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Abstract

Early literacy skills are considered prerequisites for early learners to eventually become effective readers (Storch & Whitehurst, 2002). Increasing early literacy skills is often the goal of teachers and schools, but skill acquisition can be hindered due to the bidirectional relationship between behavior difficulties and academic skill deficits. To compound this struggle, there is limited research available on the use of behavioral interventions that exist in conjunction with early academic interventions (Volpe et al., 2012). The goal of the current study was to pilot three emerging early literacy interventions: Fluency Letter Wheel; Letter Flash; and I Do, We Do, You Do. All three interventions were pulled from the Florida Center for Reading Research (FCRR), and target letter sound fluency (LSF). The second objective of this study was to examine an early academic intervention in conjunction with behavior management techniques (i.e., reinforcement and differential attention). One 7-year-old student with a history of academic and behavioral difficulties was examined across 13 individual academic sessions. A brief experimental analysis (BEA) was utilized within an alternating treatments design to identify the most effective academic intervention. A changing criterion design was then used after the I do, We do, You do intervention emerged as the most effective academic intervention. Results indicated that this intervention had moderate effects for increasing skill acquisition. In addition, skill acquisition of LSF was noted to increase from a frustrational range to a grade

level instructional range during intervention implementation. Limitations, implications, and future directions of this research are discussed.

Keywords: *academic intervention, early childhood, early literacy, skill deficit, performance deficit*

An Early Childhood Intervention Targeting Academic and Behavioral Skill Deficits

Over the past few decades, literature has documented the complicated transactional relationship between students' academic skill deficits and behavioral difficulties (i.e., performance deficits; Hinshaw, 1992; Kuchle et al., 2015; Marguin & Loeber, 1996; Nelson et al., 2004). An individual exhibits a skill deficit when they are unable to complete a given task because they do not possess the necessary skillset. On the other hand, a performance deficit is when an individual possesses the skills needed to complete a task but fails to exhibit these skills due to some internal or external variables (Eckert et. al., 2002). While the etiology of these problems is not always clear, research has suggested that academic and behavior problems occur in tandem for 50-80% of students (Benner et al., 2010).

Research evaluating the correlation between on-task behaviors and skill acquisition has reported a common theme: solely targeting behavioral skill deficits does little to improve academic performance (Daly et al., 2002; Duhon et al., 2004; Gickling & Armstrong, 1978). Other studies have noted that when skill deficits and behavioral problems coincide, skill acquisition is often dramatically slowed or, in severe cases, nonexistent if the behavioral problems are not addressed (Nelson et al., 2004). Gilbertson et al. (2008) demonstrated this concept by comparing the effects of contingent reinforcement of on-task behaviors to contingent reinforcement of on-task behaviors in conjunction with a math fluency intervention. They found that, across four elementary students referred for both academic and behavior problems, contingent reinforcement with the math fluency

instruction yielded the highest increases for both math fluency and on-task behaviors. This example emphasizes the importance of incorporating evidence-based interventions that provide both behavior and academic support.

Other examples of successful interventions for students with both behavior and academic concerns have been documented. For example, Cook et al. (2012) examined the relative effectiveness of a behavioral intervention alone and a combined behavioral and academic intervention for increasing reading fluency and decreasing behavioral concerns with six middle school students. Their results indicated that, across all six students, the combined intervention was most effective for increasing reading fluency rate and decreasing behavioral difficulties. More recently, Gettinger et al. (2021) highlighted the need for integrated academic-behavior interventions as the demands on educators increase and resources decrease for most American schools. Gettinger and colleagues' approach entitled Academic and Behavior Combined Support outlined ten steps (i.e., expectations, goal setting, modeling, repeated practice, prompting, feedback, error correction, graphing, rewards, and programmed generalization) that educators should use when elementary students fall below benchmarking standards for reading fluency (Gettinger et al., 2021). Like many other comprehensive approaches, support for Academic and Behavior Combined Support has been documented, but peer-reviewed literature replicating the success of such integrated practices is limited. There is even less documented support for the use of academic-behavioral interventions for early childhood populations.

Importance of Academic and Behavioral Support in Early Childhood Education

Early childhood education, defined as preschool through third grade, is a critically important period for children's educational trajectory. It is well established that early literacy proficiency is a leading mediating factor linked to positive long-term educational

outcomes (Bakken et al., 2017; Gullo, 2013). As a child progresses through school, skills continue to build upon previously taught material, and they are expected to be a proficient reader by the third grade (Musen, 2010). The shift from “learning to read” to “reading to learn” often becomes problematic for children who do not have foundational literacy skills, such as letter-sound blending and reading fluency (Musen, 2010). Research conducted with young children has found that struggles with early literacy skills can be predictors of later reading difficulty (Juel, 1988; Scanlon & Vellutino, 1996; Willson & Hughes, 2009). As such, there is clearly a need for research that examines early literacy interventions. A combination approach that utilizes both an academic intervention and behavioral supports would be ideal practice, especially in early childhood environments. While an argument can be made that a combination approach would be useful for children of all ages, young children’s academic deficits are often masked as behavioral difficulties such as noncompliance when presented with instructions to complete academic task demands. Unfortunately, combined academic-behavior interventions that target early literacy are often not utilized for a number of reasons (e.g., time, resources, staff, etc.). Increasing the literature with regard to evidence-based early literacy interventions, specifically those that utilize a combined academic and behavior approach, could potentially remove barriers that are hindering their utilization in schools.

While it is well understood that early literacy skills are cornerstone behaviors for future proficient reading, gaps still exist in evidence-based early literacy interventions (Storch et al., 2002). One resource that has attempted to bridge the gap between academic interventions and evidence-based practices is The Florida Center for Reading Research (FCRR). The FCRR is a free online resource designed to provide educators and other support staff with one-on-one and small-group activities for students who struggle with reading. The website outlines specific skills for each grade level (i.e., prekindergarten through fifth grade) that are associated with the

“The Big Five” reading components. These five skills (i.e., phonemic awareness, phonics, fluency, vocabulary, and comprehension) were identified by the National Reading Panel as the most essential skills required to be a successful reader (National Reading Panel [NRP], 2000). Because the FCRR is organized both by grade level and the Big Five skills, educators can select activities based on students’ unique performance levels. Each activity includes a resource guide that describes the objective, materials needed, and instructions. Most activities include printable materials as well as data collection sheets to record student progress. While most of the activities outlined on the FCRR’s website are based on and/or use components of evidence-based practices (e.g., direct instruction, repeated practice, visual stimuli, prompts, feedback, etc.), no peer-reviewed studies have specifically demonstrated their effectiveness. It is evident that this free resource provides an abundant amount of guidance to struggling readers; however, the FCRR’s early literacy resources require empirical examination and replication.

Purpose of the Current Study

The current case study sought to combine evidence-based behavioral interventions with an early literacy reading intervention in order to expand the knowledge of this process while addressing the needs of the individual participant. It is well-accepted that early intervention, whether behavioral or academic in nature, is fundamental to long-term student outcomes (e.g., Reinke et al., 2009; National Reading Panel, 2000). By combining academic and behavioral supports, the researchers hypothesized that the participant would perform at a more optimal level across both academic and behavioral domains. The study had two goals: (1) to utilize a brief experimental analysis (BEA) within an alternating treatments design to evaluate three different FCRR letter sound interventions and their effectiveness at increasing phonic fluency, and (2) to implement a token economy with a goal-setting component to address performance deficits identified during baseline.

Method

Participant and Setting

The study included one 7-year-old, African American female who will be referred to as Ann throughout this paper. Ann attended a small private school in a middle-class, rural town in the Southeastern United States. Ann's school had approximately 223 students enrolled in grades pre-kindergarten-12. No demographic data was provided for students enrolled. Ann's parents and teachers reported that Ann was below age/grade level in early literacy and numeracy skills, which prevented her from advancing to higher-order academic skills. These deficits also led to Ann's retention in kindergarten. While Ann was receiving no formal academic support through an individualized educational plan, she did stay after school two days per week for additional tutoring services. In addition to tutoring, her parents sought out additional services through the community, and she received reading interventions twice a week for one hour through a local non-profit agency. The non-profit agency was sponsored through grant funding and utilized an Orton Gillingham-based program designed to teach reading and spelling. Despite receiving services for a year and a half, Ann made little progress beyond identifying letters. Data reported by the local non-profit agency indicated that Ann was fluent in letter identification, but progress monitoring scores were inconsistent due to behavioral challenges. When this study was conducted, Ann was awaiting a clinical comprehensive psychoeducational evaluation to address parental concerns regarding learning and attention difficulties in home and school settings.

Ann was referred for intensive summer academic services provided by a Southeastern university clinic by her parents and the local non-profit agency. The clinic served school-aged children in the local community who presented with academic skill deficits across reading, math, writing, and spelling. All clinical services were implemented by doctoral or specialist-level school psychology

students. Services included a comprehensive academic assessment followed by individual intervention sessions. Academic intervention sessions occurred for 1 hour per day Monday-Thursday for four weeks. When Ann began services, she had just completed her second year of kindergarten and had been promoted to first grade, although per parent report, the school did not feel that she had mastered kindergarten material. Ann's evaluation and intervention services occurred across 13 clinic sessions within a 4-week period. Academic intervention sessions were run by a female doctoral school psychology graduate student (i.e., clinician) and supervised by an upper-level graduate student and credentialed faculty member.

Dependent Variable and Data Collection

To identify Ann's current level of academic functioning, the clinician administered the AIMSweb curriculum-based measurement early literacy benchmarking probes and focused on letter identification, letter sounds, nonsense words, and word segmentation at the kindergarten and first grade levels. Three probes were administered for letter identification, letter sounds, nonsense words, and word segmentation to identify Ann's current instructional level. Letter sounds correct per minute (LSCPM) was selected as the dependent variable of the current study. To collect LSCPM, 1-minute LSF AIMSweb probes were administered. All probes were administered by a doctoral level school psychology graduate student. To score LSCPM, the number of correct letter sounds identified within a minute was subtracted from the number of incorrect responses (Shinn & Shinn, 2002).

Interobserver Agreement and Treatment Integrity

LSCPM data were recorded by a doctoral level school psychology graduate student who received prior training in AIMSweb scoring procedures. The clinician that served as the data collector across benchmarking served as the primary data collector for the intervention procedures. Additional observers

(doctoral level graduate students and graduate supervisors) served as independent raters and collected interobserver agreement (IOA) and treatment integrity data.

IOA data were collected across BEA and intervention sessions. The total percentage of observed agreement was calculated by dividing the smaller number of LSCPM into the larger number of LSCPM and multiplying it by 100 (Joslyn & Vollmer, 2020). LSCPM IOA was collected in-session by secondary observers who listened to Ann enunciate each sound and individually scored the answers while the clinician administered each probe. IOA data were collected for 33% of all BEA sessions with 100% agreement. IOA data were collected across 29% of all intervention sessions, with a mean agreement of 97% (range = 90%-100%).

Treatment integrity data were collected to ensure that the clinician followed the FCRR activity, token economy procedures and goal-setting procedures. A checklist for each intervention was formatted based on the FCRR guidelines. See the FCRR website for specific steps included on treatment integrity checklists. To collect treatment integrity, a secondary observer sat-in and observed 33% of all BEA sessions and 23% of intervention phases. Treatment integrity was scored by dividing the scored number of steps completed by the total possible number of steps, which was then multiplied by 100. This number (i.e., steps per intervention) varied with the intervention being implemented. Mean treatment integrity across the BEA and intervention phases was 100%.

Experimental Design

BEA procedures within an alternating treatments design were used to identify the most effective intervention for improving LSCPM. The BEA procedures within an alternating treatments design allowed for the rapid assessment of different intervention strategies to determine the best fit for the individual student (Ollendick et al., 1980). A changing criterion design was then utilized to evaluate the effectiveness of the intervention identified via the BEA. A changing

criterion design involves approximate increases in the target goal and the offering immediate reinforcement when the goal is met (Hartmann & Hall, 1976).

Procedures

Benchmarking and Baseline Data Collection

Baseline data were collected during benchmarking. During the benchmarking process, no intervention was provided. Three benchmarking probes were administered for letter identification, letter sounds, nonsense words, and word segmentation. Benchmarking provided data for clinicians to utilize when selecting a starting point for Ann's instructional skill level. Across benchmarking, Ann scored below the tenth percentile for spring kindergarten norms, indicating she had overall deficits in early literacy skills. According to the AIMSweb manual, when interpreting norms, scores below the 25th percentile (i.e., 1st-24th) are at a "frustrational" level, scores that fall between the 25th-75th percentiles are considered at an "instructional" level, and scores above the 75th percentile (i.e., 76th-100th) are at a "mastery" level. Because Ann's scores fell below the tenth percentile, researchers concluded that she was at frustrational level across all benchmarked skills. When Ann was presented with the probes, her compliance to the task demand significantly decreased and impacted her performance on the probes. Due to behaviors displayed during the benchmarking process, Ann's results were interpreted with caution. Ann's behavioral concerns included work refusal, verbal protests, inattention, and limited effort.

Typical AIMSweb procedural guidelines recommend starting Ann's intervention with the initial skill (i.e., letter identification) due to her low performance. However, it was decided to start the intervention with letter sounds (i.e., Letter Sound Fluency) because records from previous academic interventions at the local non-profit agency indicated that Ann exhibited mastery of letter identification when behavioral concerns did not occur. These records also noted that performance deficits were a consistent barrier for accurate

progress monitoring of her true ability. Furthermore, Ehri (2005) stated that students must first learn to map sounds to letters before reading can begin, and Ann's parents were persistent in wanting Ann to read. Therefore, a clinical decision was made in conjunction with Ann's parents to target LSF. More specifically, LSCPM was selected as the dependent variable. Once benchmarking data were complete, the BEA procedures within an alternating treatments design began.

BEA

The benefit of utilizing a BEA is that it trials numerous intervention options and ultimately exposes the student to intervention components that the researcher may not have considered. It also eliminates the "guess and hope" mentality behind intervention selection and provides a data-based rationale as to why a given intervention was selected (Wilber & Cushman, 2006). A BEA involves the rapid implementation of multiple interventions across intervention sessions (Eckert et al., 2002). In this study, the rapid nature of the BEA allowed the primary clinician to quickly analyze Ann's performance across three LSF interventions (Letter Flash; I do, We do, You do; and Fluency Letter Wheel) and, ultimately, determine the most effective of the three. Each intervention was presented three times in a randomized order. Randomization occurred by assigning each intervention a number (i.e., 1. Letter Flash; 2. I do, We do, You do; and 3. Fluency Letter Wheel) and then by using a random number generator to determine the order in which they would be presented. A typical clinic visit allowed the clinicians to run four academic sessions. The BEA took three clinic visits to complete. Across BEA interventions, Ann was reminded of the expected behaviors that would be reinforced by a token economy.

Letter Flash. This intervention was presented based on guidelines provided by the FCRR. To begin the intervention, the clinician placed a YES and NO card in front of Ann and explained the rules of the intervention. Ann was presented with one letter card at a time and was asked to provide the corresponding letter sound.

All 26 letters across the English language were presented. If Ann answered correctly, the card was placed under YES. If Ann answered incorrectly, the card was placed under NO. All incorrectly answered letters were provided with error correction (i.e. presentation of the correct letter sound) followed by repeated practice until each incorrect letter were answered correctly and placed under YES. Following this intervention, Ann was given a 1-minute LSF probe at the kindergarten level to monitor response to this intervention.

I do, We do, You do. This intervention was based on teaching principles outlined by the FCRR. The intervention combined components of scaffold teaching strategies in which the skill was modeled, followed by in-vivo practice with feedback, and ended with independent practice. At the beginning of this intervention, Ann was informed that time would be divided between listening and leading the activity. The clinician first went through each of the 26 letters across the English language while providing Ann with the corresponding letter sound. Then, the clinician and Ann answered each letter sound together. The final phase of this intervention involved Ann saying the letter sounds with feedback provided for any incorrect letter sound. Following this intervention, Ann was given a 1-minute LSF probe at the kindergarten level to determine her current performance.

Fluency Letter Wheel. This intervention was presented based on guidelines provided by the FCRR and involved preconstructed letter wheels. Ann was instructed to spin the wheel, wait for the spinner to land on a letter, and then identify the specific letter sound. All 26 letters in the English language were presented on the letter wheel. For each correct answer, Ann received a token that she could place in jar. The clinician offered immediate corrective feedback for incorrect responses. Following this intervention, Ann was given a 1-minute LSF probe at the kindergarten level to determine current performance.

Token Economy. To prevent academic performance deficits and disruptive behavior, the clinician implemented a token economy during the BEA. The clinician predetermined that ten tokens were

required for Ann to receive access to a designated reinforcer for 2 minutes following the intervention. The token economy would reward Ann for both completing the instructed tasks and for exhibiting expected academic behaviors (i.e., orienting towards clinician, complying with academic task demands, exhibiting active academic engagement). Ann's target behaviors were operationally defined and explained to her prior to beginning the BEA. During the BEA, tokens were given on a fixed ratio (FR1) schedule at the completion of each academic session (i.e., after completing one BEA trial). Following the BEA, the token economy was removed; therefore, Ann was only rewarded for her academic performance for the rest of the study and was no longer rewarded for exhibiting appropriate academic behaviors.

Goal Setting. A changing criterion design was utilized to evaluate the effectiveness of I do, We do, You do, identified via the BEA. A goal-setting component was used in conjunction with the academic intervention. The initial criterion was set by increasing mean baseline levels of LSCPM by 5%, and adjustments to the criterion were made when Ann met the goal during three consecutive sessions. Specifically, following the third consecutive trial of meeting the phase's criterion, the subsequent phase's criterion was increased by 5% (Klein et al., 2015). Immediately after each session, Ann's LSCPM was calculated. If Ann met her goal, she received access to a designated reinforcer for 2 minutes following the intervention. These procedures continued until the intervention ended, due to the completion of the intensive summer academic clinic.

Data Analysis

Data analysis occurred in two phases. First, BEA data were analyzed by comparing baseline performance to LSCPM across interventions to determine which intervention was the most effective. Second, Ann's LSCPM data were visually analyzed across phases. These data were analyzed to consider changes in the level, trend, variability, immediacy of effect, consistency of data, and overlap of data points (Kratochwill et al., 2013). To determine a quantitative effect of the intervention, data were analyzed using

nonoverlap of all pairs (NAP). NAP procedures consider each data point within the research design and calculate the percentage of points that overlap (Parker & Vannest, 2014). The fewer points that overlap, the higher the effect size of the intervention. When evaluating effect sizes using NAP, scores of 0-.65 are considered weak effects, .66-.91 are considered medium effects, and .92-1.00 are considered large effects.

Results

Visual analysis and NAP effect size analysis were the primary methods for interpreting the effectiveness of each intervention in the BEA and the eventual implementation of I Do, We Do, You Do. Ann’s BEA data demonstrated her performance in response to each of the three interventions (Figure 1). A detailed breakdown of the NAP effect sizes across phases indicated a range of .64-.94 (Table 1). Likewise, intervention data following the BEA indicated the effectiveness of I do, We do, You do (Figure 2). Results from the BEA and intervention are described in greater detail below.

Figure 1

Letter Sounds Brief Experimental Analysis Data

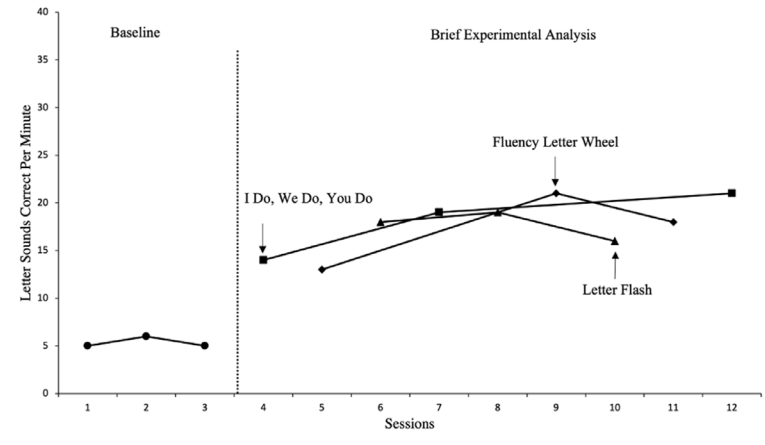


Figure 2
I do, We do, You do: Analysis Data

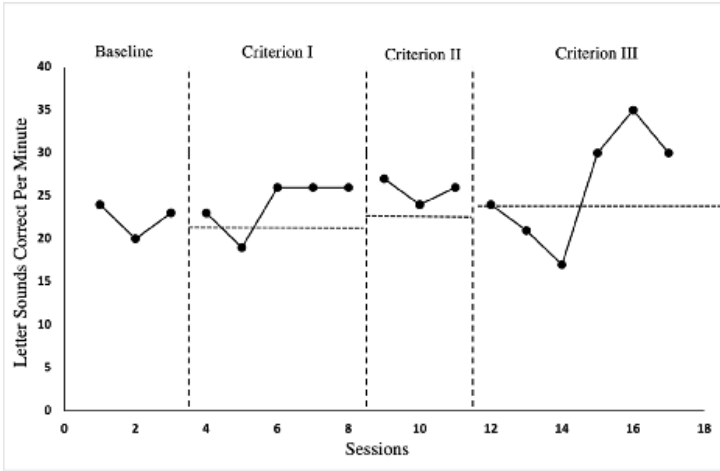


Table 1
Mean Letter Sounds Correct Per Minute and Nonoverlap of All Pairs

Baseline Mean of Letter Sounds Correct	First Criterion Intervention Mean of Letter Sounds Correct (NAP)	Second Criterion Mean of Letter Sounds Correct (NAP)	Third Criterion Intervention Mean of Letter Sounds Correct (NAP)
22.3	24.0 (0.700) ^b	25.67 (0.944) ^a	26.17 (0.6944) ^b

^a Large Effect Size

^b Medium Effect Size

BEA

During the BEA, Ann’s Fluency Letter Wheel intervention data remained level and exhibited a slightly increasing trend overall. Specifically, she obtained 13, 21, and 18 LSCPM (M = 17.3). Likewise, for the Letter Flash intervention, Ann scored 18, 19, and 16 LSCPM (M = 17.6), and her data exhibited a stable level with an overall increasing trend despite the last data point. Finally, for the I do, We do, You do intervention, Ann obtained an average of 18 LSCPM by identifying 14, 19, and 21 letter sounds correctly for each trial. Based

on the data from the BEA, the I do, We do, You do intervention was slightly more effective than the other two interventions. In addition, Ann reported that this intervention was her favorite because it allowed her to assume responsibility and some level of control. Therefore, I do, We do, You do was used for the remainder of the intervention.

I do, We do, You do Analysis

During baseline, Ann's scores ($M = 22$; range = 20 – 24) were at a moderate level, had little variability, and were stable. Once a criterion was set and the intervention began, Ann's first two data points overlapped with baseline but then stabilized to a higher, stable level ($M = 24$; range = 19 – 26). Her intervention data exhibited a slightly increasing trend at a stable level that was centered around the established criterion. The NAP score for the first criterion was .7 and demonstrated a medium effect size. The second criterion's data exhibited stability at a higher level ($M = 25.67$; range = 24 – 27) and had a large effect size (NAP = 1.00). Finally, when the third criterion was set, Ann's data initially had a decreasing trend and was lower than in any other phase ($M = 26.17$; range = 17 – 25). After three data points, however, her data increased to a consistently high level with little variability. Despite its variability, Ann's data had a medium effect for the final criterion when compared with baseline (NAP = .694).

Discussion

Given that skill acquisition is often hindered by the bidirectional relationship of behavior difficulties and academic skill deficits, the purpose of the current study was two-fold. First, the researchers wanted to evaluate the effectiveness of three emerging early literacy interventions on LSCPM. Second, the current study evaluated the effectiveness of using a goal-setting component in conjunction with an academic intervention to decrease behavioral difficulties that were interfering with academic skill acquisition. More specifically, a token economy followed by a goal-setting component was

implemented to address Ann's noncompliance and level of motivation. Researchers hypothesized that if Ann were more compliant, then the academic intervention could more effectively and efficiently target her letter sound identification skill deficits.

Initially, results from AIMSweb benchmarking probes indicated that Ann's LSCPM skills were at a kindergarten frustrational level, and her scores remained low and stable during baseline. During the benchmarking procedures, Ann engaged in work refusal, verbal protests, inattention, and limited effort when presented with letter sound probes. All disruptive behaviors were incompatible with on-task behaviors. A token economy was added to reinforce appropriate academic on-task behaviors before a BEA was implemented. Results from the BEA indicated that, overall, all three interventions were effective at increasing her letter sound identification skills.

While all three interventions resulted in similar levels of LSCPM during the BEA, Ann responded well to interventions that allowed her to assume responsibility and some level of control; thus, the I do, We do, You do intervention was implemented using a changing criterion design and a goal-setting component. The goal-setting component was introduced to increase Ann's motivation to comply with the reading tasks and to increase her performance level to grade level. Contingent upon Ann meeting her goal of LSCPM during each session, she was immediately provided access to her reinforcers (i.e., YouTube videos, games with clinician, or coloring). However, if Ann did not meet her goal, access to reinforcement was not provided. When the changing criterion design was implemented, Ann was consistently engaging in the behaviors required to attend to the reading tasks. Therefore, the token economy was faded out, and reinforcement was only provided contingent upon her academic performance.

Overall, results indicated that Ann's letter sound knowledge increased by 25 sounds. Considering Ann's academic gains across the various intervention phases, the data suggest that providing

reinforcement contingent upon meeting performance goals results in a reduction in behavioral challenges. Upon the reduction of her problem behavior, Ann was able to identify letter sounds at a level similar to her same-grade peers by the end of intervention. Since it was implemented with high levels of fidelity, the I do, We do, You do intervention paired with a goal-setting component appeared to be effective for increasing LSCPM and decreasing behavioral difficulties that interfere with academic engagement.

Taken together, these results have important implications regarding interventions aimed at increasing academic and behavioral skills in the educational setting. First, the results of the current study provide further evidence for the efficacy of combining academic and behavioral interventions to enhance student outcomes (Kuchle et al., 2015). While there is evidence that intervening in one area (e.g., reading) will improve the other area (e.g., behavior), the current study used an integrated intervention approach because assessment revealed that Ann exhibited both skill and performance deficits. Additionally, given the evidence of the bidirectional relationship between academic deficits and problem behaviors, a combined intervention approach is likely to be a more efficient method for increasing academic achievement compared to implementing either intervention in isolation (Cook et al., 2012). The current study was conducted over 13 intervention sessions across a 4-week period, and, despite the limited amount of time, gains in Ann's letter sound skill acquisition and fluency were observed. It seems plausible that targeting Ann's behavioral challenges was critical in maximizing the impact of the academic intervention.

Limitations

While the results indicated positive academic and behavioral outcomes for the participant, several limitations warrant acknowledgement and should be addressed in future research. Perhaps of most significance, the clinician implemented a token

economy during the BEA to teach and reinforce appropriate academic behaviors, but no specific data were collected on Ann's behavior. The current study relied on anecdotal data alone regarding the intervention's effectiveness of reducing behavioral difficulties. While it was reported that her appropriate behaviors increased and her academic data indicated gains that were not observed before the addition of the behavioral component, only correlation can be speculated.

It should also be noted that one deviation from standard AIMSweb guidelines was made after the completion of benchmarking. Benchmarking data indicated that Ann was in the frustrational range across all early literacy skills (i.e., letter naming, letter sounds, phoneme segmentation, and nonsense words). Using this data, AIMSweb guidelines would recommend starting with the lowest order skill (letter naming) before processing to high order skills. However, the current study began with letter sounds. This decision was made considering multiple factors, including previous data and anecdotal behavioral data. First, it should be noted that Ann engaged in disruptive behaviors throughout the benchmarking process. These behaviors were incompatible with on-task behaviors and greatly interfered with the implementation of the benchmarking probes. Second, Ann's previous records indicated that performance deficits were a consistent challenge across the 18 months Ann participated in reading interventions with a local community agency. Data were presented that indicated Ann had indeed mastered letter identification. Finally, literature supports that a student must first learn to map sounds to letters before reading can begin and therefore this was a socially valid goal that had the support of Ann's parents and teachers (Ehri, 2005).

While it was hypothesized that Ann presented with a combination of skill and performance deficits, this was not confirmed during the BEA procedures. Specifically, a BEA condition should have been run that directly assessed whether Ann's performance was a skill deficit ("can't do") or performance deficit ("won't do").

It was noted that when the third criterion was implemented, Ann seemed less interested in her previously preferred reinforcers. The clinician offered her an alternative reinforcer to work towards, and there were immediate increases in her academic skill performance. This further confirmed the clinician's hypothesis that Ann presented with a skill deficit in conjunction with performance deficits. Future studies should collect additional behavioral data in conjunction with academic skill acquisition data to evaluate the effectiveness of intervention packages targeting both behavior and academics.

The current study was conducted with one participant in a highly controlled environment where distractions were limited and the student to clinician ratio was one to one. The feasibility of implementing this intervention in the classroom setting where distractions are more frequent and the student to teacher ratio is much higher is unknown. Thus, future research should extend the application of this intervention across a larger sample and in the classroom setting while also examining the feasibility and social validity when it is implemented by teachers.

While these results appear promising in terms of the short-term gains observed in the participant, the emergence of problem behavior may become increasingly apparent when children are presented with increasingly challenging academic tasks. More convincing information on the extent to which the current procedures promote complete acquisition, generalization, and maintenance is warranted, as these components together are likely necessary for sustained benefits and should, therefore, be the focus of future research.

Finally, due to time constraints, the current study took place over a 4-week period in which the I do, We do, You do intervention and the goal-setting component were only implemented over a 2-week period. While the results indicate that the intervention was effective at increasing letter sound acquisition and managing behaviors, data were not collected on the maintenance or generalization of these skills. Therefore, future studies should consider conducting

follow-up sessions to assess the extent to which the skills sustain in the absence of intervention. Additionally, future research should assess the extent to which the generalization of skill acquisition and behavioral reductions occur across a range of settings and academic areas.

Overall, the current study demonstrated emergent evidence for the effectiveness of behavioral interventions in conjunction with early academic interventions to increase foundational literacy skills. Considering the lack of peer-reviewed studies examining the effectiveness of integrated intervention approaches for early childhood, future studies should continue to examine the effectiveness and efficiency of a combined approach to target academic and behavioral deficits. Publications that do so would build on the results of the current study. Future research should also examine the effects of a combined approach across a larger, more varied sample to better understand the extent to which results would generalize across various populations, skills, and behavioral profiles.

References

- Bakken, L., Brown, N., & Downing, B. (2017). Early childhood education: The long-term benefits. *Journal of Research in Childhood Education, 31*(2), 255–269. <https://doi.org/10.1080/02568543.2016.1273285>
- Benner, G. J., Beaudoin, K. M., Chen, P.-Y., Davis, C., & Ralston, N. C. (2010). The impact of intensive positive behavioral supports on the behavioral functioning of students with emotional disturbance: How much does fidelity matter? *Journal of Behavior Assessment and Intervention in Children, 1*(1), 85–100. <http://dx.doi.org/10.1037/h0100361>
- Cook, C., Dart, E., Collins, T., Restori, A., Daikos, C., & Delpont, J. (2012). Preliminary study of the confined, collateral, and combined effects of reading and behavioral interventions: Evidence for a transactional relationship. *Behavioral Disorders, 38*(1), 38–56. <https://doi.org/10.1177%2F019874291203800104>
- Daly, E. J. III, Murdoch, A., Lillenstein, L., Webber, L., & Lentz, F. E., Jr. (2002). An examination of methods for testing treatments: Conducting brief experimental analyses of the effects of instructional components on oral reading fluency. *Education and Treatment of Children, 25*, 288–316. <http://www.jstor.org/stable/42899707>

- Duhon, G. J., Noell, G. H., Witt, J. C., Freeland, J. T., Dufrene, B. A., & Gilbertson, D. N. (2004). Identifying academic skill and performance deficits: The experimental analysis of brief assessments of academic skills. *School Psychology Review, 33*, 429 – 443. <https://doi.org/10.1080/02796015.2004.12086260>
- Eckert, T. L., Ardoin, S. P., Daly III, E. J., & Martens, B. K. (2002). Improving oral reading fluency: A brief experimental analysis of combining an antecedent intervention with consequences. *Journal of Applied Behavior Analysis, 35*(3), 271-281. <https://doi.org/10.1901/jaba.2002.35-271>
- Ehri, L. C. (2005). Learning to read words: Theory, findings, and issues. *Scientific Studies of Reading, 9*(2), 167-188. https://doi.org/10.1207/s1532799xssr0902_4
- Florida Center for Reading Research. (n.d.). *Kindergarten and first grade*. Retrieved July 9th, 2021, from <https://fccr.org/student-center-activities/kindergarten-and-first-grade>
- Gettinger, M., Kratochwill, T., Foy, A., & Eubanks, A. (2021). Development and implementation of an integrated academic-behavior intervention. *Intervention in School and Clinic, 0*(0), 1–6. <https://doi.org/10.1177%2F105345122111047571>
- Gilbertson, D., Witt, J. C., Duhon, G., & Dufrene, B. (2008). Using Brief Assessments to Select Math Fluency and On-task Behavior Interventions: An Investigation of Treatment Utility. *Education and Treatment of Children, 31*(2), 167–181. <http://www.jstor.org/stable/42899971>
- Gickling, E. E., & Armstrong, D. L. (1978). Levels of instructional difficulty as related to on-task behavior, task completion, and comprehension. *Journal of Learning Disabilities, 11*, 559–566. <https://doi.org/10.1177%2F002221947801100905>
- Gullo, D.F. (2013). Improving Instructional Practices, Policies, and Student Outcomes for Early Childhood Language and Literacy Through Data-Driven Decision Making. *Early Childhood Education Journal, 41*, 413–421. <https://doi.org/10.1007/s10643-013-0581-x>
- Hartmann, D. P., & Hall, R. V. (1976). The changing criterion design. *Journal of Applied Behavior Analysis, 9*(4), 527-532. <https://doi.org/10.1901/jaba.1976.9-527>
- Hinshaw, S. (1992). Externalizing behavior problems and academic underachievement in childhood and adolescence: Causal relationships and underlying mechanisms. *Psychological Bulletin, 111*(1), 127–155. <https://psycnet.apa.org/doi/10.1037/0033-2909.111.1.127>
- Intervention Central. (n.d.) *Listening passage preview*. Intervention Central. Retrieved July 9, 2021, from <https://www.interventioncentral.org/academic-interventions/reading-fluency/listening-passage-preview>
- Joslyn, P. R., & Vollmer, T. R. (2020). Efficacy of teacher-implemented good behavior game despite low treatment integrity. *Journal of Applied Behavior Analysis, 53*(1), 465-474. <https://doi.org/10.1002/jaba.614>

- Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology, 80*(4), 437-447. <https://doi.org/10.1037/0022-0663.80.4.437>
- Klein, L. A., Houlihan, D., Vincent, J. L., & Panahon, C. J. (2015). Best Practices in Utilizing the Changing Criterion Design. *Behavior analysis in practice, 10*(1), 52-61. <https://doi.org/10.1007/s40617-014-0036-x>
- Kuchle, L., Edmonds, R., Danielson, L., Peterson, A., & Riley-Tillman, T. C. (2015). The next big idea: A framework for integrated academic and behavioral intensive intervention. *Learning Disabilities Research and Practice, 30*(4), 150-158. <https://doi.org/10.1111/ldrp.12084>
- Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M. & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education, 34*(1), 26-38. <https://doi.org/10.1177/0741932512452794>
- Marguin, E., & Loeber, R. (1996). Academic performance and delinquency. *Crime and Justice, 20*, 145-264. <https://doi.org/10.1086/449243>
- Musen, L. (2010). *Early reading proficiency: Leading indicators for education*. Annenberg Institute for School Reform, Brown University. at www.annenberginstitute.org/WeDo/leading_indicators.php.
- National Reading Panel (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (National Institute of Health Pub. No. 00-4769). National Institute of Child Health and Human Development.
- Nelson, J. R., Benner, G., Lane, K., & Smith, B. (2004). Academic achievement of K-12 students with emotional and behavioral disorders. *Exceptional Children, 71*(1), 59-73. <https://doi.org/10.1177%2F001440290407100104>
- Ollendick, T. H., Matson, J. L., Esveldt-Dawson, K., & Shapiro, E. S. (1980). Increasing spelling achievement: An analysis of treatment procedures utilizing an alternating treatments design. *Journal of Applied Behavior Analysis, 13*(4), 645-654. <https://doi.org/10.1901/jaba.1980.13-645>
- Parker, R. I., & Vannest, K. J. (Eds.). (2014). Non-overlap analysis for single-case research. In T. R. Kratochwill & J. R. Levin (Eds.), *Single-case intervention research: Methodological and statistical advances* (pp. 127-151). American Psychological Association. <https://doi.org/10.1037/14376-005>
- Reinke, W. M., Splett, J. D., Robeson, E. N., & Offutt, C. A. (2009). Combining school and family interventions for the prevention and early intervention of disruptive behavior problems in children: A public health perspective. *Psychology in the Schools, 46*(1), 33-43. <https://doi.org/10.1002/pits.20352>

- Reviewer Guidance for Use with the Procedures and Standards Handbook*. What Works Clearinghouse. (n.d.). <https://ies.ed.gov/ncee/wwc/>.
- Shinn, M. R., & Shinn, M. M. (2002). *AIMSweb early literacy*. Administration and scoring guide. Pearson.
- Scanlon, D. M., & Vellutino, F. R. (1996). Prerequisite Skills, Early Instruction, and Success in First-Grade Reading: Selected Results from a Longitudinal Study. *Mental Retardation & Developmental Disabilities Research Reviews*, 2(1), 54–63. [https://doi.org/10.1002/\(SICI\)1098-2779\(1996\)2:1<54::AID-MRDD9>3.0.CO;2-X](https://doi.org/10.1002/(SICI)1098-2779(1996)2:1<54::AID-MRDD9>3.0.CO;2-X)
- Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology*, 38(6), 934–947. <https://doi.org/10.1037/0012-1649.38.6.934>
- Volpe, R. J., Young, G. I., Piana, M. G., & Zaslofsky, A. F. (2012). Integrating classwide early literacy intervention and behavioral supports: A pilot investigation. *Journal of positive behavior interventions*, 14(1), 56–64. <https://doi.org/10.1177%2F1098300711402591>
- Wilber, A., & Cushman, T. P. (2006). Selecting effective academic interventions: An example using brief experimental analysis for oral reading. *Psychology in the Schools*, 43(1), 79–84. <https://doi.org/10.1002/pits.20131>
- Willson, V. L., Hughes, J. N. (2009). Who is retained in first grade? A psychosocial perspective. *The Elementary School Journal*, 109(3), 251–266. <https://doi.org/10.1086/592306>