's treatment slope fell into the accelerated range of growth. Based on this analysis, Michelle's Nonsense Word Fluency score met four out of the five criteria, indicating strong effects of the HER program.

Table 15

Michelle's Treatment Outcomes for Nonsense Word Fluency

Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Effective
4 - Slope Comparison	+
5 - Slope weekly gain	Accelerated
Total	Strong Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met.

Figure 7. Michelle's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Michelle's scores on the measure of receptive vocabulary found that she has greater skills in Spanish than in English. She scored at the 68th percentile in the measure of Spanish receptive vocabulary compared to the 0.5th percentile for English receptive vocabulary. Michelle's total reading attitude was in the above-average range and more typical of other students her age.

Summary. Based on these findings there are strong effects for increasing understanding of letter-sound correspondence and decoding skills. She also completed slightly below the average amount of HER episodes for first-grade students in this study. Michelle demonstrated an above-average range of motivation to read, and her receptive vocabulary skills were relatively strong in one language (i.e., Spanish). Based on the

primary analysis, the HER program appeared to be a beneficial education complement to Michelle’s understanding of letter-sound correspondence and decoding skills.

Student #8 – Chris. Chris was a 7-year-old first-grade male. Chris completed 16 HER episodes, with a response accuracy that ranged from 87 to 99% (94%). Chris completed 3 reading probes in the baseline condition and participated in 11 weeks of the HER program. Chris’s parents did not complete parent measures.

Primary indicator analysis (Nonsense Word Fluency). Chris’ average sounds read per minute decreased from 42.67 at baseline to 29.33 at treatment. Compared to national data, Chris’ score was in the “at-risk” range. Regarding non-overlapping data points, his score was categorized as ineffective, with 10% of treatment data points (i.e., 1 of 11) that did not overlap with baseline data points. The baseline slope was 7 nonsense words gained per week, whereas the treatment slope decreased to 0.20 nonsense words gained per week. His treatment slope fell into the moderate range of growth. Based on this analysis, Chris’ Nonsense Word Fluency scores met one out of the five criteria, indicating no effects for the HER program.

Table 16

Chris’ Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	-
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Ineffective
4 - Slope Comparison	-
5 - Slope weekly gain	Moderate
Total	No Effect

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met

Figure 8. Chris' baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Chris' scores on the measure of receptive vocabulary found that Chris has greater skills in Spanish than in English. He scored at the 55th percentile in the measure of Spanish receptive vocabulary compared to the 0.1st percentile for English receptive vocabulary. Chris' total reading attitude was in the below-average range and less typical than students his age.

Summary. Based on these findings there appeared to be no effects of the HER program increasing Chris' understanding of letter-sound correspondence and decoding skills. Chris completed approximately the average amount of HER program episodes among the first-grade students. Chris demonstrated a below-average range of motivation to read, and his receptive vocabulary skills were relatively weak in English. Based on the primary analysis, he may require additional one-to-one individualized interventions to increase his understanding of letter-sound correspondence and decoding skills.

Student #9 – Alex. Alex was a 7-year-old first-grade male. He completed 19 HER episodes, with a response accuracy that ranged from 88-98% ($M = 94\%$). He completed 5 reading probes in the baseline condition and participated in 10 weeks of the HER program. Demographic information gathered from Alex's mother stated he comes

from a home where 3 people living in the home, with at least one biological parent. The reported family income is less than \$15,000 per year. His mother is 33-years-old, with an education level less than a high-school diploma and who is single. Alex’s family is originally from Puerto Rican and both English and Spanish are spoken in the home. Information from the Bilingual Dominance Scale (BDS) categorized his mother as a Balanced-bilingual speaker. Based on her completion of the Spanish version of the Parent Reading Belief Inventory (PRBI), results suggested she held low parent reading beliefs relative to this sample (PRBI total = 130).

Primary indicator analysis (Nonsense Word Fluency). Alex’s average sounds read per minute decreased from 31.40 at baseline to 22.40 at treatment. Compared to national data, Alex’s score fell into the “at-risk” range. Regarding non-overlapping data points, Alex’s score was categorized as ineffective, with all of his treatment data points falling below his baseline data points. The baseline slope was -1.25 nonsense words lost per week, whereas the treatment slope was steeper with 0.67 nonsense words gained per week. His treatment slope fell into the moderate range of growth. Based on this analysis, Alex’s Nonsense Word Fluency scores met two of the five criteria, indicating minimal effects of the HER program.

Table 17

Alex’s Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	-
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Ineffective
4 - Slope Comparison	+
5 - Slope weekly gain	Moderate
Total	Minimal Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met

Figure 9. Alex's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Alex's scores on the measure of receptive vocabulary found that his English receptive vocabulary was greater than his Spanish receptive vocabulary. He scored at the 12th percentile on the English measure and the 5th percentile on the Spanish measure. Alex's total reading attitude was in the above-average range and slightly more typical than other students his age.

Summary. Based on these findings there appear to be minimal effects of the HER program for increasing Alex's understanding of letter-sound correspondence and decoding skills. Alex completed more than the average amount of HER program episodes among the first-grade students. He demonstrated receptive vocabulary skills that were less well developed. Based on the primary analysis, he may require additional one-to-one individualized interventions to increase his understanding of letter-sound correspondence and decoding skills.

Student #10 – Janet. Janet was a 6-year-old first-grade female who completed 7 reading probes in the baseline and participated in 10 weeks of the HER program. She completed 10 HER episodes with a response accuracy that ranged from 69-95% ($M =$

88.1%). Janet's parents did not complete their respective measures.

Primary indicator analysis (Nonsense Word Fluency). Janet's average sounds read per minute increased from 6 at baseline to 7.71 at treatment. Compared to national data, Janet's score was in the "at-risk" range. Regarding non-overlapping data points, Janet's score was ineffective, with 10% of treatment data points (i.e., 1 of 10) that did not overlap with baseline data points. The baseline slope was -1.50 nonsense words lost per week, whereas the treatment slope was slightly steeper with -0.33 nonsense words lost per week. Her treatment slope fell into an inadequate range of growth. Based on this analysis, Janet's Nonsense Word Fluency scores met two out of the five criteria, indicating minimal effects of the HER program.

Table 18

Janet's Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Ineffective
4 - Slope Comparison	+
5 - Slope weekly gain	Inadequate
Total	Minimal Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met

Figure 10. Janet's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Janet's scores on the measure of receptive vocabulary demonstrated slightly greater receptive vocabulary skills in Spanish than in English. She scored at the 25th percentile in the measure of Spanish receptive vocabulary compared to the 18th percentile for English receptive vocabulary. Janet's total reading attitude was in the below-average range and less typical of other students her age.

Summary. Based on these findings there appeared to be minimal effects of the HER program for increasing her understanding of letter-sound correspondence and decoding skills. Janet completed less than the average amount of HER program episodes among the first-grade students. She demonstrated receptive vocabulary skills that were at the lower cusp of the average range. Based on the primary analysis, she may require additional one-to-one individualized interventions to increase her understanding of letter-sound correspondence and decoding skills.

Student #11 – Jennifer. Jennifer was a 7-year-old first-grade female. Jennifer completed 3 reading probes in the baseline condition and participated in 10 weeks of the

HER program. She completed 21 HER episodes with a response accuracy that ranged between 85 to 99% ($M = 94\%$). Demographic information gathered from Jennifer's mother stated she comes from a home where four people reside, with at least one biological parent in the home. The reported family income is less than \$30,000 per year. Her mother is 32 years of age, married, and has completed a high-school education. Jennifer's family is originally from the Dominican Republic and Spanish is the primary language spoken in the home. Information from the Bilingual Dominance Scale (BDS) identified Jennifer's mother as a Spanish-dominant speaker. Based on her completion of the Spanish version of the Parent Reading Belief Inventory (PRBI), results suggested she held high parent reading beliefs (PRBI total = 132).

Primary indicator analysis (Nonsense Word Fluency). Jennifer's average sounds for nonsense words read per minute increased from 15 at baseline to 30.67 at treatment. Compared to national data, Jennifer's score fell into the "at-risk" range. Regarding non-overlapping data points, Jennifer's score was categorized as effective, with 80% of treatment data points (i.e., 8 of 10) that did not overlap with baseline data points. The baseline slope was -0.50 nonsense words lost per week, whereas the treatment slope was steeper with 0.11 nonsense words gained per week. Her treatment slope fell into the moderate range of growth. Based on this analysis, her Nonsense Word Fluency scores met four out of the five criteria, indicating strong effects of the HER program.

Table 19

Jennifer's Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Effective
4 - Slope Comparison	+

5 - Slope weekly gain

Moderate

Total

Strong Effects

Note. + positive change, = no change, - negative change. Green = criteria was met.

Red = criteria was not met

Figure 11. Jennifer's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Jennifer's scores on the measure of receptive vocabulary found greater receptive skills in Spanish than in English. For instance, she scored at the 70th percentile in the measure of Spanish receptive vocabulary compared to the 14th percentile for her English receptive vocabulary. Jennifer's total reading attitude was in the above-average range and more typical than other students her age.

Summary. Based on these findings there appeared to be strong effects of the HER program for increasing Jennifer's understanding of letter-sound correspondence and decoding skills. Jennifer completed more than the average amount of HER program episodes among the first-grade students. She demonstrated well-developed receptive vocabulary skills for Spanish and an above-average motivation to read. Based on the primary analysis, the HER program appeared to be a beneficial education complement to

her understanding of letter-sound correspondence and decoding skills.

Student #12 – Edgar. Edgar was a 6-year-old first-grade male. He completed 3 reading probes in the baseline condition, and 11 weeks of the HER intervention. Edgar completed 11 HER episodes and his episode response accuracy ranged from 69-96% (88%). Demographic information gathered from Edgar’s father indicated 4 people living in the home. The reported family annual income is less than \$15,000. Edgar's 54-years-old mother has a high school education and is currently married. Edgar’s family is Puerto Rican and the primary language spoken in the home is Spanish. Information from the Bilingual Dominance Scale (BDS) identified Edgar’s mother as a Spanish-dominant speaker. Based on her completion of the Spanish version of the Parent Reading Belief Inventory (PRBI), results suggested she held high parent reading beliefs (PRBI total = 134).

Primary indicator analysis (Nonsense Word Fluency). Edgar’s average sounds read per minute increased from 5 at baseline to 9.67 at treatment. Compared to national data, Edgar’s score fell into the “at-risk” range. Regarding non-overlapping data points, his score was categorized as ineffective, with 18% of treatment data points (i.e., 2 of 11) that did not overlap with baseline. The baseline slope was -0.5 nonsense words lost per week, whereas the treatment slope was steeper with 0.2 nonsense words gained per week. His treatment slope score fell into the moderate range of growth. Based on this analysis, Edgar’s Nonsense Word Fluency scores met three out of the five criteria, indicating moderate effects of the HER program.

Table 20

Edgar’s Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency

1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Ineffective
4 - Slope Comparison	+
5 - Slope weekly gain	Moderate
Total	Moderate Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met.
Red = criteria was not met

Figure 12. Edgar's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Edgar's scores on the measure of receptive vocabulary found that Edgar has greater skills in Spanish than in English. He scored at the 63rd percentile in the measure of Spanish receptive vocabulary compared to the 16th percentile for English receptive vocabulary. Edgar's total reading attitude was in the average range and typical of other students his age.

Summary. Based on these findings there appears to be moderate effects of the HER program on Edgar's understanding of letter-sound correspondence and decoding skills. Edgar completed below the average amount of HER program episodes among the first grade students. Edgar demonstrated an average range of motivation to read, and his receptive vocabulary skills were relatively strong in Spanish. Based on the primary analysis, the HER program appeared to be a moderately beneficial education complement

to Edgar's understanding of letter-sound correspondence and decoding skills.

Student #13 – Kevin. At the time of this study, Kevin was a 7-year-old first-grade male. He completed 5 reading probes in the baseline condition, and participated in 10 weeks of the HER program. He completed 23 HER episodes, with an episode response accuracy that ranged from 84-100% ($M = 96\%$). Demographic information gathered from Kevin's mother stated 6 or more people are living in the home. The reported annual family income is less than \$30,000. Kevin's mother is 28 years old, with a high school education and who is single. Kevin's family is Puerto Rican and the primary language spoken in the home is Spanish. Information from the Bilingual Dominance Scale (BDS) identified Kevin's mother as a Spanish-dominant speaker. Based on her completion of the Spanish version of the Parent Reading Belief Inventory (PRBI), results suggested she held low parent reading beliefs relative to the other parents in this study (PRBI total = 118).

Primary indicator analysis (Nonsense Word Fluency). Kevin's average sounds per minute increased from 7.4 at baseline to 21.6 at treatment. Compared to national data, Kevin's scores his score fell in the "at-risk" range. Regarding non-overlapping data points, his score was categorized as effective, with 80% of treatment data points (i.e., 8 of 10) that did not overlap with baseline data points. The baseline slope was .75 nonsense words gained per week, whereas the treatment slope was steeper with 1.44 nonsense words gained per week. His treatment slope fell into the accelerated range of growth. Based on this analysis, Kevin's Nonsense Word Fluency scores met four out of the five criteria, indicating strong effects of the HER program.

Table 21

Kevin's Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Effective
4 - Slope Comparison	+
5 - Slope weekly gain	Accelerated
Total	Strong Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met.
Red = criteria was not met

Figure 13. Kevin's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS. Kevin's scores on the measure of receptive vocabulary found greater skills in Spanish than in English. For instance, he scored at the 47th percentile for Spanish receptive vocabulary compared to the 23rd percentile for English receptive vocabulary. Kevin's total reading attitude was in the average range and typical of other students his age.

Summary. Based on these findings there appear to be strong effects of the HER program for increasing his understanding of letter-sound correspondence and decoding skills. Kevin also completed more than the average amount of HER program episodes among the first grade students. With his average range of motivation to read, and his

receptive language skills for Spanish and English in the average range, the HER program appeared to be a beneficial education complement to Kevin’s understanding of letter-sound correspondence and decoding skills.

Student #14 – Anita. Anita was a 6-year-old first-grade female who completed 7 reading probes in the baseline condition and participated in 9 weeks of the HER program. She completed 13 HER episodes, with a response accuracy that ranged from 56-98% ($M = 88\%$). Anita’s parents did not complete their respective measures.

Primary indicator analysis (Nonsense Word Fluency). Anita’s average sounds read per minute increased from 13.8 at baseline to 27 at treatment. Compared to national data, Anita’s score fell in the “at-risk” range. Regarding non-overlapping data points, Anita’s score was categorized as mild effectiveness, demonstrating 56% of treatment data points (i.e., 5 of 9) that did not overlap with baseline data points. The baseline slope was 3.83 nonsense words gained per week, whereas the treatment slope was less steep with 2.5 nonsense words gained per week. Her treatment slope fell into the accelerated range of growth. Based on this analysis, Anita’s Nonsense Word Fluency scores met four out of the five criteria, indicating strong effects of the HER program.

Table 22

Anita’s Treatment Outcomes for Nonsense Word Fluency	
Criterion	Nonsense Word Fluency
1 - Mean absolute value	+
2 - National Norm Comparison	At-Risk
3 - Non-overlapping data points	Effective
4 - Slope Comparison	+
5 - Slope weekly gain	Accelerated
Total	Strong Effects

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met

Figure 14. Anita's baseline and treatment phases for Nonsense Word Fluency.

PPVT (English, Spanish) and ERAS Scale. Anita's scores on the measure of receptive vocabulary found greater skills in Spanish than in English. For instance, she scored at the 55th percentile in the measure of Spanish receptive vocabulary compared to the 0.1st percentile for English receptive vocabulary. Anita's total reading attitude was in the below-average range and less typical of other students her age.

Summary. Based on these findings there appear to be strong effects of the HER program on her understanding of letter-sound correspondence and decoding skills. She completed slightly below the average amount of HER episodes for first-grade students in this study. Anita demonstrated a below-average range of motivation to read, and her receptive vocabulary skills were relatively stronger in Spanish. Based on the primary analysis, the HER program appeared to be a beneficial education complement to Anita's understanding of letter-sound correspondence and decoding skills.

First grade group summary. Strong effects of the HER intervention were found for four students (i.e., Michelle; Jennifer; Kevin; Anita). There were moderate effects of the HER intervention found for one student (i.e., Edgar), and minimal effects of the HER intervention were found for two students (i.e., Alex; Janet). The HER intervention was

determined to be ineffective for one student (i.e., Chris). See Table 23 for results ordered by the primary indicator (i.e., Nonsense Word Fluency). Overall results will be synthesized and reviewed in the discussion section.

Table 23

Group Summary for First Grade Student Outcomes for Nonsense Word Fluency							
<i>1st Grade Students</i>	Mean absolute value	National Norm Comparison	Non-overlapping data points	Slope	Slope weekly gain	Primary Indicator Analysis Outcome	HER Episodes/ <i>M%</i> *
7. Michelle	+	At-Risk	Effective	+	Accelerated	Strong Effects	13 (95%)
8. Chris	-	At-Risk	Ineffective	-	Moderate	No Effect	16 (94%)
9. Alex	-	At-Risk	Ineffective	+	Moderate	Minimal Effects	19 (94%)
10. Janet	+	At-Risk	Ineffective	+	Inadequate	Minimal Effects	10 (88%)
11. Jennifer	+	At-Risk	Effective	+	Moderate	Strong Effects	21 (94%)
12. Edgar	+	At-Risk	Ineffective	+	Moderate	Moderate Effects	11 (88%)
13. Kevin	+	At-Risk	Effective	+	Accelerated	Strong Effects	23 (96%)
14. Anita	+	At-Risk	Effective	+	Accelerated	Strong Effects	13 (88%)

Note. *M%* = Average score across episodes. + positive change, = no change, - negative change.
Green = criteria was met. **Red** = criteria was not met.

A summary of student and family variables is presented below in Table 24.

Table 24

First-grade Student and Family Demographic Variables						
<i>Grade/Student</i>	Age in years	Gender	Ethnicity	Total students in classroom	Home Variables	Home Bilingual Dominance Scale
<i>1st</i>						
#7 Michelle	7	Female	Dominican	26	Family size = 5 Income = \$15,000 Married = No Mother's reported education = High School Degree Mother's age = 27 years	Spanish-dominant
#8 Chris	7	Male	H/L	26	unknown	unknown
#9 Alex	7	Male	Puerto Rican	26	Family size = 3 Income = \$15,000	Balanced-bilingual

#10 Janet	6	Female	H/L	26	<i>Married = No</i>	unknown	unknown
					<i>Mother's reported</i>		
					<i>education = High School</i>		
					<i>Degree</i>		
					<i>Mother's age = 33 years</i>		
#11 Jennifer	7	Female	Dominican	25	<i>Family size = 4</i>	Spanish-dominant	
					<i>Income = \$30,000</i>		
					<i>Married = Yes</i>		
					<i>Mother's reported</i>		
					<i>education = High School</i>		
#12 Edgar	6	Male	Puerto Rican	25	<i>Degree</i>	Spanish-dominant	
					<i>Mother's age = 32 years</i>		
					<i>Family size = 4</i>		
					<i>Income = \$15,000</i>		
					<i>Married = Yes</i>		
#13 Kevin	7	Male	Puerto Rican	25	<i>Father's reported</i>	Spanish-dominant	
					<i>education = High School</i>		
					<i>Degree</i>		
					<i>Father's age = 54 years</i>		
					<i>Family size = >6</i>		
#14 Anita	6	Female	H/L	25	<i>Income = \$30,000</i>	Spanish-dominant	
					<i>Married = No</i>		
					<i>Mother's reported</i>		
					<i>education = High School</i>		
					<i>Degree</i>		
#14 Anita	6	Female	H/L	25	<i>Mother's age = 28 years</i>	unknown	unknown
					<i>unknown</i>		
					<i>unknown</i>		
					<i>unknown</i>		
					<i>unknown</i>		

Group Summary of Kindergarten and First Grade Results

Among kindergarten students, the HER intervention was not effective for Adan and Laura, whereas there were Minimal Effects seen for Jeffery and David, Moderate Effects for Joseph, and Strong Effects for Jacob. Across first-grade students, the HER intervention was not effective for Chris, whereas there were Minimal Effects for Alex and Janet, Moderate Effects for Edgar, and Strong Effects for Michelle, Jennifer, Kevin, and Anita. There appears to be greater responsive to the HER intervention for first-grade students than compared to kindergarten students. See Table 25 for primary and secondary analyses across grades and measure.

Table 25

Student Measures for Kindergarten and First Grades ordered by Primary Analyses then by Secondary Indicator Analyses

Student by Grade/ Measure	PPVT Spanish Standard Scores	PPVT English Standard Scores	ERAS Qualitative Descriptor	Primary Indicator Analysis	Secondary Indicator Analysis	Secondary Indicator Analysis	HER Episodes (M%*)
<i>K</i>				(NWF)	(PSF)	(ISF)	
#5 Laura	Extremely Low	Moderately Low	Below Average	No Effect	Minimal Effects	Minimal Effects	8 (90%)
#3 Adan	Average	Extremely Low	Average	No Effect	Strong Effects	Minimal Effects	17 (93%)
#4 David	Average	Extremely Low	Average	Minimal Effects	Minimal Effects	No Effect	10 (88%)
#2 Jeffery	Average	Moderately Low	Average	Minimal Effects	Strong Effects	No Effect	11 (93%)
#6 Joseph*	Average	Moderately Low	Above Average	Moderate Effects	Strong Effects	No Effect	16 (93%)
#1 Jacob*	Average	Moderately Low	Average	Strong Effects	Moderate Effects	No Effect	12 (79%)
<i>1st</i>				(NWF)	(PSF)	(ORF)	
#8 Chris	Average	Extremely Low	Below Average	No Effect	Strong Effects	Strong Effects	16 (94%)
#10 Janet	Average	Average	Below Average	Minimal Effects	Moderate Effects	No Effect	10 (88%)
#9 Alex*	Moderately Low	Moderately Low	Above Average	Minimal Effects	Strong Effects	Minimal Effects	19 (94%)
#12 Edgar*	Average	Average	Average	Moderate Effects	Strong Effects	Moderate Effects	11 (88%)
#7 Michelle*	Average	Extremely Low	Above Average	Strong Effects	Moderate Effects	No Effect	13 (95%)
#13 Kevin*	Average	Average	Average	Strong Effects	Strong Effects	Minimal Effects	23 (96%)
#14 Anita	Average	Extremely Low	Below Average	Strong Effects	Strong Effects	Minimal Effects	13 (88%)
#11 Jennifer*	Average	Moderately Low	Above Average	Strong Effects	Strong Effects	Strong Effects	21 (94%)

Note. *Parent measures completed.

Moreover, five out of the six kindergarten students demonstrated a positive gain in the mean score between the baseline and treatment. Among the 1st grade students, 6 of the 8 students demonstrated an increase in their mean performance between the baseline phases to the intervention phases.

Group summary of parent information. Across grades education levels ranged between high school to a technical degree. The average family size was four people and the home income ranged from \$15,000 to \$30,000. Across these indicators there was one instance of minimal effects, two moderate effects, and four strong effects for the Nonsense Word Fluency Measure. For more information, see Table 26.

Table 26

Parent Measures for Kindergarten and First Grades ordered by Primary Analyses

Grade/ Parent of:	Age (years)	Gender	Marital Status	Family Size	Income per year	Parent Education	Primary Indicator Analysis
<i>K</i>							(NWF)
#6 Joseph	36	Female	Yes	5	\$30,000	Technical Degree	Moderate Effects
#1 Jacob	40	Male	Yes	3	\$15,000	Technical Degree	Strong Effects
<i>1st</i>							(NWF)
#9 Alex	33	Female	No	3	\$15,000	High School	Minimal Effects
#12 Edgar	54	Male	Yes	4	\$15,000	High School	Moderate Effects
#7 Michelle	27	Female	No	5	\$15,000	High School	Strong Effects
#13 Kevin	28	Female	No	>6	\$30,000	High School	Strong Effects
#11 Jennifer	32	Female	Yes	4	\$30,000	High School	Strong Effects

Discussion

This section is organized first by a summary of the treatment outcomes in response to the two research questions posed in this study. Factors that may explain treatment effects on each participant's emergent reading outcomes are identified, and then a comparison of previous research with this study's current results is presented. Finally, discussions of the limitations of this study are presented, along with suggestions for future practice and research, and a conclusion.

Summary of Treatment Outcomes

Research Question 1. This study aimed to assess the treatment efficacy of the HER program for kindergarten and first-grade students who were identified as either Hispanic/Latino and/or English Language Learners and were struggling early readers. The HER program effectiveness or ineffectiveness was evaluated across five criteria and classified overall as one of the following: No Effects, Mild Effects, Moderate Effects, and Strong Effects. Results from the primary analysis (i.e., Nonsense Word Fluency [NWF]) for kindergarten students found that one student out of the six students (i.e., 16%) showed strong effects, whereas across 1st grade students there were four out of eight students (i.e., 50%) who showed strong effects. Two kindergarten students demonstrated no effect (33%), and one first-grade student demonstrated (13%) no treatment effect, as measured by the NWF measure. As for the Phoneme Segmentation Fluency (PSF) measure, there were strong effects found for 50% of kindergarten students, and strong effects found across 75% of first-grade students (see Appendix C). Here, it appears that the HER program's effects were found primarily for decoding real words (i.e., as measured by PSF) followed by decoding nonsense words (i.e., as measured by NWF), and more

treatment effects were seen for first-grade students rather than for kindergarten students.

Interpretation of the results needs to be considered in light of significant issues with treatment fidelity. Specifically, the first 23 HER program episodes focus on segmenting/blending words and learning letter-sound correspondence. Given that no student completed more than 23 episodes, the limited number of episodes completed is a likely reason why many of the treatment effects for students were seen in the decoding heavy tasks (i.e., NWF/PSF). Paradoxically, kindergarten students' treatment scores on the Initial Sound Fluency (i.e., ISF) measure ranged between no effects to minimal effects. An explanation for why this may have occurred is presented in the limitation section below. Overall results suggest that the HER intervention appeared more effective for first-grade students relative to kindergarten students in the development of important emergent literacy skills (i.e., phonological awareness training, phonics).

Research Question 2. Another aim of this study was to understand the influence of socio-cultural factors (i.e., motivation, attitudes) on the intervention program's effectiveness. Where received, parents provided information about family demographics (i.e., ethnicity, household size, income, parent's age, marital status, and education level), English and Spanish receptive vocabulary, and parent reading beliefs and student reading motivations. This information further serves to provide some basis of the ecological context of student's home reading environments.

Socio-cultural information. Only two of the six parents of kindergarten students returned the parent information, and five of eight first-grade parents did so, thus limiting the available data. Across these data, four families indicated Dominican and three families indicated Puerto Rican as ethnicities. Both kindergarten parents identified as

Spanish-dominant speakers in the home and the majority of first-grade parents (i.e., 4 of 5) identified as Spanish-dominant speakers in the home. This information also is reflected by the overall group's significantly higher PPVT Spanish receptive vocabulary scores, as compared to the PPVT English receptive vocabulary scores.

Receptive vocabulary. When examining receptive vocabulary skills as a proxy for oral receptive language skills, 11 out of the 16 students with an average receptive vocabulary range in one language demonstrated at least one instance of Moderate Effects or Strong Effects across fluency measures. There was one student however with lower receptive vocabulary scores but who demonstrated treatment responsiveness to the HER intervention. For instance, Alex's receptive vocabulary skills for English and Spanish were Moderately Low. However, Alex's scores were found to on the PSF measure were classified as Strong Effects, which indicate there are additional factors that facilitated his response to the HER intervention. For instance, his mother identified him as living in a home where she speaks both English and Spanish (i.e., balanced bilingual); therefore, the experience with hearing more English in the home, relative to other students where parent information was collected, may have facilitated his response to the HER intervention. Although correlational links to the student HER performance based on PPVTs scores are beyond the scope of this study, there appeared to be an overall tendency for students to respond positively to the HER intervention when there was at least an average receptive vocabulary in one language.

Socioeconomic status. The reported income across participant families was less than \$30,000 per year and the family sizes ranged from three to more than six persons per household, which is an indicator these students ($n=7$) came from homes that were

considered below the federal poverty guidelines (ASPE, 2017). The parents of the two kindergarteners reported they earned technical degrees, whereas all of the first-grade parents reported at least a high school education. Across these seven students, there was at least one reported parent in the home with a high school education or better and is one indicator that these homes placed an emphasis on academic achievement. Regarding the treatment results for the seven parents where sociocultural information was returned, there were moderate to strong effects of the HER intervention found across NWF and PSF measures for two kindergarten students. Among the five first grade students, there was one instance each of minimal and moderate effects, and three instances of strong effects for the NWF measure. Moreover, for the PSF measure there was one instance of moderate effects and four instances of strong effects. These results highlight that for these seven students who came from diverse homes there was an educational benefit of the HER intervention.

Parent Reading Belief Inventory and Elementary Reading Attitude Scale. Of further interest to our understanding of using a CAI were both parent beliefs about reading and student reading motivation. Descriptive information suggests the following. Among participating parents who reported high parent reading beliefs (i.e., $n = 4$), students demonstrated moderate to strong effects on the primary indicator of the HER program. Further, the majority of students who reported an average to above-average motivation to read scored had more positive indicators of the HER intervention than students who reported a below average motivation to read. That is, the majority of kindergarten and first-grade students who demonstrated moderate to strong effects on NWF and PSF measures rated an average to above-average motivation for reading

practices. One exception was Anita (i.e., student #14), who rated herself as having “below average” motivation to read but she responded with strong effects to the HER intervention.

Although the information described in response to question two is descriptive in nature, there is indication that sociocultural factors should be explored when researching CAI utilization and effectiveness among the H/L-ELL population. For instance, the finding that many of the students with average Spanish receptive vocabulary skills made progress in an English-only CAI is promising for future use with this population. For those students with less well-developed English skills, the HER program’s visual and auditory cues likely supported students in their understanding of the directions.

Regarding sociocultural factors, future research should continue to explore ways to increase home-school partnerships with CAI technology that can increase utilization and meaningful teaching moments between parents and students in the home. Also, parent reading beliefs and student motivation should examine additional measurement tools that incorporate CAI reading and technology elements as a way to integrate these areas.

Comparisons with Previous Research

When comparing this study to previous research, there are some similarities and differences. For example, Cassady et al. (2017) also were interested in low-income ELL (Spanish-English) early readers in kindergarten and first-graders, and used the CAI Imagine Learning as an intervention. These researchers found that the first grade students made more intervention gains than the kindergarten students on emergent literacy outcomes. Similar to Cassady et al., the current study’s treatment outcomes were more consistent for first graders than for kindergarten students. In contrast to the current

study's focus on single participant growth, Cassady et al. were interested in group differences between an experimental and control group. Although the methodology of the current study and work by Cassady et al. are different, the tendency for first-grade HL-EEL students to respond to a reading CAI adds to our understanding of the age group for which this type of intervention will work. Furthermore, the teachers in Cassady et al.'s study implemented the CAI directly in their classrooms, while in this study the CAI intervention was completed with researchers outside of the classroom. Thus, future work in this area should continue to examine ways to integrate and align CAI technology with the classroom curriculum and experience, as this may be an important factor influencing effectiveness.

In another CAI based study using the program Lexia with students in an urban public school setting, Macaruso and Rodman (2011) found evidence for improvement of kindergarten students' phonological awareness skills (Macaruso & Rodman, 2011). Similarly, the present research found evidence for HER related improvement in kindergartener's phonological decoding skills, particularly for decoding of real words. This effect was not as strong for pseudo-words, however. This result is in line with research by Kreskey and Truscott (2015), who found a lack of HER program effect's on nonsense word fluency for a large kindergarten sample at-risk for reading failure. However, it should be noted that their population included less diverse students of whom only 6% were Hispanic and 1.6% ELL. Kreskey and Truscott explained that much of the reason the sample did not respond is that the HER program's instructions could benefit from instructions more tailored to the language needs of the student. In addition, the current study's integration of student variables (i.e., motivation, receptive vocabulary in

Spanish and English) may alert educators and parents to preview instructions in both languages or increase social praise as students complete the HER program.

In an unpublished doctoral dissertation (Morena, 2011), the focus was primarily on determining whether the HER program would influence ELL students' performance on norm-referenced measure of early reading and two curriculum based measures of reading fluency (i.e., ORF; NWF). Morena found no significant differences between the control and treatment groups on all of the measures. Morena's population included 23 Hispanic students who were ELLs; however, ethnicities categories were not reported. In comparison to Morena's study, the current research provides information on a specific group of ELL students (Dominican Republic; Puerto Rican) and demonstrates evidence for growth in phonological awareness skills, while examining sociocultural factors.

Although some of the first-grade student's ORF scores in the current study did not show improvement, there was some evidence to show growth in whole word reading in spite of the limited engagement with those episodes of the HER focused on these skills. This result is similar result to a study (Clarfield & Stoner, 2005) completed on several first-grade students that found the HER program had positive effects on a measure of Oral Reading Fluency. Students in Clarfield and Stoner had only completed between 21-27 episodes but increased in their oral reading fluency skills for three native English speakers with Attention Deficit Hyperactivity Disorder; thus, the HER program appears to have some effect for oral reading fluency even in the earlier reading episodes. In a different study completed in Wales (Tyler et al., 2015), students (6-7 years-old) in the treatment group also made significant gains in the ORF measure as compared to a wait-list control and all students in this study completed all 80 episodes. Clearly, there is a

need to better understand the way the HER program influences oral reading fluency for H/L-ELL emergent at-risk readers, and future research can benefit from including additional oral language measures to identify critical growth patterns.

In summary, in a manner similar to previous research with CAI, the current study found more treatment effects for first-grade students than for kindergarten students. Many of the aforementioned studies used larger samples with pre-post analyses that are different from the current study design. The present study methodology aligns with current educational practices using response to intervention practices. The participants in the current study represented a subset of H/L-ELL students (i.e., Dominican, Puerto Rican) who were similar to participants in earlier work, as they were HL and/or ELL students. As a whole, the results across studies discussed here suggest the need explore HER effects in larger samples of H/L-ELL students. In other words, it is important to be specific of the degree of language and ethnic composition, as well as including important indicators of socio-cultural factors, as these likely will continue to add valuable information for treatment modifications.

Limitations

Several factors relating to treatment fidelity are cause for concern in the present work. For example, students did not complete the minimum desired amount of lessons needed to achieve effectiveness as described in the HER research (Twyman et al., 2011). Of concern was the variable rate of lesson completion among students. For example, some students completed an episode every academic week, while other students were somewhat slower, such as completing one episode over two weeks. Participation also was impacted by school holidays, student absences, and technology difficulties with the

school Internet or laptop computers. Lastly, due to the lengthy time process with the school's research review board, this project began significantly later in the school year than planned. As a result, the intervals for baseline probes were shortened to two to three days, rather than every week, thus limiting the reliability of student's data in the baseline period.

Another concerning treatment integrity factor was that of inconsistent checking of fidelity of implementation of outcome measures. The primary researcher, who was an advanced graduate student, completed informal checks when research assistants were collecting data. A more systematic process for checking fidelity is warranted when completing progress-monitoring data to ensure these are implemented in as accurate a manner as possible (Keller-Margulis, 2012). For example, it is suggested that fidelity checks be scheduled periodically every week, and use both informal and formal methods of oversight (Keller- Margulis). Additionally, only the primary researcher was a bilingual English-Spanish speaker, whereas all of the research assistants were monolingual English speakers. This language factor may have influenced the kindergarten's response to the initial sound fluency task. That is, this task requires more English verbal prompts with the student than compared with the other fluency measures (i.e., NWF, PSF, ORF), so students in this study may have had some difficulty with hearing prompts in their non-native language.

Another limitation was the low rate of parent response to requested information about home-based factors such as income and educational attainment. Parent response rate was 50% across all students. This is similar to return rates described in a systematic review suggesting it is typical that between 30-70% participants return forms mailed to

the home (Sykes, Walker, Ngwakongnwi, & Quan, 2010). Although the current sample fits within this range of typical response rates, the missing information limits the ability to understand important home, language, and cultural factors on emergent literacy skills for each student. Another area that was not directly captured in the parent demographic information was immigration status, limiting the understanding of acculturation to the American education system.

Several aspects of the treatment fidelity were weaker than desired for the current study. Nevertheless, results demonstrate that future work should continue to consider innovative ways to increase utilization of CAIs with H/L-ELL students. Moreover, exploring sociocultural factors is warranted, as these are areas that are still understudied for CAI use among H/L-ELL students.

Future directions

Implications for professional practices. It is highly likely that young children who are low performing readers will need extensive instruction and practice to catch up to same-age peers. Each of the students in this study were identified by their school as struggling readers and on the school's radar and in need of additional reading and language interventions. The finding that many of the kindergarten and first grade students made phonological awareness progress in the current work is useful information for educators because phonological awareness skills for H/L-ELL students are found to be a good indicator of oral reading fluency skills at the end of second grade (Solari et al., 2014).

Another practical consideration has to do with the variability seen in the data. The high degree of variability in demonstrated, individual, reading skills seen for some of the

participants likely suggests either a very tenuous grasp on emergent literacy skills or the diverse profiles exhibited by HL and/or ELL emergent readers, or both. For this reason, this study, along with other research, demonstrates the importance of using multiple analyses of outcomes that examine the trend, level of change, and norm-referenced comparisons of the obtained outcome data. Such information may yield important patterns in the data, and support attempts at intervention that might otherwise be dismissed as ineffective if only one outcome were to be relied on for decision-making. Also, in the present study the intervention slope was found to be the criterion that increased more frequently in the intervention phase for students. Thus, it is noteworthy that although these rates of learning were not commensurate with national norms, the slope analysis demonstrated that the HER program had an effect on the students' rates of growth.

Another consideration is that children who come from language minority are likely to experience less interaction with English language. This information should sensitize educators to a potential need to find creative ways to implement a CAI that is only provided in English. For instance, using a weekly progress monitoring can alert educators to modify the delivery of a CAI (e.g., pair the student with a more knowledgeable peer) rather than waiting until the completion of the entire CAI program. For example, peer-mediated learning could be implemented through small group instruction (Archer & Hughes, 2011; McMaster, Fuchs, & Fuchs, 2006) and students may be able to benefit from social interaction experiences and observations of others while using a CAI (Bandura, 1986).

Additionally, the overall significantly higher Spanish receptive vocabulary scores

(i.e., relative to English vocabulary scores) elucidate an important area to consider. ELL students who are experiencing two languages at the same time and learning to read, highlights the need for educators to consider the cognitive load on working memory for young children. For instance, when an ELL student is learning to read there is likely competing information that either may impede reading and language development (Bialystok, 2002, 2008; Poulin-Dubois et al., 2013). Therefore, given that the HER program was only in English, for some students this may have interfered with their understanding of directions for each task. Consequently, the HER program may benefit from considering a two-way immersion model to delivering instruction, as this may also reduce the amount of interference experienced (Alanís, 2018; Cassady et al., 2017). For instance, there could be an option for students to hear Spanish and English instruction in the HER program.

To further foster emergent reading development among H/L-ELL students, schools can increase the number of reading specialists available to provide instructional support. The reading specialist, along with other school-based professionals (i.e., speech-language pathologists, psychologists, and social workers), can advocate for the use of reading programs that can integrate a host of language-rich activities and that are developmentally appropriate and culturally sensitive. Such instruction is likely to not only remediate emergent literacy skills but also increase practice with oral language skills across the home-school environment. It also would be useful for students to be engaged in learning and practicing phonological awareness skills in both a student's native and non-native language. For example, comparing and contrasting the phonemes from both languages can have the added benefit of increasing meta-linguistic skills. Coupled with a

strong, published reading curriculum and well-designed instruction, the implementation of reading interventions that foster language and print-rich experiences will further illuminate H/L-ELL students who actually are in need of additional supports. Without this strong foundation in the general curriculum and a culturally balanced progress monitoring of student skills, H/L-ELL students are likely to be over-identified as needing special education services.

A final practical consideration pertains to the HER placement test. When considering the placement test, it may be advantageous to incorporate additional outside progress monitoring measures or norm-referenced measures baseline measures into the placement decision-making process. This may allow students to be placed into lessons containing instruction more suited for their levels. For example, four students (i.e., Chris, Alex, Jennifer, Kevin) showed “At or Above Benchmark” on the phoneme segmentation measure at the start of the study but each demonstrated “At-Risk” oral-reading skills between baseline and treatment phases. Based on the HER placement test each of these students were entered into the program’s first episode that explicitly reviews decoding skills. These students, in particular, may have benefited from starting at a more advanced episode that focused more on vocabulary and comprehension. The potential for a placement algorithm to either build in or build out certain emergent literacy skills might yield increased participant benefits.

Implications for research. Given that students received little adult in this study, future research should examine the effects of student-adult interactions while using the HER intervention for H/L-ELL students. A process by which the amount of English and Spanish language used for directions and instruction could be modified would be

interesting. For example, a student who has just immigrated could be presented with slightly more Spanish prompts on the CAI by the computer or an adult. Then, as the student adjusts to the culture and language, Spanish language instruction/direction could be slowly scaled back. This method may have the added benefit of decreasing anxiety related to unfamiliarity with a new language (Pappamihel, 2002). In the same vein, the incorporation of more cultural components may be another research variable worth exploring. For instance, there is some research to show that Hispanic and Latino students and their parents have found success on increasing emergent literacy skills when the activities used more culturally related themes (Leyva & Skorb, 2019; Ortiz & Ordoñez-Jasis, 2005). Here a CAI program can build in culturally relevant practices which students might find more relatable and entertaining.

Moreover, having a system whereby teachers fully integrate concepts and information from CAI lessons into concomitant classroom teaching is worth exploring. Similarly, research for children with this level of challenges can further benefit by exploring the effects of a home-school liaison to implement and monitor CAI usage at home. This activity and information could help teachers and schools identify who might benefit from CAIs. For instance, researching a student's motivation and parent engagement could highlight who is willing to participate in a CAI program. Therefore, future research should continue to focus on parent participation and attempts to increase in-home engagement through home base CAI, for children, and potentially for parents as well.

The heterogeneity in reading profiles for H/L-ELL emergent readers is another important factor when thinking of the HER intervention effects on their emergent reading

outcomes. For example, previous research on profiles of kindergarten H/L-ELL early readers (Ford, Cabell, Konold, Invernizzi, & Gartland, 2013) indicated orthography skills at the end of the school year was associated with greater emergent literacy achievement, over and above phonological awareness skills. Therefore, H/L-ELL students may require more explicit and systemic instruction on orthographic skills and knowledge (Ford et al., 2013; Kreskey & Truscott, 2015). Additional practice of orthographic knowledge with multisensory approaches should be considered when researching H/L-ELL students and CAI use (Moats, 2000).

Future research in this area should strive to incorporate models of cultural sensitivity that aim to incorporate and tease apart the large language and literacy skill variations exhibited by children who are H/L-ELL populations (Callanan & Waxman, 2013). In addition, future research and practice in this area should strongly consider using Hispanic/Latino and English Language Learner DIBEL norms and growth rates to determine treatment effectiveness (Callanan & Waxman, 2013). Without the use of measures having appropriate norms, educators may falsely conclude that students are significantly behind in their reading and literacy development or not responding to the prescribed intervention.

Conclusions

The majority of special education student referrals are due to student literacy development concerns expressed by teachers (Cortiella & Horowitz, 2014). It is clear that efforts to prevent reading problems among young children are critical for school psychologists, educators, and parents (Cortiella & Horowitz). Concerning the state of reading development for this population, according to the NAEP, only 8% of ELL

students and 21% of Hispanic students in fourth grade are at or above benchmark levels of reading proficiency (NAEP, 2015). The ability to increase H/L-ELL emergent reading skills has the potential to increase positive healthy school and educational outcomes, such as high school completion or vocational success. Also, with the increasing number of heterogeneous Hispanic/Latino students in American public schools, CAI holds promise as a method to increase emergent literacy skills; however, such strategies need to be considered and evaluated carefully (Garcia & Miller, 2008).

Narrowing of achievement gaps between H/L-ELL learners and their Caucasian monolingual counterparts will require supports that incorporate a multipronged focus aimed at increasing a variety of language and literacy related skills. Also, the host schools, along with families, will need to have a sense of urgency to increase the emergent English language literacy skills of these students, while at the same time being patient with slower than typical (for English language natives) rates of skill development. The present study found evidence of CAI treatment effectiveness for a majority of participating first-grade students on their decoding skills in particular. This work highlights the complexities of working with the H/L-ELL population in efforts to ameliorate emergent reading difficulties using CAI technology. For example, oral language and emergent literacy development progress on a continuum and can be altered by a multitude of social and academic interactions (Whipple, Evans, Barry, & Maxwell, 2010).

With this in mind, incorporating the use of measures that assess socio-cultural factors provide ways to buttress CAI responsiveness and practices. The future is only likely to see continued growth of technology-based supports in schools. Therefore,

effectively using these supports for students who are struggling readers and from diverse backgrounds will continue to be an important educational and research endeavor. In conclusion, supplemental instructional programs such as the HER program used herein, when designed for monolingual English speakers and used in classrooms lacking evidence-based reading curricula, appear to contribute to student learning and skill development for some, but not all students.

Appendix A

Summary of the relevant literature on Computer Assisted Instruction

Authors (date)	Affiliation	<i>N</i>	Socio-cultural variables	Method	Outcomes
Blok, Oostdam, Otter, & Overmaat, (2002)	University of Amsterdam	42 studies	Mixed	Review	Analyzed 75 experiments on emergent literacy between 1990-2002. Authors found a small positive effect size ($d = .19$) of CAIs on literacy skills.
Cassady et al. (2017)	Ball State University	1,490	ELL; 90% eligible for free or reduced lunch	Experimental (randomized); Analyzed kindergarten and first grade students who used the CAI Imagine Learning.	Kindergarten students showed significant growth in vocabulary compared to the control group. For first-graders, the CAI significantly increased phonological awareness, phonics, text comprehension, and vocabulary, compared to the control group.
Cheung & Slavin (2012)	Chinese University of Hong Kong	60,553	Mixed	Meta-Analysis	Analyzed 84 studies that were deemed high-quality methodology. Authors found a small positive effect size ($d = .16$) CAIs on literacy outcomes.
Huffstetter et al. (2010)	Saint Lucie County School District	62	10 H/L; 27 ELL	Experimental (randomized); Analyzed the use of the HER program compared to a CAI math program for eight weeks each school day across kindergarten and first graders.	Overall, only significant gains in emergent reading outcome measures (i.e., print conventions and oral language) were found for the experimental group who used the HER program,

Kreskey & Trescott (2011)	Newnan Crossing Elementary School	102	6% H/L; 2% ELL; 33% low-SES	Experimental; Intervention and control groups were matched on age, income, and literacy skills. Performance on curriculum-based measures of emergent literacy was compared.	There was a significant difference in one of the DIBELS' subtests (i.e., Nonsense Word Fluency) in favor of the control group but with a small effect size. Concluded no educational benefit for using the HER program within their sample
Macaruso & Rodman (2011)	Community College of Rhode Island	Study 1 = 38 Study 2 = 66	Study 1 = Ethnicity 38.5% H/L*; 40% free or reduced lunch. Study 2 = 44% H/L*; 70% free or reduced lunch.	Experimental	Study 1. Pre-school students who completed the CAI Lexia had significant phonological awareness gains than the control group. Study 2. Low performing kindergarten students who completed the CAI Lexia outperformed the control group.
Macaruso, Hook, & McCabe (2006)	Community College of Rhode Island	179	29% ELL; 50% qualified for free lunch; Race/Ethnic variables not reported	Experimental; Compared students from Title 1 and non-Title 1 schools across 10 first-grade classrooms.	Results indicated students from Title 1 schools who completed CAI performed similarly to post-test scores of students from non-Title 1 schools.
Rigney, Hixson, & Drevon (2019)	Central Michigan University	6 studies	Mixed	Systematic Review	Found evidence from six studies using the HER program that showed positive effects on the following emergent literacy skills: phonics, vocabulary, and fluency/ Comprehension.
Twyman, Layng, & Layng (2011)	Headsprout	65	23% H/L*	Experimental (randomized); Compared students who a minimum of 41 HER episodes and a control group who participated in non-CAI supplementary emergent reading instruction.	As measured by letter-word identification and grade-level measures of basic reading skills, students who completed at least half of the HER episodes showed greater instructional educational benefits than the control group.

Note. *Please refer back to the study for the additional race/ethnicities categories. H/L = Hispanic/Latino. ELL = English Language Learners. HER = Headsprout Early Reading. SES = Socioeconomic status.

Appendix B

Literature Review: Oral Language Development, Emergent Literacy, and Reading

Development for Monolingual Populations

Oral Language Development

Oral language is conceptualized as both expressive and receptive in nature. Receptive language refers to perception and/or comprehension, whereas expressive language involves the production of language, whether communicated verbally, non-verbally or in writing (Scarborough & Brady, 2002). The development of oral language skills begins as early as six months, with infants recognizing different speech sounds (Tsao, Liu, & Kuhl, 2004). At around the time when first words are spoken (typically around 12-18 months), infants are purported to understand more words than they can communicate (Mills, Plunkett, Prat, & Schafer, 2005). Young children, around two years of age, go through a process called “fast mapping,” or the acquisition of words, simply through interactions and communication with other individuals in their environments (Carey & Bartlett, 1978; Spiegel & Halberda, 2011; Swingley, 2010). Then as infants begin to speak more, a period between 18-months to three years of age is considered a "naming explosion," whereby words are learned slowly at first but then develops relatively quickly. Between the ages of two and three years, the effects of quality verbal interactions play a significant role, such that parents and caregivers who used limited vocabulary or more stern disciplines styles can inadvertently decrease the amount of spoken language young children hear (Alexander, Entwisle, & Olson, 2001; Hart & Risley, 1995; Nelson, 1996).

Subsumed within language development is children’s phonological processing

skills, which include phonological sensitivity and phonemic awareness (Scarborough & Brady, 2002). Phonological sensitivity is the initial stage of recognizing rhymes or syllables, whereas phonemic awareness is the ability to isolate, blend or segment phonemes (Scarborough & Brady, 2002). Children's phonemic awareness skills in preschool are a good indicator of decoding abilities later in kindergarten and first grade (Lonigan, Burgess, & Anthony, 2000). Thus, in English, and in many other languages without a one-to-one correspondence between sounds and letters, acquiring good phonological processing skills is critical for becoming a proficient reader (Ehri & McCormick, 1998; Scarborough & Brady).

Next, orthographic abilities develop from basic to complex concepts, with the first stage characterized as a pre-awareness that letters map onto sounds (Moats, 2000; Snow, Burns, & Griffin, 1998; Soifer, 1999). For instance, young children may recognize the first letters in their names at around three years of age (Snow et al., 1998). Between 3-4 years of age, children start to demonstrate evidence for identifying letters and single syllables in speech. Next, begins a process of attempts to map the letters to sounds. Around five years of age, children begin to recognize rhyming words and identify syllables (Moats, 2000). Between 5-7 years of age, children can start to demonstrate mastery over breaking down words into the smallest meaningful speech sounds, or phonemes (Liberman, Shankweiler, Fischer, & Carter, 1974; Sharp, Sinatra, & Reynolds, 2008).

A model of word reading describes a five-stage trajectory for typically developing children (Ehri & McCormick, 1998). First, children in the pre-alphabetic stage use cues or logos to inform what the word means (Juel, 1991). For example, a picture of a ball

may cue the word ball. Second, the partial-alphabetic stage indicates an awareness of letter-sound relationships and the ability to read sight words, or use part of the word to guess the rest. Stage three is considered the full alphabetic phase whereby students can read texts with commonly known words, advance in their abilities to decode new words. Stage four is referred to as consolidated alphabetic, which begins due to the decoding of orthographic information. A hallmark of stage four is that early readers are learning syntax, morphology, and how to read longer words with longer syllables. Stage five is called automatic alphabetic, when reading written words become automatic and strategies to read new unknown words becomes more efficient (Chall, 1983; Ehri & McCormick, 1998). Notably, teaching the letter-sound relationship is found to have greater effects on literacy when introduced at earlier grades than at later grades (Brady, 2011; McCardle & Chhabra, 2004).

An additional area of importance is the intersection of cognitive and environmental factors, which contribute to oral language development, and in turn affect emergent literacy (Shonkoff & Phillips, 2000; Storch & Whitehurst, 2002). In other words, individuals with environmental inputs that are language-rich lay the foundations for emergent reading skills and increase the likelihood that language print skills can coalesce to form individuals who not only understand how to not only decode words but also comprehend what was read (Chall, 1983; Hart & Risley, 1995; Scarborough, 2001).

In a seminal study conducted by Hart and Risley, the quantity of oral language and quality of interactions of families from three different SES categories (i.e., welfare, working-class, and professional) were recorded to highlight the differences in oral language. Results demonstrated a significant gap between welfare and professional

families in the number of words spoken to children, and the quality of the speech used by the adults was different between professional and welfare families. Professional families tended to use more open-ended questions and elaborated upon their children's language (Hart & Risley). This stark contrast in receptive oral language skills has become known as the "30 million word gap" between lower and higher SES families and significantly contributes to later reading abilities (Cadima, McWilliam, & Leal, 2010; Hart & Risley, 1995).

Emerging Literacy. Essential elements on emergent literacy not only include phonological processing skills, print conventions, emergent writing, and oral language skills, but also the attitudes and knowledge around early literacy concepts (Dickinson & McCabe, 2001; Neuman & Dickinson, 2003; Whitehurst & Lonigan, 1998). Among these elements, several concepts are part of emergent literacy skill development, including phonology, orthography, semantics, and grammar (Booth et al., 2001; Moats, 2000; Roth, Speece, & Cooper, 2002; Soifer, 1999; Storch & Whitehurst, 2002). Each of these emergent literacy dimensions has a role in influencing reading development.

Phonology is the overarching language system that addresses oral language, including mental abstractions and spoken words (Scarborough & Brady, 2002). It is the knowledge of phonemes that comprise spoken words, including attending to and manipulating parts of speech within oral language (Scarborough & Brady). There exists a strong connection between phonological awareness (PA) skills and later early word reading (Ehri & Nunes, 2002; Storch & Whitehurst, 2002). For example, children with well-developed PA skills rely less on the printed text and use the sounds that comprise words to read (i.e., top-down processing; McCardle & Chhabra, 2004; Torgesen &

Mathes, 1998).

Similarly, orthography plays a role in emergent literacy and oral language development. Orthography is the knowledge of visual symbols that represent the sounds of oral language. In English, there are approximately 42-44 speech sounds that map onto 24 letters (Moats, 1999; Scarborough & Brady, 2002). Through oral language activities that include practice and explicit instruction with orthography, young children learn the ways that speech sounds are connected to text (Bowey, 1994; Moats, 2000). Before school entry, young children who come from homes that introduced print through teaching letters, verbally labeling items that children encounter, and reading books are often better equipped to start formal reading instruction (Adams, 1990; Bialystok, Shenfield, & Codd, 2000; Justice, Pullen, & Pence, 2008).

Fuchs et al. (2001) reviewed various models of reading and found that all recognized the need for the automaticity of word reading. Without it, the cognitive load will consume too much of the available resources in memory, leaving little to no attentional resources for comprehension. Automaticity, or the continued practice of concepts as encoded in implicit memory, highlights this notion that implicit memory is important to emergent literacy and oral language (Ettlinger, Margulis, & Wong, 2011; Fuchs, Fuchs, Hosp, & Jenkins, 2001; Roediger, Weldon, Stadler, & Riegler, 1992). Overall, frequent exposure and interactions with written text can build automaticity, which can, in turn, have positive effects on oral language and emerging comprehension (McCardle & Chhabra, 2004; Neuman & Dickinson, 2003).

Another aspect of language development is semantics, which refers to the individual's knowledge of what words mean and is hypothesized to be stored in mind as a

“lexicon” (or mental dictionary; Joseph, 2008; McCardle & Chhabra, 2004; Scarborough & Brady, 2002; Soifer, 1999). Vocabulary size of this mental dictionary is associated with later literacy skills, such that the size and quality of the vocabulary influences literacy skills (Chall & Jacobs, 2003), and vocabulary growth has been shown to impact later literacy skills, such as reading comprehension (Hirsch, 2003). For instance, it is estimated that not knowing at least 90 percent of words in a passage will hinder comprehension (Hirsch, 2003). An environment that uses high-quality oral language and values emergent literacy has been found to have positive effects on vocabulary (Evans, 2004; Hart & Risley, 1995).

Reading development. In a comprehensively detailed report by the National Reading Panel (NRP; 2000), findings showed scientific support for direct, explicit and high-quality reading instruction, and indicated phonemic awareness, phonics, vocabulary, fluency, and comprehension as critical to reading development. During early childhood, the development of receptive and expressive oral language is often described as an effortless and explosive phenomenon that sets the foundation for emergent literacy. Unlike oral language development, learning to read requires direct and explicit instruction for an individual to become a proficient reader (Adams & Osborn, 1990).

Reading instruction. Phonemic awareness refers to the isolating, blending, or segmenting phonemes within an oral language. Phonemes represent the smallest units of sound that can alter the meaning of a word and provide the basis for forming words. Previous research has found that an overall awareness and ability to isolate, as well as blend and segment phonemes, is associated with better decoding and comprehension skills (Ehri & Nunes, 2002). Phonics is a set of rules that involve the correspondence

between written letters and sounds, which is facilitative for decoding unknown text. In a meta-analysis of research studies on phonics skills instruction and decoding abilities, a statistically significant moderate effect size ($d = .44$) was found suggesting this type of instruction can account for a moderate amount of emergent reading outcomes (NRP, 2000). Moreover, children in kindergarten and first grade who were at-risk for reading failure and who received phonics instruction were found to significantly improve their decoding abilities. However, this same effect was not found between second and sixth grades, highlighting the importance of early intervention (NRP).

Vocabulary refers to the sets of words students can speak and identify in written form (Aguiar & Brady, 1991). Research in this area has identified a student's vocabulary as a strong predictor of reading ability. Vocabulary is primarily taught through early environmental experiences and direct instruction (Hart & Risley, 1995; Hirsch Jr, 2003; Neuman & Dickinson, 2003). Fluency is the accurate and rapid oral translation of written information (Fuchs, Fuchs, Hosp & Jenkins, 2001). The NRP report also includes prosody (e.g. voice inflection), along with accuracy and speed, as an indicator of fluency (Hasbrouck, 2006). As evidenced by research examining instructional methods measured among groups or individuals, fluency is integral to good comprehension outcomes, (Kuhn & Stahl, 2003; McCardle & Chhabra, 2004).

Comprehension is decoding written text and making inferences about the content. The comprehension process can be conceptualized as a reading rope, with two intertwining strands of rope coming together to formulate an efficient reader across development. The first strand emphasizes early reading abilities, such as decoding and phonological awareness, while the second strand consists of higher-level reading abilities,

such as vocabulary and fluency skills. When these two strands work in unison, readers are more likely to comprehend and interpret the written text and causal inferences (Scarborough, 2001).

Another important aspect of comprehension is the allocation of cognitive resources. Specifically, if an individual is using the majority of their cognitive resources (e.g., working memory) for decoding written words, then there will be little to none left for comprehending and integrating across passages (Perfetti, Hatta, Kawakami, In, & Hatta, 1985). Verbal short-term working memory is also a reliable predictor to explain individual reading differences across emergent literacy research (Melby-Lervåg, Lyster, & Hulme, 2012; Rapala & Brady, 1990).

Appendix C

Secondary Analyses for K and 1st grades

Phoneme Segmentation Fluency and Initial Sound Fluency Measures

Table

Kindergarten Data Analysis Criteria for Phoneme Segmentation Fluency and Initial Sound Fluency			
Criterion Category	Description of Analysis	Criterion not met	Criterion met
1. Mean Comparison	Each student's mean reading performance during the baseline and treatment phases, then the baseline to intervention averages were compared to determine if intervention was quantitatively greater than baseline score.	Intervention mean is less than baseline mean	Intervention mean greater than baseline mean
2. National Norm Comparison	Then the intervention mean was compared to national averages. The following descriptors will be used: above benchmark, below benchmark, and at-risk.	Below Benchmark PSF = 25-39 ISF = 20-29 At-Risk PSF = 0-24 ISF = 0-19	At or Above Benchmark PSF ≥ 40 ISF ≥ 30
3. DIBELS Percentage of Nonoverlapping data points (PND)	A non-overlapping data point analysis identifies the number and percentage of intervention phase data points that are outside the range of the baseline condition data points (above the highest point in baseline). Treatment effectiveness or ineffectiveness was determined based on the following descriptive criteria: > 90% Highly Effective, 70-89% Effective, 50-69% Mild Effectiveness, and <50% Ineffective.	Ineffective = <50%	Highly Effective = > 90% Effective = 70-89% Mild Effectiveness = 50-69%
4. Slope Comparison	The weekly rate of change for the baseline and intervention phases was calculated by using the formula $(y_2 - y_1 / x_2 - x_1)$ to obtain the slope, which is the difference between the last and the first of the respective baseline and intervention scores divided by the difference between the number of data points. This calculation yields the average rate of weekly change (improvement or decline) for the student's DIBELS scores.	Baseline slope is greater than intervention slope	Intervention slope is greater than baseline slope
5. Slope Weekly Change	The intensive learning profile for a student at the middle year is 5 or less correct letter sounds. To obtain the growth profiles the formula $(y_2 - y_1 / x_2 - x_1)$ was used with the denominator as the time variable (33-18) and numerator was each profile's growth. PSF Numerators used: Inadequate	PSF Inadequate Intensive = <0.13 ISF Inadequate	PSF Moderate Intensive to Strategic = 0.20 – 1.80 Accelerated Intensive to

= (9-7); Moderate range lower bound = (10-7) and upper bound = (34-7); and Adequate = (35-7). ISF Numerators used: Inadequate = (9-3); Moderate range lower bound = (9-3) and upper bound = (24-3); and Adequate = (25-3).

Intensive = <0.39

Benchmark = > 1.80

ISF
Moderate
 Intensive to Strategic
 = 0.40 – 1.39
Accelerated
 Intensive to Benchmark
 = > 1.40

Classification

4-5 criteria met = Strong effects
 3 criteria met = Moderate effects
 2 criteria met = Minimal effects
 0-1 criteria met = No Effect

Note: PSF = Phoneme Segmentation Fluency; ISF = Initial Sound Fluency

Student #1 – Jacob

Phoneme Segmentation Fluency. Jacob’s sounds read per minute increased from 11 in the baseline phase to 14.33 in the treatment phase. Compared to national data, Jacob’s intervention average score fell in the “at-risk” range. Regarding non-overlapping data points, Jacob’s scores were categorized as ineffective, with 27% of treatment data points (i.e., 3 of 11) that scored above the highest baseline data point. The baseline slope was -1.0 phonemes lost per week, whereas the treatment phase the slope was steeper (positive) with 1.6 phonemes gained per week. His treatment score fell into the moderate range of growth.

Figure. Jacob’s baseline and treatment phases for Phoneme Segmentation Fluency.

Initial Sound Fluency. His sounds identified in the baseline phase (1.73) were similar to the intervention phase (1.78), indicating no change. Compared to national data, Jacob’s average score in the intervention phase fell in the “at-risk” range. Regarding non-overlapping data points, Jacob’s scores were categorized as mild effectiveness, with 55% of treatment data points (i.e., 6 of 11) that did not overlap with the highest baseline data point. His baseline slope was 0.1 and -0.12 in the treatment phase, indicating that treatment slope decreased and fell into the inadequate range of growth.

Figure. Jacob’s baseline and treatment phases for Initial Sound Fluency

Summary. Based of these analyses, Jacob’s Phoneme Segmentation Fluency scores met three out of the five criteria, indicating moderate effects. As for Initial Sound Fluency no criteria were met, indicating no effect.

Table

Jacob’s Treatment Outcomes for Phoneme Segmentation Fluency and Initial Sound Fluency		
Criterion	Phoneme Segmentation Fluency	Initial Sound Fluency
1 - Mean absolute value	+	=
2 - National Norm Comparison	At-Risk	At-Risk
3 - Non-overlapping data points	Ineffective	Mild Effectiveness
4 - Slope Comparison	+	-
5 - Slope weekly gain	Moderate	Inadequate
Total	Moderate Effects	No Effect

Student #2 - Jeffery

Phoneme Segmentation Fluency. Jeffery’s average sounds read per minute increased from 3.80 in the baseline phase to 29.40 in the treatment phase. Compared to national data, Jeffery’s average score in the treatment phase was classified in the “below benchmark” range. Regarding non-overlapping data points, Jeffery’s scores were categorized as effective, with 100% of treatment data points (i.e., 9 of 9) that scored above the highest baseline data point. His baseline slope was -0.50, whereas his treatment phase slope was steeper with 2.38 gained per week and fell into the accelerated range of growth.

Figure. Jeffery's baseline and treatment phases for Phoneme Segmentation Fluency.

Initial Sound Fluency. His average first sounds identified in the baseline phase were 4.13 but increased slightly in the intervention phase to 5.90. Compared to national data, his score was classified in the “at-risk” range. Regarding non-overlapping data points, Jeffery's scores were categorized as ineffective, with 22% of treatment data points (i.e., 2 of 9) that scored above the highest baseline data point. His baseline slope was 0.42, whereas his treatment slope was -0.31, indicating the treatment slope decreased and fell into the inadequate range of growth.

Figure. Jeffery's baseline and treatment phases for Initial Sound Fluency.

Summary. Based of these analyses, Jeffery’s Phoneme Segmentation Fluency scores met four out of the five criteria, indicating strong effects. As for Initial Sound Fluency only one criterion was met, indicating no effect.

Table

Jeffery’s Treatment Outcomes for Phoneme Segmentation Fluency and Initial Sound Fluency		
Criterion	Phoneme Segmentation Fluency	Initial Sound Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Below Benchmark	At-Risk
3 - Non-overlapping data points	Effective	Ineffective
4 - Slope Comparison	+	-
5 - Slope weekly gain	Accelerated	Inadequate
Total	Strong Effects	No Effect

Student #3 – Adan

Phoneme Segmentation Fluency. His baseline average sounds read per minute was 17 but then increased in the intervention phase to 35. Compared to national data, his score was classified as “above benchmark.” Regarding non-overlapping data points, Adan’s treatment scores were categorized as effective (i.e., 9 of 12), with 75% of treatment data points that scored above the highest baseline data point. His baseline slope was -0.25, whereas his treatment slope was steeper at 3.27 and fell into the accelerated range of growth.

Figure. Adan's baseline and treatment phases for Phoneme Segmentation Fluency.

Initial Sound Fluency. His baseline average sounds read per minute was 3.01 but then increased in the intervention phase to 5.58. Compared to national data, his score was classified as “at-risk.” Regarding non-overlapping data points his treatment scores were categorized as mild effectiveness (i.e., 7 of 12), with 58% of treatment data points that scored above the highest baseline data point. His baseline slope was 0.48 whereas his treatment slope decreased to 0.30, falling into the inadequate range of growth.

Figure. Adan’s baseline and treatment phases for Initial Sound Fluency

Summary. Based of these analyses, Adan’s Phoneme Segmentation Fluency scores met five out of the five criteria, indicating strong effects. As for Initial Sound Fluency, his scores met two of the five criteria, indicating minimal effects.

Table

Adan’s Treatment Outcomes for Phoneme Segmentation Fluency and Initial Sound Fluency		
Criterion	Phoneme Segmentation Fluency	Initial Sound Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Above Benchmark	At-Risk
3 - Non-overlapping data points	Effective	Mild Effectiveness
4 - Slope Comparison	+	-
5 - Slope weekly gain	Accelerated	Inadequate
Total	Strong Effects	Minimal Effects

Student #4 – David

Phoneme Segmentation Fluency. David’s Phoneme Segmentation Fluency average baseline score increased from 25.29 to 35.43 in treatment phase. Compared to national data, his intervention average score fell into the “below benchmark” range. Regarding non-overlapping data points, his treatment scores was categorized as ineffective (i.e., 3 of 10), with 30% of treatment data points that scored above the highest baseline data point. David’s baseline slope was 3.50 phonemes per week, while in the treatment phase the slope decreased to 3.11 phonemes gained per week, indicating the treatment slope remained in the accelerated range of growth.

Figure. David's baseline and treatment phases for Phoneme Segmentation Fluency.

Initial Sound Fluency. His average baseline score was 3.05 but slightly increased in the intervention phase to 3.15. Compared to national data, his scores were classified in the “at-risk” range. Regarding non-overlapping data points, his intervention scores were categorized as ineffective, with 0% of treatment data points (i.e., 0 of 10) that scored above the highest baseline data point. His baseline slope was 0.54 but then decreased in the treatment phase to -0.07, falling into the inadequate range of growth.

Figure. David's baseline and treatment phases for Initial Sound Fluency.

Summary. Based of these analyses, David's Phoneme Segmentation Fluency

scores met two out of the five criteria, indicating minimal effects. As for Initial Sound Fluency only one criterion was met, indicating no effects.

Table

David's Treatment Outcomes for Phoneme Segmentation Fluency and Initial Sound Fluency

Criterion	Phoneme Segmentation Fluency	Initial Sound Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Below Benchmark	At-Risk
3 - Non-overlapping data points	Ineffective	Ineffective
4 - Slope Comparison	-	-
5 - Slope weekly gain	Accelerated	Inadequate
Total	Minimal Effects	No Effects

Student #5 – Laura

Phoneme Segmentation Fluency. Laura's average sounds read per minute slightly increased from 4.00 in the baseline phase to 5.33 in the treatment phase. Compared to national data, her intervention average score fell into the "at-risk" range. Regarding non-overlapping data points, Laura's treatments scores were categorized as effective, with 70% of treatment data points (i.e., 7 of 10) that scored above the highest baseline data point. Her baseline slope was -0.50 whereas her treatment slope decreased to -1.00 in the treatment phase, indicating her treatment slope fell into the inadequate range of growth.

Figure. Laura's baseline and treatment phases for Phoneme Segmentation Fluency.

Initial Sound Fluency. Her average first sounds identified at baseline were 3.40 but then slightly increased in the intervention phase to 4.62. Compared to national data, her scores were classified in the “at-risk” range. Regarding non-overlapping data points, Laura's treatment scores were categorized as effective, with 80% of treatment data points (i.e., 8 of 10) that scored above the highest baseline data point. Her slopes did not demonstrate an increase, with 0.00 in the baseline phase and -0.05 in the treatment phase, falling into the inadequate range of growth.

Figure. Laura's baseline and treatment phases for Initial Sound Fluency.

Summary. Based on these analyses, Laura's Phoneme Segmentation Fluency and

Initial Sound Fluency scores met two out of the five criteria, indicating minimal effects.

Table

Laura's Treatment Outcomes for Phoneme Segmentation Fluency and Initial Sound Fluency

Criterion	Phoneme Segmentation Fluency	Initial Sound Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	At-Risk	At-Risk
3 - Non-overlapping data points	Effective	Effective
4 - Slope Comparison	-	-
5 - Slope weekly gain	Inadequate	Inadequate
Total	Minimal Effects	Minimal Effects

Student #6 – Joseph

Phoneme Segmentation Fluency. Joseph's average sounds read per minute increased from 12.86 in the baseline phase to 34 in the treatment phase. Compared to national data, Joseph's average treatment score was classified in the "below benchmark" range. Regarding non-overlapping data points, his treatment scores were categorized as effective, with 70% of treatment data points (i.e., 7 of 10) that scored above the highest baseline data point. His baseline slope was -1.16 phonemes lost per week, whereas his treatment phase slope was steeper (positive) with 1.55 phonemes gained per week and fell into the moderate range of growth.

Figure. Joseph’s baseline and treatment phases for Phoneme Segmentation Fluency.

Initial Sound Fluency. His average first sounds identified in the baseline phase were 3.45 but then slightly increased in the intervention phase to 5.12. Compared to national data, his treatment average score was classified in the “at-risk” range. Regarding non-overlapping data points, his treatment scores were categorized as ineffective, with 40% of treatment data points (i.e., 4 of 10) that scored above the highest baseline data point. His baseline slope (0.15) and his treatment slope were equal (i.e., 0.15), indicating no change and fell into the inadequate range of growth.

Figure. Joseph’s baseline and treatment phases for Initial Sound Fluency.

Summary. Based of these analyses, Joseph’s Phoneme Segmentation Fluency scores met four out of the five criteria, indicating strong effects. As for Initial Sound Fluency only one criterion was met, indicating no effect.

Table

Joseph’s Treatment Outcomes for Phoneme Segmentation Fluency and Initial Sound Fluency

Criterion	Phoneme Segmentation Fluency	Initial Sound Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Below Benchmark	At-Risk
3 - Non-overlapping data points	Effective	Ineffective
4 - Slope Comparison	+	=
5 - Slope weekly gain	Moderate	Inadequate

Total	Strong Effects	No Effect
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First Grade Students

Table

First Grade Data Analysis Criteria for Phoneme Segmentation Fluency and Initial Sound Fluency

Criterion Category	Description of Analysis	Criterion not met	Criterion met
1. Mean Comparison	Each student's mean reading performance during the baseline and treatment phases, then the baseline to intervention averages were compared to determine if intervention was quantitatively greater than baseline score.	Intervention mean is less than baseline mean	Intervention mean greater than baseline mean
2. National Norm Comparison	Then the intervention mean was compared to national averages. The following descriptors will be used: above benchmark, below benchmark, and at-risk.	Below Benchmark PSF = 25-39 ORF = 32-46 At-Risk PSF = 0-24 ORF = 0-31	At or Above Benchmark PSF $\geq$ 40 ORF $\geq$ 47
3. DIBELS Percentage of Nonoverlapping data points (PND)	A non-overlapping data point analysis identifies the number and percentage of intervention phase data points that are outside the range of the baseline condition data points (above the highest point in baseline). Treatment effectiveness or ineffectiveness was determined based on the following descriptive criteria: > 90% Highly Effective, 70-89% Effective, 50-69% Mild Effectiveness, and <50% Ineffective.	Ineffective = <50%	Highly Effective = > 90% Effective = 70-89% Mild Effectiveness = 50-69%
4. Slope Comparison	The weekly rate of change for the baseline and intervention phases was calculated by using the formula $(y_2 - y_1 / x_2 - x_1)$ to obtain the slope, which is the difference between the last and the first of the respective baseline and intervention scores divided by the difference between the number of data points. This calculation yields the average rate of weekly change (improvement or decline) for the student's DIBELS scores.	Baseline slope is greater than intervention slope	Intervention slope is greater than baseline slope
5. Slope Weekly Change	The intensive learning profile for a student at the middle year is 5 or	PSF Inadequate	PSF Moderate

<p>less correct letter sounds. To obtain the growth profiles the formula $(y_2 - y_1 / x_2 - x_1)$ was used with the denominator as the time variable (33-18) and numerator was each profile's growth. PSF Numerators used: Inadequate = (9-7); Moderate range lower bound = (10-7) and upper bound = (34-7); and Adequate = (35-7). ORF Numerators used: Inadequate = (8-7); Moderate range lower bound = (9-7) and upper bound = (39-7); and Adequate = (40-7).</p>	<p>Intensive = <0.13</p> <p>ISF</p> <p>Inadequate</p> <p>Intensive = <0.07</p>	<p>Intensive to Strategic = $0.20 - 1.80$</p> <p>Accelerated</p> <p>Intensive to Benchmark = > 1.80</p> <p>ORF</p> <p>Moderate</p> <p>Intensive to Strategic = $0.08 - 2.13$</p> <p>Accelerated</p> <p>Intensive to Benchmark = > 2.14</p>
<p>Classification</p>	<p>4-5 criteria met = Strong effects 3 criteria met = Moderate effects 2 criteria met = Minimal effects 0-1 criteria met = No Effect</p>	

Student #7 – Michelle

Phoneme Segmentation Fluency. Michelle's average sounds read per minute increased from 10 in the baseline phase to 51.67 in the treatment phase. Compared to national data, Michelle's treatment average score for PSF was classified as "above benchmark." Regarding non-overlapping data points, Michelle's treatment scores were categorized as ineffective, with 33% of treatment data points (i.e., 4 of 12) that scored above the highest baseline data point. Her baseline slope was 6 phonemes gained per week, whereas in the treatment phase the slope decreased to 5.2 phonemes gained per week. Her treatment slope fell into the accelerated range of growth.

Figure. Michelle’s baseline and treatment phases for Phoneme Segmentation Fluency.

Oral Reading Fluency. Michelle’s average sounds read per minute was similar in the baseline phase (i.e., 5) to the treatment phase (i.e., 5.33). Compared to national data, her treatment average score was classified in the “at-risk” range. Regarding non-overlapping data points, Michelle’s treatment scores were categorized as ineffective, with 0% of treatment data points (i.e., 0 of 12) that scored above the highest baseline data point. Her baseline slope was decreased from 5 in the baseline phase to 0.6 in the treatment phase but fell into the moderate range of growth.

Figure. Michelle’s baseline and treatment phases for Oral Reading Fluency.

Summary. Based of these analyses, Michelle’s Phoneme Segmentation Fluency scores met three out of the five criteria, indicating moderate effects. As for Oral Reading Fluency only one criterion was met, indicating no effect.

Table

Michelle’s Treatment Outcomes for Phoneme Segmentation Fluency and Oral Reading Fluency

Criterion	Phoneme Segmentation Fluency	Oral Reading Fluency
1 - Mean absolute value	+	=
2 - National Norm Comparison	Above Benchmark	At-Risk
3 - Non-overlapping data points	Ineffective	Ineffective
4 - Slope Comparison	-	-
5 - Slope weekly gain	Accelerated	Moderate
Total	Moderate Effects	No Effect

Note. + positive change, = no change, - negative change. **Green** = criteria was met. **Red** = criteria was not met.

Student #8 – Chris

Phoneme Segmentation Fluency. Chris’ average sounds read per minute increased from 47 in the baseline phase to 69.33 in the treatment phase. Compared to national data, Chris’ treatment average score was classified as “above benchmark.” Regarding non-overlapping data points, Chris’ treatment scores were categorized as mild effectiveness, with 64% of treatment data points (i.e., 7 of 11) that scored above the highest baseline data point. His baseline slope was -13.50 phonemes per week, whereas in the treatment phase his slope increased to 4.50 phonemes gained per week and fell into the accelerated range of growth.

Figure. Chris' baseline and treatment phases for Phoneme Segmentation Fluency.

Oral Reading Fluency. Chris' average words read per minute increased from the baseline phase (i.e., 10) to the intervention phased (i.e., 18). Compared to national data, his scores were classified in the "at-risk" range. Regarding non-overlapping data points, Chris' treatment scores were categorized as mild effectiveness, with 55% of treatment data points (i.e., 6 of 11) that scored above the highest baseline data point. His slope in the baseline phase was -1.50 but increased in the treatment phase to 1.10, indicating his treatment slope fell into the moderate range of growth.

Figure. Chris' baseline and treatment phases for Oral Reading Fluency.

Summary. Based on these analyses, Chris' Phoneme Segmentation Fluency scores met five out of the five criteria, indicating strong effects. As for Oral Reading Fluency, Chris' scores met four out of the five criteria, indicating no strong effects.

Table

Chris' Treatment Outcomes for Phoneme Segmentation Fluency and Oral Reading Fluency

Criterion	Phoneme Segmentation Fluency	Oral Reading Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Above Benchmark	At-Risk
3 - Non-overlapping data points	Mild Effectiveness	Mild Effectiveness
4 - Slope Comparison	+	+
5 - Slope weekly gain	Accelerated	Moderate
Total	Strong Effects	Strong Effects

Note. + positive change, = no change, - negative change. Green = criteria was met. Red = criteria was not met.

Student #9 – Alex

Phoneme Segmentation Fluency. Alex's average sounds read per minute increased from 52.40 in the baseline phase to 63.60 in the treatment phase. Compared to national data, Alex's treatment scores were classified as "above benchmark." Regarding non-overlapping data points, Alex's treatment scores were categorized as mild

effectiveness, with 60% of treatment data points (i.e., 6 of 10) that scored above the highest baseline data point. The baseline slope was 1.00 phoneme gained per week, and in the treatment phase the slope increased to 1.78 phonemes gain per week. His treatment fell into the moderate range of growth.

Figure. Alex's baseline and treatment phases for Phoneme Segmentation Fluency.

Oral Reading Fluency. Alex's average words read per minute increased from the baseline phase from 2.80 to 4 in the intervention phase. Compared to national data, his treatment average score was classified in the "at-risk" range. Regarding non-overlapping data points, Alex's treatment scores were categorized as ineffective, with 30% of treatment data points (i.e., 3 of 10) that scored above the highest baseline data point. His baseline slope was -1.00 but slightly increased to -0.22 in the treatment phased, and fell into the inadequate range of growth.

Figure. Alex's baseline and treatment phases for Oral Reading Fluency.

Summary. Based on these analyses, Alex's Phoneme Segmentation Fluency treatment scores met five out of the five criteria, indicating strong effects. As for Oral Reading Fluency, Alex's treatment scores met two of the five criteria, indicating minimal effects.

Table

Alex's Treatment Outcomes for Phoneme Segmentation Fluency and Oral Reading Fluency

Criterion	Phoneme Segmentation Fluency	Oral Reading Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Above Benchmark	At-Risk
3 - Non-overlapping data points	Mild Effectiveness	Ineffective
4 - Slope Comparison	+	+
5 - Slope weekly gain	Moderate	Inadequate
Total	Strong Effects	Minimal Effects

Note. + positive change, = no change, - negative change. Green = criteria was met. Red = criteria was not met.

Student #10 - Janet

Phoneme Segmentation Fluency. Janet's average sounds read per minute increased from 28.86 in the baseline phase to 50.71 in the treatment phase. Compared to national data, Janet's treatment score was classified as "above benchmark." Regarding non-overlapping data points, her treatment scores were categorized as mild effectiveness,

with 50% of treatment data points (i.e., 5 of 10) that scored above the highest baseline data point. Janet’s baseline slope was 2.00 phonemes gained per week, whereas in the treatment phase the slope decreased to -0.78 phonemes lost per week and fell into the inadequate range of growth.

Figure. Janet’s baseline and treatment phases for Phoneme Segmentation Fluency.

Oral Reading Fluency. Janet’s average words read per minute increased from 0.86 in the baseline phase to 1.86 in the intervention phase. Compared to national data, her scores were classified in the “at-risk” range. Regarding non-overlapping data points, Janet’s treatment scores were categorized as ineffective, with 20% of treatment data points (i.e., 2 of 10) that scored above the highest baseline data point. Her slope in the baseline phase decreased from -0.17 to -0.22 in the treatment phase and fell into the inadequate range of growth.

Figure. Janet's baseline and treatment phases for Oral Reading Fluency.

Summary. Based on these analyses, Janet's Phoneme Segmentation Fluency treatment scores met three out of the five criteria, indicating moderate effects. As for Initial Sound Fluency only one criterion was met, indicating no effect.

Table

Janet's Treatment Outcomes for Phoneme Segmentation Fluency and Oral Reading Fluency		
Criterion	Phoneme Segmentation Fluency	Oral Reading Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Above Benchmark	At-Risk
3 - Non-overlapping data points	Mild Effectiveness	Ineffective
4 - Slope Comparison	-	-
5 - Slope weekly gain	Inadequate	Inadequate
Total	Moderate Effects	No Effect

Note. + positive change, = no change, - negative change. Green = criteria was met. Red = criteria was not met.

Student #11 – Jennifer

Phoneme Segmentation Fluency. Jennifer's average sounds read per minute increased from 54.67 in the baseline phase to 68.33 in the treatment phase. Compared to national data, Jennifer's treatment average was classified as in the "above benchmark" range. Regarding non-overlapping data points, Jennifer's treatment scores were

categorized as mild effectiveness, with 50% of treatment data points (i.e., 5 of 10) that scored above the highest baseline data point. Her baseline slope was -8.00 phonemes lost per week but then increased to 1.22 phonemes gained per week in the treatment phase. Her treatment slope fell into the moderate range of growth.

Figure. Jennifer's baseline and treatment phases for Phoneme Segmentation Fluency.

Oral Reading Fluency. Jennifer's average words read per minute increased from 3.33 in the baseline phase to 12 in the treatment phase. Compared to national data, her treatment score was classified in the "at-risk" range. Regarding non-overlapping data points, Jennifer's scores were categorized as effective, with 80% of treatment data points (i.e., 8 of 10) that scored above the highest baseline data point. Her slope in the baseline phase was -0.50 but then increased to 1.56 in the treatment phase, falling into the moderate range of growth.

Figure. Jennifer's baseline and treatment phases for Oral Reading Fluency.

Summary. Based on these analyses, Jennifer's Phoneme Segmentation Fluency scores met five out of the five criteria, indicating strong effects. Similarly for Oral Reading Fluency, her scores met four out of the five criteria, indicating strong effects.

Table

Jennifer's Treatment Outcomes for Phoneme Segmentation Fluency and Oral Reading Fluency		
Criterion	Phoneme Segmentation Fluency	Oral Reading Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Above Benchmark	At-Risk
3 - Non-overlapping data points	Mild Effectiveness	Effective
4 - Slope Comparison	+	+
5 - Slope weekly gain	Moderate	Moderate
Total	Strong Effects	Strong Effects

Note. + positive change, = no change, - negative change. Green = criteria was met. Red = criteria was not met.

Student #12 – Edgar.

Phoneme Segmentation Fluency. Edgar's average sounds read per minute increased from 11 in the baseline phase to 25 in the treatment phase. Compared to national data, his treatment average was classified as in the "above benchmark" range. Regarding non-overlapping data points, Edgar's treatment scores were categorized as

ineffective, with 18% of treatment data points (i.e., 2 of 11) that scored above the highest baseline data point. His baseline slope was -1.0 phonemes lost per week, where in the treatment phase his slope was positive with 0.9 phonemes gain per week. His treatment slope fell into the moderate range of growth.

Figure. Edgar's baseline and treatment phases for Phoneme Segmentation Fluency.

Oral Reading Fluency. His average words read per minute increased from 1 in the baseline phase to 3.33 in the intervention phase. Compared to national data, his scores were classified in the “at-risk” range. Regarding non-overlapping data points, Edgar's treatment scores were categorized as ineffective, with 18% of treatment data points (i.e., 2 of 11) that scored above the highest baseline data point. The baseline slope was -1.5 but then slightly increased to 0.2 in the treatment phase, falling into the moderate range of growth.

Figure. Edgar's baseline and treatment phases for Oral Reading Fluency.

Summary. Based on these analyses, Edgar's Phoneme Segmentation Fluency scores met four out of the five criteria, indicating strong effects. As for Oral Reading Fluency, Edgar's scores met three of the five criteria, indicating moderate effects.

Table

Edgar's Treatment Outcomes for Phoneme Segmentation Fluency and Oral Reading Fluency

Criterion	Phoneme Segmentation Fluency	Oral Reading Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Above Benchmark	At-Risk
3 - Non-overlapping data points	Ineffective	Ineffective
4 - Slope Comparison	+	+
5 - Slope weekly gain	Moderate	Moderate
Total	Strong Effects	Moderate Effects

Note. + positive change, = no change, - negative change. Green = criteria was met. Red = criteria was not met.

Student #13 – Kevin

Phoneme Segmentation Fluency. Kevin's average treatment sounds read per minute increased from 60.8 in the baseline phase to 75.6 in the treatment phase.

Compared to national data, Kevin's treatment average score was classified as in the "above benchmark" range. Regarding non-overlapping data points, Kevin's treatment scores were categorized as mild effectiveness, with 60% of treatment data points (i.e., 6

of 10) that scored above the highest baseline data point. The baseline slope was 5.5 sounds gained per week, whereas in the treatment phase the slope decreased to 3.1 phonemes gained per week. His treatment slope fell into the accelerated range of growth.

Figure. Kevin's baseline and treatment phases for Phoneme Segmentation Fluency.

Oral Reading Fluency. Kevin's treatment average words read per minute increased from 2.2 in the baseline phase to 4 in the intervention phase. Compared to national data, Kevin's average treatment score was classified in the "at-risk" range. Regarding non-overlapping data points, Kevin's treatment scores were categorized as ineffective, with 40% of treatment data points (i.e., 4 of 10) that scored above the highest baseline data point. The baseline slope was .25 but then decreased slightly to 0.10 in the treatment phase, which his treatment slope fell into the moderate range of growth.

Figure. Kevin's baseline and treatment phases for Oral Reading Fluency.

Summary. Based on these analyses, Kevin's Phoneme Segmentation Fluency scores met four out of the five criteria, indicating strong effects. As for Oral Reading Fluency, Kevin's scores met two out of the five criteria, indicating minimal effects.

Table

Kevin's Treatment Outcomes for Phoneme Segmentation Fluency and Oral Reading Fluency

Criterion	Phoneme Segmentation Fluency	Oral Reading Fluency
1 - Mean absolute value	+	+
2 - National Norm Comparison	Above Benchmark	At-Risk
3 - Non-overlapping data points	Mild Effectiveness	Ineffective
4 - Slope Comparison	-	-
5 - Slope weekly gain	Accelerated	Moderate
Total	Strong Effects	Minimal Effects

Note. + positive change, = no change, - negative change. Green = criteria was met. Red = criteria was not met.

Student #14 – Anita.

Phoneme Segmentation Fluency. Anita's average sounds read per minute increased from 1.71 in the baseline phase to 8.57 in the treatment phase. Compared to national data, Anita's treatment average was classified as in the "at-risk" range. Regarding non-overlapping data points, her treatment scores were categorized as mild

effectiveness, with 56% of treatment data points (i.e., 5 of 9) that scored above the highest baseline data point. Her baseline slope was 0.33 sounds gained per week but then increased to 2.13 sounds gained per week in the treatment phase. Her treatment slope fell into the accelerated range of growth.

Figure. Anita's baseline and treatment phases for Phoneme Segmentation Fluency.

Oral Reading Fluency. Anita's average words read per minute were the same from the baseline phase (i.e., 2.86) to the treatment phase (i.e., 2.86). Compared to national data, her treatment score was classified in the "at-risk" range. Regarding non-overlapping data points, Anita's scores were categorized as ineffective, with 0% of treatment data points (i.e., 0 of 9) that scored above the highest baseline data point. Her slope in the baseline phase was -0.33 but then slightly increased to 0.36 in the treatment phase, falling into the moderate range of growth.

Figure. Anita's baseline and treatment phases for Oral Reading Fluency.

Summary. Based on these analyses, Anita's Phoneme Segmentation Fluency treatment scores met four out of the five criteria, indicating strong effects. Similarly for Oral Reading Fluency, her scores met two out of the five criteria, indicating minimal effects.

Table

Anita's Treatment Outcomes for Phoneme Segmentation Fluency and Oral Reading Fluency

Criterion	Phoneme Segmentation Fluency	Oral Reading Fluency
1 - Mean absolute value	+	=
2 - National Norm Comparison	At-Risk	At-Risk
3 - Non-overlapping data points	Mild Effectiveness	Ineffective
4 - Slope Comparison	+	+
5 - Slope weekly gain	Accelerated	Moderate
Total	Strong Effects	Minimal Effects

Note. + positive change, = no change, - negative change. Green = criteria was met. Red = criteria was not met.

Appendix D

Parent Measures and Secondary Indicator Analyses

Table

Parent Measures for Kindergarten and First Grades ordered by Primary Analyses then by Secondary Indicator Analyses

Student by Grade/ Measure	Age (years)	Gender	Marital Status	Family Size	Income per year	Parent Education	Secondary Indicator Analysis	Secondary Indicator Analysis
<i>K</i>							(PSF)	(ISF)
Student #6 Joseph	36	Female	Yes	5	\$30,000	Technical Degree	Strong Effects	No Effect
Student #1 Jacob	40	Male	Yes	3	\$15,000	Technical Degree	Moderate Effects	No Effect
<i>1st</i>							(PSF)	(ORF)
Student #9 Alex	33	Female	No	3	\$15,000	High School	Strong Effects	Minimal Effects
Student #12 Edgar	54	Male	Yes	4	\$15,000	High School	Strong Effects	Moderate Effects
Student #7 Michelle	27	Female	No	5	\$15,000	High School	Moderate Effects	No Effect
Student #13 Kevin	28	Female	No	>6	\$30,000	High School	Strong Effects	Minimal Effects
Student #11 Jennifer	32	Female	Yes	4	\$30,000	High School	Strong Effects	Strong Effects

Appendix E

Baseline and Treatment Means for Fluency Measures

Reading Measure		Baseline		Treatment	
<i>Kindergarten</i>					
Jacob		Mean	Range	Mean	Range
	NWF	3.14	0-10	5.29	0-11
	PSF	25.29	12-33	35.43	22-55
	ISF	3.05	1.97-5.20	3.15	1.32-4.89
Jeffery					
	NWF	5.40	1-13	15.80	11-19
	PSF	3.80	2-7	29.40	9-35
	ISF	4.13	2.31-6.00	5.90	4.40-8.48
Adan					
	NWF	8.40	3-12	17.60	3-29
	PSF	17	9-24	35	12-48
	ISF	3.01	0.90-4.80	5.58	3.11-7.77
David					
	NWF	3.14	0-10	5.29	0-11
	PSF	25.29	12-33	35.43	22-55
	ISF	3.05	1.97-5.20	3.15	1.32-4.89
Laura					
	NWF	20.67	17-24	10	2-21
	PSF	4.00	3-5	5.33	3-16
	ISF	3.40	3.18-3.84	4.62	2.45-5.19
Joseph					
	NWF	5.86	2-22	17.14	1-32
	PSF	12.86	3-25	34	14-57
	ISF	3.45	1.85-5.18	5.12	2.77-6.17
First Grade					
Michelle					
	NWF	3.33	1-5	20.67	1-28
	PSF	10	4-16	51.67	2-69
	ORF	5	1-12	5.33	0-7
Chris					
	NWF	42.67	28-58	29.33	19-66
	PSF	47	33-60	69.33	31-76
	ORF	10	7-13	18	6-23
Alex					
	NWF	31.40	27-39	22.40	17-31
	PSF	52.40	48-60	63.60	48-75
	ORF	2.80	1-5	4	2-7
Janet					
	NWF	6	2-12	7.71	0-17
	PSF	28.86	16-46	50.71	26-71

Jennifer	ORF	0.86	0-2	1.86	0-4
	NWF	15	8-19	30.67	7-48
	PSF	54.67	48-64	68.33	48-77
Edgar	ORF	3.33	2-5	12	1-15
	NWF	5	3-8	9.67	0-19
	PSF	11	8-15	25	3-40
Kevin	ORF	1	0-3	3.33	0-6
	NWF	7.4	5-10	21.6	7-26
	PSF	60.8	43-67	75.6	52-80
Anita	ORF	2.2	1-4	4	2-7
	NWF	13.8	2-25	28.43	17-42
	PSF	1.71	0-4	8.57	0-17
	ORF	2.86	0-5	2.86	1-5

Appendix F

PRBI Means, Standard Deviations, and Range of Scores

Item	M	SD	Min	Max
Teaching Efficacy	3.86	0.38	3.00	4.00
Teaching Efficacy	2.71	1.25	1.00	4.00
Teaching Efficacy	4.00	0.00	4.00	4.00
Teaching Efficacy	2.43	1.40	1.00	4.00
Teaching Efficacy	3.57	0.53	3.00	4.00
Teaching Efficacy	2.14	1.07	1.00	3.00
Teaching Efficacy	3.86	0.38	3.00	4.00
Teaching Efficacy	2.71	0.95	1.00	4.00
Teaching Efficacy	3.86	0.38	3.00	4.00
Positive Affect	2.57	0.53	2.00	3.00
Positive Affect	3.43	0.53	3.00	4.00
Positive Affect	3.14	0.69	2.00	4.00
Positive Affect	3.29	0.76	2.00	4.00
Positive Affect	2.57	0.79	2.00	4.00
Positive Affect	3.43	0.53	3.00	4.00
Positive Affect	3.14	1.07	1.00	4.00
Positive Affect	2.86	0.69	2.00	4.00
Positive Affect	2.86	0.90	1.00	4.00
Positive Affect	3.00	0.82	2.00	4.00
Positive Affect	3.57	0.53	3.00	4.00
Verbal Participation	3.57	0.53	3.00	4.00
Verbal Participation	3.43	0.53	3.00	4.00
Verbal Participation	3.43	0.53	3.00	4.00
Verbal Participation	3.14	0.69	2.00	4.00
Verbal Participation	3.43	0.53	3.00	4.00
Verbal Participation	3.14	0.69	2.00	4.00
Verbal Participation	3.29	0.49	3.00	4.00
Verbal Participation	2.86	0.90	1.00	4.00
Reading Instruction	1.86	0.38	1.00	2.00
Reading Instruction	2.00	0.82	1.00	3.00
Reading Instruction	2.71	0.76	2.00	4.00
Reading Instruction	3.43	0.53	3.00	4.00
Knowledge Base	2.86	0.69	2.00	4.00
Knowledge Base	3.14	0.69	2.00	4.00
Knowledge Base	3.43	0.53	3.00	4.00
Knowledge Base	3.43	0.53	3.00	4.00
Knowledge Base	3.14	0.69	2.00	4.00

Resources	3.00	0.00	3.00	3.00
Resources	2.86	0.38	2.00	3.00
Resources	3.00	0.00	3.00	3.00
Resources	3.14	0.38	3.00	4.00
Environmental Input	2.00	1.00	1.00	3.00
Environmental Input	1.43	0.53	1.00	2.00
PBRI Total Score	130.71	9.78	118.00	143.00

Appendix G

Summer Treatment Program Rules

Rules were taken from the summer treatment program and are highly effective in managing a wide array of classroom behaviors (Graziano, Slavec, Hart, Garcia, & Pelham Jr, 2014).

1. Be Respectful
2. Follow Directions
3. Work Quietly
4. Use Materials and Possessions Appropriately (a.k.a. “Use your stuff right.”)
5. Remain in Your Assigned Seat or Area
6. Raise Your Hand to Speak or Ask for Help
7. Look, Listen, & Pay Attention

Appendix H

Socio-Demographic Information (English and Spanish)

Child's Age: _____

Parent's Age: _____

Parent's Gender: _____

Relationship to child:

☐ Biological parent

☐ Adoptive parent

☐ Step-parent

☐ Legal guardian

☐ Other Specify: _____

Race/Ethnicity:

☐ Colombian

☐ Cuban

☐ Puerto Rican

☐ Dominican

☐ Mexican

☐ Other Specify: _____

Marital Status:

☐ Single

☐ In a relationship

☐ Married

☐ Separated

☐ Divorced

☐ Widow

Level of Education:

☐ Some High School

☐ High School degree

☐ Some College

☐ Associates degree

☐ Bachelor's degree

☐ Graduate degree

Average Annual Family Income:

☐ \$0 – \$14,999

☐ \$15,000 – \$29,999

☐ \$30,000 – \$44,999

☐ \$45,000 – \$59,999

☐ \$60,000 – \$74,999

☐ \$75,000 – above

What is the number of individuals living in the home?

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6 or more

Información sociodemográfica

Edad de su niño(a): ____

Su edad: ____

Su género: ____

Relación con niño(a):

- ☐ Padre biológico
- ☐ Padre adoptivo
- ☐ Padrastro
- ☐ Tutor legal
- ☐ Otro: _____

Estatus marital:

- ☐ Soltero
- ☐ En una relación
- ☐ Casado
- ☐ Separado
- ☐ Divorciado
- ☐ Viudo

Medio sueldo anual de familia:

- ☐ \$0 – \$14,999
- ☐ \$15,000 – \$29,999
- ☐ \$30,000 – \$44,999
- ☐ \$45,000 – \$59,999
- ☐ \$60,000 – \$74,999
- ☐ \$75,000 – above

Raza:

- ☐ Colombiano
- ☐ Cubano
- ☐ Puertorriqueño
- ☐ Dominicano
- ☐ Mexicano
- ☐ Otro: _____

Nivel de educación:

- ☐ Lleva un poco de secundaria
- ☐ Título de secundaria
- ☐ Lleva un poco de universidad
- ☐ Título técnico
- ☐ Título bachillerato
- ☐ Título avanzado

Cuántas personas están viviendo en su hogar?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ 6 o mas

Appendix I

Bilingual Dominance Scale (English and Spanish)

Questions 1: At what age did you first learn Spanish _____?

Question 2: At what age did you first learn English _____?

Questions 3: At what age did you feel comfortable speaking this language? (If you still do not feel comfortable, please write “not yet.”) Spanish _____

Question 4: At what age did you feel comfortable speaking this language? (If you still do not feel comfortable, please write “not yet.”) English _____

Question 5: Which language do you predominately use at home? Spanish _____
English _____ Both _____

Question 6: When doing math in your head (such as multiplying 243×5), which language do you calculate the numbers in? _____

Question 7: If you have a foreign accent, which language(s) is it in? _____

Question 8: If you had to choose which language to use for the rest of your life, which language would it be? _____

Questions 9: How many years of schooling (primary school through university) did you have in: Spanish _____

Question 10: How many years of schooling (primary school through university) did you have in:

English _____

Question 11: Do you feel that you have lost any fluency in a particular language?

If yes, which one? _____ At what age? _____

Question 12: What country/region do you currently live in? _____

Escala dominada de las habilidades bilingües

Cuestión 1: ¿A qué edad aprendió usted el Español _____?

Cuestión 2: ¿A qué edad aprendió usted el Inglés _____?

Cuestión 3: ¿A qué edad sintió cómodo usando este idioma? (Si todavía no siente cómodo, por favor escribe “no”) Español _____

Cuestión 4: ¿A qué edad sintió cómodo usando este idioma? (Si todavía no siente cómodo, por favor escribe “no”) Inglés _____

Cuestión 5: ¿Cuál es el idioma que hablan en su hogar la mayoría de tiempo? Español _____ Inglés _____ Los dos _____

Cuestión 6: ¿Cuando usted esta haciendo matemáticas en su mente (como multiplicando 243×5), cual idioma lo use para calcular? _____

Cuestión 7: ¿Si usted tenga un acento extranjero, en cual idioma(s) lo tenga? _____

Cuestión 8: ¿Si tuviera escoger un idioma para toda su vida, que escogería? _____

Cuestión 9: ¿Cuántos años de escuela (primara hasta universidad) ha tomado en: Español _____

Cuestión 10: ¿Cuántos años de escuela (primara hasta universidad) ha tomado en: Inglés _____

Cuestión 11: ¿Siente que usted ha perdido la fluidez en uno de sus idioma que usted habla? _____

¿si, cuál idioma? _____ A que edad? _____

Cuestión 12: En que país vive ahora usted? _____

Appendix J

PRBI Questionnaire (English & Spanish)

Listed below are several statements about parent's attitudes and beliefs. Circle the answer that is closest to your feelings. Please answer each question in response to your child. There are no right or wrong answers. Your own opinions are important to us.

1) As a parent, I play an important role in my child's development.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
2) There is little I can do help my child get ready to do well in school. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
3) My child learns many important things from me.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
4) I would like to help my child learn, but I don't know how. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
5) I am my child's most important teacher.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
6) Schools are responsible for teaching children, not parents. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
7) Parents need to be involved in their children's education.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
8) When my child goes to school, the teacher will teach my child everything my child needs to know so I don't need to worry. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
9) Children do better in school when their parents also teach them things at home.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
10) I find it boring or difficult to read to my child. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
11) I enjoy reading with my child.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
12) I have good memories of being read to when I was a child.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

13) Reading with my child is a special time that we love to share.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
14) My child does not like to be read to. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
15) I feel warm and close to my child when we read			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
16) I have to scold or discipline my child when we try to read. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
17) I want my child to love books.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
18) I don't read to my child because he or she won't sit still. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
19) I read to my child whenever he or she wants.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
20) When we read I try to sound excited so my child stays interested. <i>(two scales)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
21) Children learn new words, colors, names, etc. from books.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
22) Reading helps children be better talkers and better listeners.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
23) My child knows the names of many things he or she has seen in books.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
24) When we read, I want my child to help me tell the story.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
25) I ask my child a lot of questions when we read.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
26) When we read, I want my child to ask questions about the book.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
27) When we read we talk about the pictures as much as we read the story.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
28) I read with my child so he/she will learn the letters and how to read simple words. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
29) Parents should teach children how to read before they start school. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

30) My child is too young to learn about reading. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
31) When we read, I have my child point out different letters or numbers that are printed in the book.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
32) I try to make the story more real to my child by relating the story to his or her life.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
33) Stories help build my child's imagination.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
34) My child learns lessons and morals from the stories we read.			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
35) Reading helps children learn about things they never see in real life (like Eskimos and polar bears).			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
36) My child learns important life skills from books (like how to follow a cooking recipe, how to protect themselves from strangers).			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
37) Even if I would like to, I'm just too busy and too tired to read to my child. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
38) I don't read to my child because we have nothing to read. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
39) I don't read to my child because there is no room and no quiet place in the house. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
40) I don't read to my child because I have other, more important things to do as a parent. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4
41) Some children are natural talkers, others are silent. Parents do not have much influence over this. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	3	4	
42) Children inherit their language ability from their parents in their genes. <i>(Reverse)</i>			
Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Inventario de opiniones de los padres con respecto a la lectura

A continuación se mencionan varias actitudes y opiniones que los padres de familia podrían tener con respecto a la lectura. Encierre en un círculo la respuesta que más se parezca a la opinión que usted tenga. Conteste cada pregunta con respecto a su hijo/a de edad preescolar. No hay respuestas correctas ni incorrectas. Sus opiniones son importantes para nosotros.

- 1) **Como padre de familia, tengo una función importante en cuanto al desarrollo de mi hijo/a.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 2) **Es poco lo que puedo hacer para preparar a mi hijo/a, a fin de que le vaya bien en la escuela.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 3) **Mi hijo/a aprende de mí muchas cosas importantes.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 4) **Me gustaría ayudar a mi hijo/a a aprender, pero no sé cómo hacerlo.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 5) **Soy el / la maestro/a más importante de mi hijo/a.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 6) **Las escuelas, y no los padres, tienen la responsabilidad de enseñarles a los niños.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 7) **Los padres deben participar en la educación de sus hijos.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 8) **Cuando mi hijo/a va a la escuela, el / la maestro/a le enseña todo lo que él / ella debe saber, de modo que no debo preocuparme por eso.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 9) **A los niños les va mejor en la escuela cuando los padres también les enseñan cosas en el.**

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
-------------------	---------------	------------	----------------

- 10) Se me hace aburrido o difícil leerle a mi hijo/a.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 11) Me gusta leer con mi hijo/a.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 12) Tengo recuerdos agradables de cuando me leían a mí cuando yo era niño/a.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 13) Leer junto con mi hijo/a es un momento especial que nos encanta disfrutar juntos.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 14) A mi hijo/a no le gusta que le lean.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 15) Cuando leemos juntos me siento cariñosamente unido a mi hijo/a.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 16) Tengo que regañar o disciplinar a mi hijo/a cuando tratamos de leer.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 17) Quisiera que a mi hijo/a le gustaran mucho los libros.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 18) No le leo a mi hijo/a porque no se queda quieto/a.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 19) Le leo a mi hijo/a cada vez que él / ella así lo desea.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 20) Cuando leemos juntos, trato de hacerlo con entusiasmo, a fin de que mi hijo/a se mantenga interesado/a en la lectura.**

	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 21) En los libros los niños aprenden palabras, colores, nombres nuevos, etc.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 22) La lectura ayuda a que los niños hablen mejor y escuchen con más atención.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 23) Mi hijo/a sabe el nombre de muchas cosas que ha visto en los libros.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 24) Cuando leemos, quiero que mi hijo/a me ayude a contar el cuento.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 25) Le hago muchas preguntas a mi hijo/a cuando estamos leyendo.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 26) Cuando leemos, me gustaría que mi hijo/a hiciera muchas preguntas acerca del libro.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 27) Cuando leemos, hablamos de los dibujos a la vez que leemos el cuento.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 28) Leo con mi hijo/a para que aprenda las letras, así como a leer palabras sencillas.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 29) Los padres deberían enseñarles a leer a sus hijos antes de que ellos empiecen a ir a la escuela.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|
- 30) Mi hijo/a está demasiado joven para aprender acerca de la lectura.**
	Muy en desacuerdo
1 | En desacuerdo
2 | De acuerdo
3 | Muy de acuerdo
4 |
|--|------------------------|--------------------|-----------------|---------------------|

- 31) Cuando leemos, le pido a mi hijo/a que señale las letras o los números que estén impresos en el libro.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 32) Para que el cuento le parezca más real a mi hijo, trato de relacionarlo con su vida.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 33) Los cuentos sirven para desarrollar la imaginación de mi hijo/a.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 34) Mi hijo/a aprende lecciones de buen comportamiento y de buenas costumbres en los cuentos que leemos.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 35) La lectura ayuda a los niños a aprender acerca de cosas que nunca ven en la vida real (por ejemplo: dinosaurios).**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 36) Mi hijo aprende en los libros conocimientos prácticos para la vida diaria (por ejemplo: cómo preparar una receta de cocina).**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 37) Aunque me gustaría hacerlo, estoy demasiado ocupado/a o cansado/a para leerle a mi hijo/a.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 38) No le leo a mi hijo/a, porque no tenemos nada que leer.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 39) No le leo a mi hijo/a, porque en la casa no hay espacio ni un lugar tranquilo.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 40) No le leo a mi hijo/a porque tengo otras cosas más importantes que hacer como padre de familia.**
Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4
- 41) Hay niños que, por naturaleza, les gusta hablar. Hay otros que son callados. Los padres no tienen**

mucho que ver en eso.

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4

42) Los niños nacen con la capacidad para aprender a hablar, la cual heredan de sus padres.

Muy en desacuerdo	En desacuerdo	De acuerdo	Muy de acuerdo
1	2	3	4

Appendix K

Elementary Reading Survey Attitude Scale

Please circle the picture that describes how you feel when you read a book.

1.	How do you feel when you read a book on a rainy Saturday?

2.	How do you feel when you read a book in school during free time?

3.	How do you feel about reading for fun at home?

4.	How do you feel about getting a book for a present?

Please circle the picture that describes how you feel when you read a book.

5.	How do you feel about spending free time reading a book?

6.	How do you feel about starting a new book?

7.	How do you feel about reading during summer vacation?

8.	How do you feel about reading instead of playing?

Please circle the picture that describes how you feel when you read a book.

9.	How do you feel about going to a bookstore?

10.	How do you feel about reading different kinds of books?

11.	How do you feel when a teacher asks you questions about what you read?

12.	How do you feel about reading workbook pages and worksheets?

Please circle the picture that describes how you feel when you read a book.

13.

How do you feel about reading in school?

14.

How do you feel about reading your school books?

15.

How do you feel about learning from a book?

16.

How do you feel when it's time for reading in class?

Please circle the picture that describes how you feel when you read a book.

17.	How do you feel about stories you read in reading class?

18.	How do you feel when you read out loud in class?

19.	How do you feel about using a dictionary?

20.	How do you feel about taking a reading test?

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