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Effects of a Tier 3 Self-Management Intervention Implemented with and without Treatment Integrity

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Abstract

This study investigated the effects of a Tier 3 peer-matching self-management intervention on two elementary school students who had previously been less responsive to Tier 1 and Tier 2 interventions. The Tier 3 self-management intervention, which was implemented in the general education classrooms, included daily electronic communication between the teachers and the children's parents. Results indicated that this intervention effectively reduced disruptive behaviors and increased total engagement when implemented with integrity; without integrity results were variable.

Keywords: behavior, Tier 3 intervention, treatment integrity, CW-FIT, self-management, peer-matching, parent involvement, electronic messaging

An increasing number of schools are implementing positive behavior interventions and supports (PBIS; Horner et al., 2014). PBIS

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is grounded in the assumption that all students can be successful when educators use a tiered system of support and evidenced-based behavioral interventions tailored to meet the needs of students at-risk (Lane, Menzies, Oakes, & Kalberg, 2012; Young, Caldarella, Richardson, & Young, 2012). In support of this, the reauthorization of the Individuals with Disabilities Education Act (IDEA, 2004) included an increased focus on helping students with challenging learning and behavior problems succeed in general education. To achieve this end, schools need to implement interventions across a continuum of support.

The majority of students in a school (70–90%) succeed academically and socially in general education settings (Tier 1), and do not require additional support (Buffum, Mattos, & Weber, 2011). As students' progress through school, some will be unresponsive to school discipline systems. Students at-risk (5–15%) often need targeted individual or small group attention to be successful (Tier 2). For example, Buffum and colleagues stressed that Tier 2 and 3 interventions provide increased time and/or support in general education classrooms. The remaining students, typically no more than 1–5%, may continue to have difficulty despite additional support and require even more intensive Tier 3 interventions (Young et al., 2012).

PBIS is an effective system for decreasing inappropriate behavior (Anderson, Fisher, Marchant, Young, & Smith, 2006). The tiered system provides additional time and support to promote academic success as well as improve classroom behavior (Christensen, Young, & Marchant, 2007). Frequently, Tier 2 and 3 interventions are administered outside of the general education classroom. Successfully implementing Tier 2 and 3 interventions in general education classrooms allows students to continue to access the core curriculum (Basham, Israel, Graden, Poth, & Winston, 2010).

Class-wide function-related intervention teams (CW-FIT) is a multi-tiered classroom management intervention to improve the behavior of all students (Wills et al., 2010). CW-FIT Tier 1 teaches classroom rules and social skills. It uses a group contingency based on differential reinforcement of appropriate behaviors and minimized attention to inappropriate behavior (Kamps, Conklin, & Wills, 2015). CW-FIT has a Tier 2 self-management and help card component (Kamps, Wills et al., 2015). Additional details are provided in the Method section.

CW-FIT is well researched in classrooms across the country (see e.g., Caldarella, Williams, Hansen, & Wills, 2015; Kamps, Conklin, et al., 2015). Studies have shown that implementation of CW-FIT has

effectively increased on-task behavior, improved academic engagement, and decreased disruptive behavior of many students (Caldarella, Young, Wills, Kamps, & Wehby, 2015; Kamps et al., 2011). However, CW-FIT Tier 1 alone does not prove effective for all students, particularly for students at-risk for challenging behavioral problems (Kamps et al., 2011). More research is needed to examine the effects of the CW-FIT Tier 2 intervention and to investigate individualized, comprehensive Tier 3 interventions for at-risk students. The intensive Tier 3 intervention used in this study included three major components: self-management with peer support, parental involvement, and electronic communication.

Self-Management

Research indicates self-management interventions have been effectively implemented as Tier 2 and Tier 3 interventions to improve academic and behavioral success with typically developing students and those with disabilities (Briesch & Chafouleas, 2009; Hansen, Wills, Kamps, & Greenwood, 2014; Peterson, Young, Salzberg, West, & Hill, 2006; Young et al., 2012). Self-management interventions can include a variety of strategies such as self-monitoring, self-recording, self-evaluation, self-reinforcement, and self-instruction (Wills & Young, 2014). Falkenberg and Barbetta (2013) found that four elementary students with disabilities improved their homework accuracy and completion by self-monitoring their homework on a computer at school and with their parents at home. Research conducted with three students indicated that having students monitor and record their on-task behavior helped to increase their time on task during classroom activities (Moore, Anderson, Glassenbury, Lang, & Didden, 2013).

Interventions using self-management often include teacher or peer ratings to match with self-ratings of target students to improve self-evaluations and increase social skills and/or decrease off-task behavior (McCurdy & Cole, 2014; Peterson et al., 2006). Matching self-ratings with teacher ratings of behavior is designed for students to learn to accurately self-evaluate the appropriateness of their behavior (Young, West, Smith, and Morgan, 1991). In the matching process, students receive reinforcement (points) for both accurate matches and improved behavior. Peers may also be utilized to support struggling students (McCurdy & Cole, 2014). Christensen and colleagues (2007) described how peers saved teachers time and involvement with an intervention by performing the matching and point-giving functions with students. This resulted in improved behavior and decreased teacher involvement in the intervention.

Parent Involvement

Parents are another valuable resource in the behavior change process. Parent involvement has been found to be positively correlated to a child's educational and social success (Chen, Yu, & Chang, 2007) and declines in problem behaviors and improved social skills (El Nokali, Bachman, & Votruba-Drzal, 2010). Parents have been shown to be an effective source of positive reinforcement for their children (Marchant, Young, & West, 2004).

Teachers have successfully involved parents in interventions at school or home using traditional and electronic means (Adams, Womack, Shatzer, & Caldarella, 2010; Ozcinar & Ekizoglu, 2013). Adams and colleagues (2010) found social skills of elementary students generalized from school to home using "home notes," which gave parents information and suggested activities regarding social skills. Marchant and Young (2001) found positive results by providing "coaches" who taught behavior management skills to parents of young children within their home. Though these interventions were found to be effective, many are time-consuming and may not provide personal interactions with parents. Additional effective and efficient ways for school personnel to involve parents in interventions should be explored. One method that holds promise is electronic messaging, which can provide efficient and cost-effective personal interaction between school and home (Sharifi et al., 2013). There is limited literature on the use of electronic messaging in public schools.

Treatment Integrity

Treatment integrity is key to determining the effectiveness of interventions. The results of an experiment can be confounded if the intervention is not implemented as planned (Cooper, Heron, & Heward, 2007). If the treatment is applied inconsistently, improperly, or partially, it is difficult to determine the functional relation between the intervention and behavior change. Cooper and colleagues (2007) noted that without fidelity, the results of an intervention can be interpreted incorrectly, leading to conclusions of either a false positive (claiming a functional relation when one does not exist) or a false negative (failing to identify one that does exist). Therefore, this study examined treatment integrity to determine the relation between intervention and outcomes.

Purpose

Previous to this Tier 3 study, a large group study with seven experimental classes and seven control classes was conducted to evalu-

ate the effectiveness of CW-FIT (Caldarella, Young, et al., 2015). There were 152 students who received the CW-FIT intervention. CW-FIT Tier 1 achieved the desired effect for 88% of students; 19 (12%) were referred for the CW-FIT Tier 2 intervention. Two of the 19 students (<1%) were referred for Tier 3 intervention. We examined the effectiveness of a comprehensive peer-mediated self-management package for reducing disruptive behavior and increasing academic engagement for two elementary students who were less responsive to CW-FIT Tier 1 and 2 interventions. While this Tier 3 study is separate from the CW-FIT group study (Caldarella, Young, et al., 2015), data collected on the two students during the group study provided data for baseline, Tier 1, and Tier 2 phases of this study.

The purpose of this study was to examine the effectiveness of a Tier 3 intervention implemented within the general education classrooms. The research questions were: (a) To what extent does a Tier 3 peer-matching self-management package including parent involvement impact academic engagement and disruptive behavior of two elementary students? and (b) What is the impact of treatment integrity on the effectiveness of the Tier 3 intervention package?

Method

Participants

Target students. Two students, Shane and Ricardo (pseudonyms), participated in this study. Both were referred by their teachers based on their need for extra support beyond CW-FIT Tier 1 and 2 interventions due to high levels of disruptive behaviors during these conditions. The disruptive behavior was confirmed for both students during 20-minute antecedent-behavior-consequence (ABC) observations conducted by the primary researcher (PR, a school psychology graduate student) prior to the commencement of this study. Both students were involved in disruptive behaviors a majority of the time. Behaviors included calling out, whistling, banging the chair against the floor, talking and arguing with peers, and poking peers. Shane's teacher responded by ignoring his behavior, praising engagement, or praising around. Ricardo's teacher ignored him or gave a mild reprimand. Based on the ABC observations, it was hypothesized that both students engaged in disruptive behaviors to gain attention from peers and/or teacher.

Shane was a male, Caucasian, third-grade student who had difficulties with class disruptions and off-task classroom behavior. He did not receive special education services. Ricardo, was a fourth-grade,

Caucasian male student, homeschooled until 11 a.m., when he arrived at school. He was classified under the Autism category, and his Individualized Education Program (IEP) focused on behavior. His behavior plan was suspended prior to the study.

Peer partners. One feature of the CW-FIT program is the use of peers to model high-level academic engagement and appropriate behaviors. Multiple peers were identified and chosen by the teachers in each class based on appropriate class behavior and academic success. Two male peer models that had established positive relationships with Shane and Ricardo were selected from each class by teachers to serve as peer partners for the Tier 3 intervention.

Teachers. Shane's teacher was a Caucasian female with training in elementary education and in her first year of teaching. Ricardo's teacher was a female, with a master's degree in education. She had six years of teaching experience in second–fourth grade general education classrooms. Both teachers participated in a half-day training on how to implement CW-FIT in their classrooms at the beginning of the school year, and received additional training for the Tier 2 intervention. Tier 3 training is described in the Intervention Procedures section.

Parents. Shane lived with his biological parents. His mother was a stay-at-home mom. She participated in the intervention by communicating daily with his teacher via text messaging, and by talking with Shane each day after school. Based on feedback from the teacher, she praised him for his good behavior and provided activities Shane earned.

Ricardo's biological parents were divorced. He lived with his mother, who worked part-time. His mother requested she be contacted by email. She participated in the intervention by communicating daily with the teacher and talking to Ricardo each day after school. Based on feedback from the teacher, she praised him for good behavior and provided activities he earned.

Setting

This study took place in a suburban Title I elementary school in two general education classrooms. Both teachers had already been utilizing CW-FIT in their classrooms (i.e., math instruction in the third-grade class and reading centers in the fourth-grade class). The Tier 3 intervention was also implemented during these activities. Both students participated with the entire class and received class-wide rewards with their teams as part of CW-FIT Tier 1.

There were 18 students in Shane's class (10 girls and 8 boys), of whom seven were English language learners. Two students in addition to Shane received the Tier 2 intervention. The CW-FIT Tier 2 in-

tervention achieved the desired results for these students, but Shane was referred for further interventions. None of the students in this class had an IEP or received special education services; however, two had 504 accommodations.

There were 23 students in Ricardo's class (13 boys and 10 girls). There were 11 English language learners, with six students served in special education. In addition to Ricardo, two students were provided the CW-FIT Tier 2 intervention, and each achieved the desired results. However, Ricardo was referred for further intervention due to lack of desired response.

Dependent Variables

Dependent variables were total engagement and disruptive behaviors. Total engagement was defined as the student being engaged in working on any assigned work or other approved activity (i.e., "Is the student doing what he is supposed to be doing?"). Examples for Shane included keeping his eyes on the teacher during instruction and answering questions in a class discussion. Examples for Ricardo included reading quietly at his desk and working quietly at a computer. Disruptive behavior was defined as any action interfering with the students' participation and/or the productivity of his classmates. Disruptive behavior included rocking back and forth in a chair, name-calling, and physically invading the boundaries of others.

Data Collection and Analysis

Student behavior was collected in 15-minute sessions by trained observers using tablets and measured directly via *Multi-Option Observation System for Experimental Studies* (MOOSES; see Tapp, Wehby, & Ellis, 1995), an event/duration recording software system that has been successfully used in other studies (see e.g., Caldarella, Young, et al., 2015; Reinke, Herman, & Stormont, 2013). During observations, the duration of total engagement was tracked based on MOOSES codes of engaged or disengaged, and reported as a percentage of time. Disruptive behaviors were recorded according to the MOOSES frequency codes. MOOSES data were graphed, and level of performance, trend, and variability within each phase were analyzed. Adjacent phases were also compared to examine overlapping data points and changes in level, trend, and variability. To enhance visual analysis of the data, we calculated Tau-U for each adjacent phase. Tau-U was used because it is a robust statistic that provides an effect size measure and controls for positive baseline trend and a limited number of data points (Parker,

Vannest, Davis, & Sauber, 2011). We entered data from each phase into an online Tau-U calculator (singlecaseresearch.org) to compute effect sizes (Wolfe et al., 2015).

Observer training and interobserver agreement (IOA). A CW-FIT research coordinator trained seven observers who collected data throughout the year. The observers read the definitions for the observation codes used to track student behaviors and passed a quiz on definitions at >90%. They practiced coding using a prerecorded video until they reached >85% IOA three times. They observed in various elementary classrooms not participating in this study until they achieved an IOA of >85% three times. Throughout the study, IOA was conducted in 29% of all sessions (mean IOA = 90%, *SD* = 6.35, range 77–100%) to ensure >85% agreement.

Independent Variable

The independent variable consisted of a self-management intervention package consisting of nine components. There are five procedures that involved the interaction between the target students and the peer partners: (a) self-evaluating and recording by the target student, (b) evaluating and recording by the peer partner, (c) matching data recorded by the two students, (d) awarding points based on matches, and (e) exchanging points for student-selected rewards (i.e., computer time at school for Shane and a ticket to get in a prize box for Ricardo) with the teacher. Four additional components included: (f) praising by the peer, (g) praising by the teacher, (h) daily electronic teacher-parent messaging, and (i) praise and rewards from mothers at home. Shane's reward was time on the computer or time to play a game with his mother. Ricardo's reward was money toward a toy he was trying to buy. Shane and Ricardo were expected to effectively manage their target behaviors by working on their assignment, sitting quietly at their desk, keeping their hands to themselves, and engaging appropriately with the teacher. These four behaviors were listed on their self-management card, and at variable intervals averaging 2 minutes the students self-evaluated their behavior.

At the beginning of each session, Shane and Ricardo retrieved their self-management cards and peer partners picked up a MotivAider® (2000) timer. Shane and Ricardo reviewed their four target behaviors with their peer partners, who then set the timer. When the timer vibrated, the peer partners told Shane or Ricardo to mark the card. The peer partners then marked the card to rate Shane or Ricardo's behavior for the interval. The peers gave two points if both the target student and the peer partner marked *yes*, that they exhibited the target behaviors (one point for appropriate behavior and one point for

accurate matching), one point if they both marked *no* (zero points for appropriate behavior, but one point for accurate matching), and zero points if one marked *yes* and one marked *no*. Peer partners praised and/or encouraged Shane or Ricardo. At the end of the session, teachers praised and/or encouraged Shane and Ricardo, and totaled session points. Students were given a card indicating the reward earned so they could receive it later in the day. Target students were given the team-earned reward.

Each day the teachers sent an electronic message to the mothers, stating the behaviors that should be praised. When their child arrived home, mothers praised their child and gave them their earned reward. The mothers then sent a text message or email back to the teacher explaining the reward they had given and a short message about interacting with their child. The teachers forwarded the text message or email to the PR.

Training. Training for the Tier 3 intervention (Phase D) for Shane and Ricardo, peer partners, teachers, and parents was conducted independently for each by the PR. Training consisted of teaching components of the independent variable: (a) defining the target behaviors, (b) explaining the self-management card, self-evaluation, and self-recording, (c) matching with the peer partner, recording points earned, and delivering praise, (d) reporting to the teacher followed by teacher delivering praise, presenting reward card, and later exchanging the card for rewards, and (e) the parent-teacher interaction through electronic messaging and delivering of praise and rewards by mothers. In addition, students role-played their responsibilities following the trainer's model. Training for each student occurred over multiple days for a total of two to three hours in a conference room. After training, the students were brought together to practice in the classroom before the commencement of the intervention. Teachers and parents met with the PR regarding all aspects of the intervention and received a written copy of their role.

Research Design

The original intent of this study was to implement a reversal design with both students. However, because of the lack of implementation integrity for Ricardo, the research design for Ricardo was modified. The problem with integrity was further compounded due to insufficient time at the end of the school year. Since time did not allow for a reversal, we implemented a modified Tier 3 intervention (Phase E) to test the impact of integrity.

The first four study phases (ABCD) were identical for both students. After Phase D, Shane's intervention reversed to Phase B, then

returned to Phase D. Ricardo was less responsive to Phase D due to low treatment integrity. We then modified the Tier 3 intervention for Phase E.

Phase A. Baseline data were collected during Shane's math class and Ricardo's reading centers, where teachers used their personal classroom management and teaching styles. Shane's teacher had three posted rules, which allowed the students to earn privileges. She used a clip chart and told the students to clip up on the chart for good behavior (which represented receiving more privileges) or to clip down for bad behavior (with fewer privileges). Ricardo's teacher posted six classroom rules, but observers noted they were referenced infrequently. Ricardo's teacher focused on students' academic work and less on behavior management procedures.

Phase B. CW-FIT was introduced in both classes four days a week during 45-minute sessions (Caldarella, Young, et al., 2015). Students were placed on teams of three to five students. Each session began with teachers reviewing CW-FIT expectations. These expectations were: get the teacher's attention appropriately, follow directions the first time, and ignore inappropriate behavior. During each session, teams earned points to exchange for rewards. Teachers announced the possible daily reward and the required point totals (e.g., approximately 75–85% of the total number of points possible). Points for each team were tracked and displayed on a laminated poster. At the beginning of each session, a timer was set to beep on an average of three minutes, prompting the teacher to award points and praise the students for following the posted CW-FIT expectations. If all team members followed the expectations, the team was awarded a point at each time interval. Simultaneously, the teachers praised both teams and individuals for following the expectations. The teachers could award additional points and express praise at other times during the session. All teams meeting the goal were given the reward (e.g., free time, joke time, game time) immediately following the session.

Phase C. Shane and Ricardo participated in all elements of CW-FIT Tier 1 during Phase C and self-recorded points for individually following the expectations. This Tier 2 intervention is referred to as self-management in the CW-FIT program. To reduce confusion with the Tier 3 self-management intervention, it is referred to as self-recording in this paper. Shane and Ricardo each self-recorded a point for good behavior if they were following expectations when the timer sounded. No other self-management procedure was used in CW-FIT Tier 2.

Phase D. The Tier 2 intervention was replaced by the Tier 3 intervention. Shane and Ricardo still participated in all elements of the CW-FIT Tier 1 intervention.

Return to Phase B: Shane. With Shane, the Tier 3 intervention was removed and the phase was reversed to the conditions of CW-FIT Tier 1 (Phase B).

Return to Phase D: Shane. Following the reversal, the Tier 3 intervention (Phase D) was reintroduced.

Phase E: Ricardo. This phase was only implemented with Ricardo. It included the components of Phase D, with the exception that the PR performed the peer partner responsibilities and followed the procedures with precision to ensure treatment integrity.

Treatment integrity. We examined the extent to which teachers were using CW-FIT Tier 1 classroom management procedures in baseline (prior to any training) and the exactness with which teachers followed Tier 1 procedures during all phases of the study. We also monitored the implementation of the components of the Tier 3 self-management package; some similar components were combined and integrity is reported on six variables. These six variables (peer self-management procedures, peer praise, teacher praise, teacher electronic message, parent praise, parent electronic message) were examined across students, peer partners, teachers, and parents.

Throughout the Tier 3 intervention, observers recorded whether the target students and their peer partners followed the procedures using a treatment integrity checklist. Specifically, the observers recorded whether the target students marked the self-management card, peers marked the card, peers awarded points based on matching, and their peer praised them each time the MotivAider® (2000) signaled a new interval. At the end of the session, the observers recorded if teachers praised the target students. Additionally, text message or email threads between the teachers and mothers were sent to the PR to track the teacher and parent components including the teachers' text or email message and the mothers' report of their activities (e.g., praise, reinforcement, discussions with their sons) in a return message.

The treatment integrity variables were scored as *yes* for occurring or *no* for not occuring for each session. The only exception was that peer praise was scored as a percentage. The researchers expected that the peers would praise the target students during ≥ 80% of the opportunities; if this occurred, praise was scored as *yes*. If not, peer praise was scored as *no*. To be scored as *yes* for the self-management procedures, the peers needed to follow ≥ 80% of the procedures during a session. For each session, six scores were entered and reported as the total integrity percentage. A total integrity percentage by component was also calculated.

Social validity. Researcher-developed questionnaires were used to assess social validity. All participants responded to a questionnaire,

based on their role, composed of several questions using either a three- to five-point rating scale or yes/no responses, with space provided for comments. The students filled out the questionnaire on the last day of the intervention. The teachers responded to the questionnaire via email before the end of the school year. The parents filled out the questionnaire in a final meeting with the teachers and the PR following completion of the study. The questions for all participants were used to obtain their opinions regarding the acceptability and effectiveness of the intervention. In addition, the mothers and teachers were asked for their opinions about the feasibility of implementing the intervention in the future.

Results

Treatment Integrity

Treatment integrity of CW-FIT class-wide procedures. During baseline, Shane's teacher used 12% of the CW-FIT classroom procedures. Ricardo's teacher used 1% of the procedures. After training, Shane's teacher implemented classroom procedures with 95% integrity during Phase B (Tier 1) and C (Tier 2). Ricardo's teacher improved to 92% during Phase B, but dropped to 78% during the Phase C. During Phase D, the percentage of integrity dropped to 89% for Shane's teacher and to 77% for Ricardo's teacher.

Treatment integrity for Shane's Tier 3 intervention. Data on the six treatment integrity variables were collected on 8 of 16 sessions where Shane received the Tier 3 intervention (see Table 1). Shane's peer partner both followed the procedures and praised him at a mean level of 88%. His teacher both praised him and sent a text message home to his mother 100% of the time. Shane's mother reinforced him and sent a return text message to the teacher 75% of the time. The peer praise, teacher praise, and parent reinforcement data indicate that Shane was praised/reinforced, on average, 88% of the time. The percentage of treatment integrity by session (see Table 1) represents the percent of *yes* responses in the session column. The overall integrity percentages for the 8 sessions ranged from 67 to 100% with a mean of 87%.

Treatment integrity for Ricardo's Tier 3 intervention. Table 2 displays the treatment integrity data for Ricardo for 5 of the 9 sessions in which the Tier 3 peer-matching intervention was in effect. During these sessions, the peer partner followed the procedures at a mean of 80%, but he only praised Ricardo 20% of the time. The teacher praised Ricardo on average only 40% of the time, but she sent an email to

Table 1

Treatment Integrity Data for the Tier 3 Self-Management Intervention for Shane

Intervention Components	Peer Partner (PP)								Mean Percentages for Treatment Integrity
	Sessions								
	19	29	30	31	32	34	35	36	
Peer Self-Management Procedures (%)	Y (100)	Y (100)	N (57)	Y (100)	Y (100)	Y (100)	Y (100)	Y (100)	88
Percentage of Peer Praise (%)	Y (80)	Y (80)	N (40)	Y (100)	Y (100)	Y (100)	Y (80)	Y (88)	88
Teacher Praise	Y	Y	Y	Y	Y	Y	Y	Y	100
Teacher Text Message	Y	Y	Y	Y	Y	Y	Y	Y	100
Parent Reinforcement	Y	Y	Y	Y	Y	Y	N	N	75
Parent Text Message	N	Y	Y	Y	N	Y	Y	Y	75
Integrity Percentage by Session	83	100	67	100	83	100	83	83	87

Ricardo's mom 80% of the time. Finally, based on the information provided by Ricardo's mother, she did not reinforce him, but she did send a return email to the teacher 40% of the time. The average percentage of praise given to Ricardo was 20% by his peer partner and 40% by his teacher. His mother never reported reinforcing him at home. The percentage of treatment integrity by session (see Table 2) represents the percent of *yes* responses in the session column. The overall integrity percentage for the five sessions ranged from 17 to 67% with a mean of 47%.

The last two sessions of the Tier 3 intervention were modified by replacing the peer partner with the PR. Self-management procedures were implemented with a higher level of integrity (see Table 2), with percentages ranging from 80 to 100% ($M = 90\%$). The PR followed procedures and praised Ricardo 100% of the time. During Phase E, the teacher praised Ricardo and sent an email home to his mother 100% of the time. His mother only reinforced him at home 50% of the time, but she sent an email back to the teacher after both sessions (100%). Ricardo was reinforced by the PR, his teacher, and his mother, on average, 83% of the time. The overall integrity percentage was 90%, the first session being 100% and the second being 80%.

Results for Total Engagement and Disruptive Behavior

Shane's total engagement. As seen in Figure 1, Shane's total engagement scores were variable within five of the six phases. The least variable of the six phases was the initial implementation of the Tier 3 intervention. During Phase A, his four scores ranged from 35 to 83% ($M = 60\%$). In the first CW-FIT Tier 1 phase, his four scores ranged from 43 to 85% ($M = 68\%$). The mean increased 8%, but three of the data points overlapped with baseline, and there was a sharp downward trend, suggesting the intervention had minimal effect on Shane's engagement. In Phase C, his mean score increased an additional 6 percentage points over Tier 1 and 14 points over the baseline to 74% (range 53–90%). The data showed an overall upward trend, but scores were still variable. When the Tier 3 intervention was introduced, Shane's mean level increased to 99% with minor variability, a range of 98 to 100%. When the Tier 3 intervention was withdrawn, and CW-FIT Tier 1 was again the sole intervention, there were no overlapping scores with the Tier 3 phase and his mean level dropped to 83% (range 69–91%).

During the second Tier 3 phase, Shane's total engagement increased to a mean of 91%, (range 59–100%). Shane's mean score increased significantly, from 60% at baseline and 76% during combined CW-FIT Tier 1 phases to 95% during combined Tier 3 phases.

Table 2

Treatment Integrity Data for the Tier 3 Self-Management Intervention for Ricardo

	Peer Partner (PP)					Primary Researcher (PR)		Mean Percentages for Treatment Integrity	
	Sessions					Sessions			
Intervention Components	18	19	20	23	24	25	26	PP	PR
Peer Self-Management Procedures (%)	Y (96)	Y (96)	Y (96)	Y (85)	N (78)	Y (100)	Y (100)	80	100
Percentage of Praise (%)	Y (100)	N (20)	N (0)	N (0)	N (60)	Y (100)	Y (100)	20	100
Teacher Praise	N	N	N	Y	Y	Y	N/A*	40	100
Teacher Email Message	Y	Y	Y	Y	N	Y	Y	80	100
Parent Reinforcement	N	N	N	N	N	Y	N	0	50
Parent Email Message	N	Y	Y	Y	N	Y	Y	60	100
Total Integrity Percentage	50	50	50	67	17	100	80	47	90

Note. * On this day there was a substitute teacher so teacher praise was not recorded.

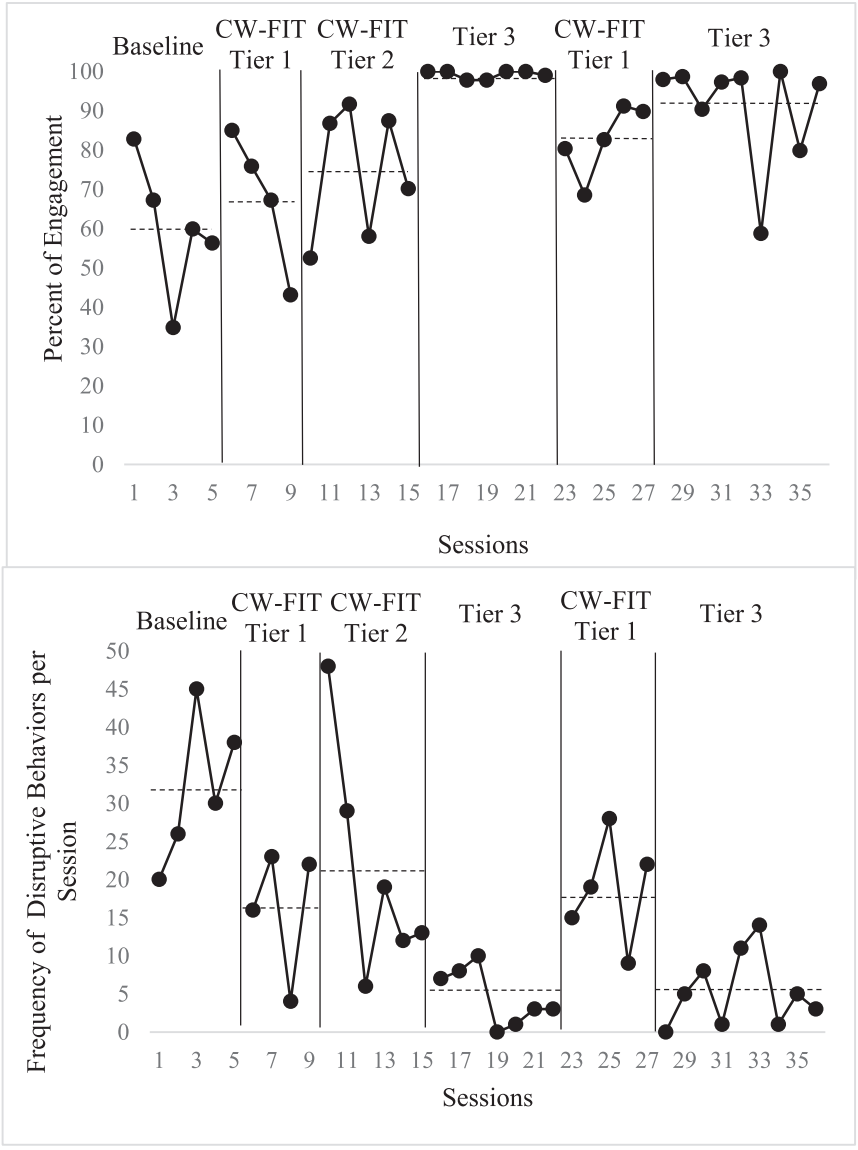

Figure 1. The top graph represents Shane's Percentage of Total Engagement per session. The bottom graph represents Shane's Frequency of Total Disruptive Behaviors per observation session. The mean line for each phase is included in the form of a dotted line.

The effect sizes and corresponding *p*-values between phases were as follows: baseline to CW-FIT Tier 1 (Tau-U = 0.04, $p = .327$), CW-FIT Tier 1 to CW-FIT Tier 2 (Tau-U = 0.33, $p = .394$), CW-FIT Tier 2 to Tier 3 (Tau-U = 1.00, $p = .003$), reversal of Tier 3 to CW-FIT Tier 1 (Tau-U = –1.00, $p = .005$), and CW-FIT Tier 1 back to Tier 3 (Tau-U = 0.56, $p = .096$).

Shane's disruptive behavior. Figure 1 shows the rate of Shane's disruptive behaviors per session. Shane's disruptive behaviors were variable over each phase. During baseline his disruptive behaviors ranged from 20 to 45 with a mean rate of 32 disruptions per 15-minute interval. In the first CW-FIT Tier 1 phase, Shane's disruptive behaviors across four sessions decreased by 16 behaviors from baseline to a mean rate of 16 behaviors per session (range 4 to 23). Although two data points overlapped with baseline, the intervention decreased Shane's disruptive behaviors. In the CW-FIT Tier 2 phase, his mean score (21 disruptive behaviors per 15 minutes) increased 5 points from the CW-FIT Tier 1 phase, but was still down 11 points from baseline. Despite an overall downward trend, the scores were still variable, ranging from 6 to 48. When the Tier 3 intervention was introduced, Shane's mean level decreased to 5 with minor variability, scores ranging from 0 to 10.

The Tier 3 intervention was then withdrawn, and CW-FIT Tier 1 was again the sole intervention. This change resulted in an immediate increase in disruptive behaviors, with the mean score increasing 13 points, up to 18, with one overlapping data point with the Tier 3 intervention. Shane performed better than during the initial baseline and CW-FIT Tier 2 phases. During the second Tier 3 intervention phase, Shane's disruptive behaviors decreased to a mean rate of 5 (range 0 to 14), with a minor increase in variability. His disruptive behaviors decreased from a mean rate of 32 during baseline and 15 during CW-FIT Tier 1 phases to a mean rate of 5 during combined Tier 3 intervention phases. There were no overlapping data points between baseline and both Tier 3 intervention phases, suggesting that the Tier 3 intervention phases demonstrated clear improvement over baseline and CW-FIT Tier 1 and 2 phases.

The effect sizes and corresponding *p*-values between phases were as follows: baseline to CW-FIT Tier 1 (Tau-U = 0.80, $p = .050$), CW-FIT Tier 1 to CW-FIT Tier 2 (Tau-U = –0.08, $p = .831$), CW-FIT Tier 2 to Tier 3 (Tau-U = 0.86, $p = .010$), reversal of Tier 3 to CW-FIT Tier 1 (Tau-U = –0.94, $p = .007$), and CW-FIT Tier 1 back to Tier 3 (Tau-U = 0.9, $p = .006$).

Ricardo's total engagement. Figure 2 indicates that Ricardo's percentage of total engagement was variable throughout the phases.

During baseline, his five total engagement scores ranged from 26 to 88% ($M = 53\%$). During the CW-FIT Tier 1 phase, his five scores ranged from 60 to 94% ($M = 72\%$). His mean score increased by 19%, but four of the five data points overlapped with baseline. There was also a small downward trend. In the CW-FIT Tier 2 phase, his five total engagement scores had a mean of 50% (range 30–71%), a decrease of 22% from CW-FIT Tier 1. His scores continued to be variable, and there was a downward trend. When the Tier 3 intervention was introduced, Ricardo's mean level of engagement increased to 73% (range 22–99%), with continued variability in his nine scores. Four of the nine scores overlapped with CW-FIT Tier 2 phase scores. This phase had the greatest degree of variability among all of the phases. In the PR-matching Tier 3 intervention, his scores ranged from 87 to 100% on the two data points ($M = 94\%$) with the least variability.

The effect sizes and corresponding *p*-values between phases are as follows: baseline to CW-FIT Tier 1 (Tau-U = 0.68, $p = .076$), CW-FIT Tier 1 to CW-FIT Tier 2 (Tau-U = −0.6, $p = .117$), CW-FIT Tier 2 to Tier 3 (Tau-U = 0.56, $p = .096$), Tier 3 to Tier 3 matching with the PR (Tau-U = 0.67, $p = .157$).

Ricardo's disruptive behavior. Figure 2 shows a visual representation of the rate of Ricardo's disruptive behaviors per 15-minute session during each phase. Ricardo's disruptive behaviors were variable over each phase. During baseline, Ricardo's rate of disruptive behaviors ranged from 19 to 47 ($M = 30$). In the CW-FIT Tier 1 phase, Ricardo's rate of disruptive behaviors ranged from 4 to 28 ($M = 17$), decreasing by 13 from baseline. Only two out of his five scores from this phase overlapped with baseline. Since his disruptive behaviors had not improved to desired levels, CW-FIT Tier 2 was implemented. In this phase, his mean rate of 23 was an increase of 6 points from the CW-FIT Tier 1 phase, but was still down by 7 from baseline. His disruptive behaviors were still variable, ranging from 10 to 42, but there was a downward trend. When the Tier 3 intervention was introduced, Ricardo's mean rate of disruptive behaviors stayed fairly consistent at 22 (range 5 to 37). Additionally, seven of the nine scores overlapped with scores from the CW-FIT Tier 2 intervention. The final PR-matching Tier 3 phase (Phase E) resulted in two scores ranging from 2 to 9, with a mean rate of 6. Ricardo's mean rate of disruptive behaviors decreased by 18 points from the previous Tier 3 phase.

The effect sizes and corresponding *p*-values between phases are as follows: baseline to CW-FIT Tier 1 (Tau-U = 0.56, $p = .144$), CW-FIT Tier 1 to CW-FIT Tier 2 (Tau-U = −0.20, $p = .602$), CW-FIT Tier 2 to Tier 3 (Tau-U = 0.04, $p = .894$), Tier 3 to Tier 3 matching with the PR (Tau-U = 0.78, $p = .099$).

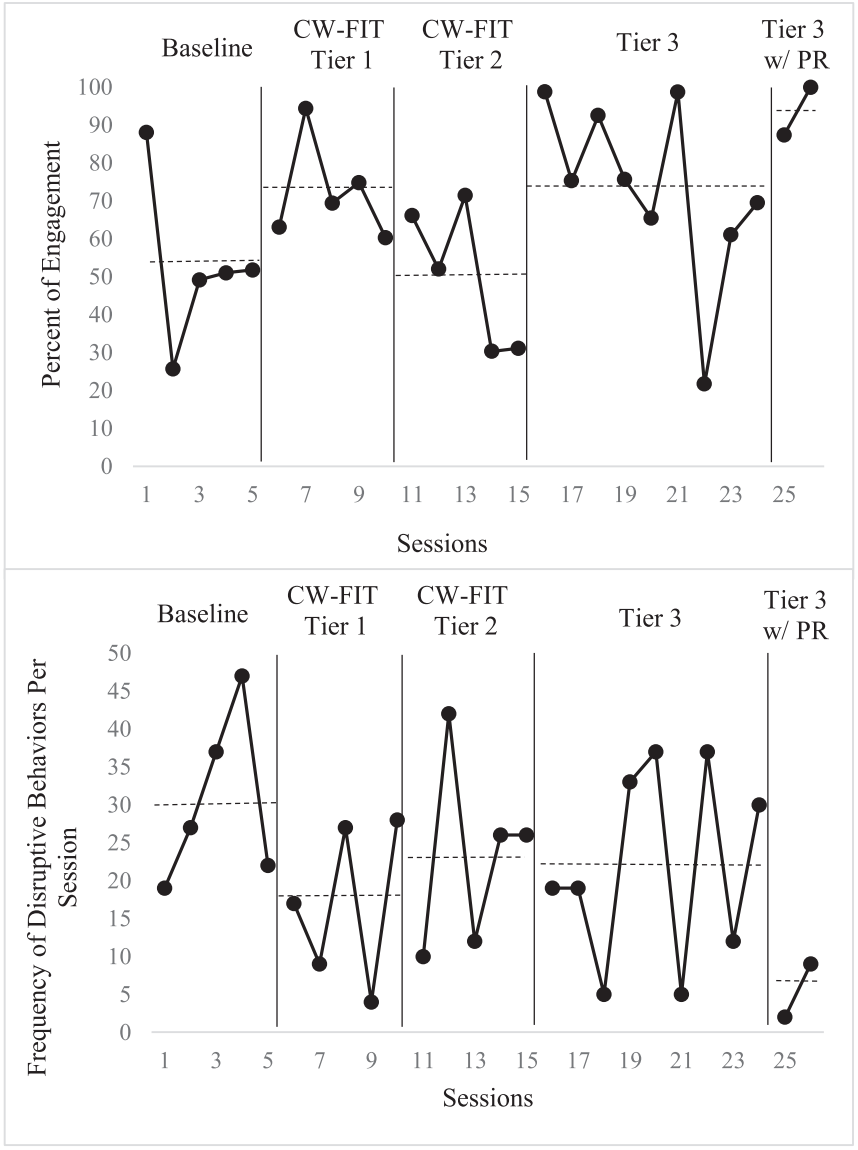

Figure 2. The top graph represents Ricardo's Percentage of Total Engagement per session. The bottom graph represents Ricardo's Frequency of Total Disruptive Behaviors per observation session. The mean line for each phase is included in the form of a dotted line.

Social Validity

Shane and Ricardo, their peer partners, the teachers, and their mothers were given questionnaires to obtain their opinions regarding the acceptability and feasibility of the Tier 3 intervention. Each acknowledged that they enjoyed participating in this intervention. All the participants saw the intervention as acceptable, feasible, and practical.

Target students. Shane and Ricardo responded to a 10-item questionnaire. The first five items asked if they liked the self-management program, the self-management card, matching with a peer, earning rewards in class, and earning rewards at home. They both marked "liked a lot" on four out of five questions. Shane indicated he liked matching with a peer "a little" and Ricardo indicated he liked the self-management card "a little." Four additional questions asked if the intervention helped them improve on the target behaviors: working quietly on assignments, sitting quietly in chair, keeping hands to self, and engaging the teacher appropriately (eyes on teacher, raise hand for attention). Shane indicated the intervention helped "a lot" for all four behaviors. Ricardo indicated the intervention helped "a little" on his first three target behaviors, but "not at all" on keeping his eyes on the teacher during instruction. Both students indicated that they liked discussing their progress with their mothers "a little."

Peer partners. Shane and Ricardo's peer partners were asked to answer nine questions. Shane's partner indicated that he liked using the self-management card, the timer, and earning a reward "a lot," but he liked matching ratings with Shane "a little." He also liked helping Shane "a lot." In his opinion, the self-management intervention helped Shane keep his hands to himself, work quietly on assignments, and listen to his teacher "a lot." He indicated the program helped Shane sit quietly at his desk "a little."

Ricardo's peer partner indicated that he liked using the self-management card, earning rewards, and helping Ricardo "a lot." He liked matching and using the timer "a little." He thought Ricardo improved on sitting quietly in his chair, keeping hands to himself, and listening to the teacher "a lot," and working quietly on his assignments "a little."

Teachers. The teachers were asked to answer seven questions. Five questions asked about the helpfulness of the following components in improving the student's performance on target behaviors: self-management card, peer partners, parent involvement, electronic communications, and school/home rewards. The teachers indicated "very helpful" or "somewhat helpful" on all of the components. Both teach-

ers indicated that they were "very satisfied" with the overall results, and that it was worth the time and effort taken to implement the self-management intervention. A comment from Shane's teacher provided additional social validity on the overall impact of the intervention; she stated, "I noticed a big difference in Shane. He was much happier at school and resolved his frustrations more calmly." Ricardo's teacher mentioned that she wished the intervention had been implemented earlier with Ricardo.

Parents. The mothers of the target students responded to eight questions. Responses to six questions indicated how important and helpful the following components were: daily electronic communication, self-management card, peer partner, reinforcement system at school, reinforcement system at home, and discussing their child's daily progress at home. Both parents indicated that all of these components were important and helpful for their child. They also both indicated that they were "very satisfied" with the results of the intervention, and that it was worth the time and the effort to implement the intervention. In addition, Shane's mother mentioned that she appreciated what she had learned from the intervention about the importance of giving her son quality attention and how the texting provided her with daily prompts to help him. Ricardo's mother commented that she loved the program, and said that she wanted to implement it during the time that she would be homeschooling him.

Discussion

This study examined the effectiveness of a Tier 3 intervention implemented with two students who had previously been less responsive than their peers to Tier 1 and 2 interventions. Both students responded to CW-FIT Tier 1 and 2 interventions. However, the changes were not to the level desired, and both required the intensity of a Tier 3 intervention. The effectiveness of the Tier 3 intervention was very different for Shane and Ricardo. The treatment integrity data suggest the differences are related to the fidelity with which the intervention was implemented.

Peer praise to Shane was implemented with integrity in all but one of the eight sessions for which treatment integrity data were recorded. Although Shane did not receive peer praise during that session, he still received teacher and parent praise. The high level of treatment integrity for Shane's intervention (87%) supports the likelihood that the Tier 3 intervention was effective in increasing total engagement and decreasing disruptive behaviors for Shane. This high

level of integrity was contrasted with Ricardo, where treatment integrity was poor. During the Tier 3 intervention, when the peer was helping to implement the self-management intervention, praise from the peer only occurred in one out of the five sessions where treatment integrity data were recorded. Parent reinforcement (money to purchase a toy) was not recorded in any of these sessions, and praise from the teacher occurred on only two occasions. The overall treatment integrity score for the implementation of Tier 3 (Phase D) was 47%, which suggests that the intervention was not implemented as intended much of the time. Additionally, because of Ricardo's excessive absences and end of the school year scheduling conflicts during the Tier 3 intervention, Ricardo was not exposed to the intervention consistently (43% of the time). It is possible that with additional time the peer partner could have improved the integrity of his performance and Ricardo's behavior may have had greater improvement.

Because of the lack of treatment integrity with Ricardo, the effectiveness of the Tier 3 intervention is unclear. The high level of treatment integrity when Ricardo was matching with the PR (Phase E) supports the conclusion that the Tier 3 intervention could be effective in increasing Ricardo's total engagement and decreasing disruptive behaviors, but since there were only two data points we must be cautious regarding this interpretation.

The disparity in fidelity highlights the importance of monitoring treatment integrity in the implementation of interventions. It is especially important to note the disparity in the praise/reinforcement components of the Tier 3 intervention; without positive reinforcement a behavior is not likely to increase in frequency or maintain a high level of performance. The high level of integrity with Shane's intervention, including positive reinforcement, proved effective in improving academic engagement and decreasing disruptive behaviors. However, with the integrity problems with Ricardo's intervention, particularly the low levels of reinforcement, Ricardo's engagement remained variable and his behavior erratic.

Not only was this intervention effective when implemented consistently and with integrity, the teachers also found it feasible to implement in their classrooms. The likelihood of teachers implementing an intervention increases if the intervention is both acceptable and feasible (Mitchem & Young, 2001). All participants commented that this intervention was an acceptable and feasible way for Shane and Ricardo to receive the assistance they needed. However, it is interesting to note that although Ricardo's teacher, parent, and peer reported the intervention was feasible to implement, their behavior did not support this.

Both students reported matching with integrity helped them become more engaged and less disruptive. Both mothers and teachers were highly satisfied with the outcome of the Tier 3 intervention.

Visual analysis and effect sizes of Shane's data indicated that the Tier 3 intervention provided the support necessary for Shane to improve his classroom behavior. Furthermore, Shane's scores demonstrated that a more intensive Tier 3 intervention can be effectively implemented in the general education classroom, supporting previous research (Basham et al., 2010). With the support of both parents and peers, students with behavior problems can still access the core curriculum while receiving the intensity of support they need. The visual analysis and effect sizes of Ricardo's data indicated that the Tier 3 intervention was not effective, although the poor outcomes are likely related to the lack of consistent implementation.

Ricardo's and Shane's results showed how educators can use purposeful and positive communication with parents to enlist additional support for students, bringing attention to electronic messaging as an efficient method for creating meaningful two-way communication. Such communication has been noted in other professions (Collins, McAllister, & Ford, 2007; Sharifi et al., 2013), but has not been well researched by educators. We demonstrated that this electronic messaging can serve at least three functions: (a) allowing teacher-parent communication regarding the child's school performance, (b) providing information to the parent for which they can praise their child, and (c) allowing the parent to report back to the teacher.

Limitations

Although the effects on Shane's total engagement and disruptive behavior were encouraging, this research had limitations. Since this study included only two subjects, it should be replicated with more students, in other settings, and across different behaviors to build evidence that it is an effective practice. Additionally, further research should be conducted to demonstrate the need for moving through a tiered system until the level of support given matches what is required to help effectively manage the behavior problems and increase the academic engagement of students. It should be noted that the information reported by the mothers is self-report data and has no measure of reliabilty, but comments made by Shane and his teacher suggested that the praise was given at home. This information was not corroborated by Ricardo or his teacher. Future research should check the reliability of data reported from home. Research should measure the impact of parent praise and positive interactions with their child on

the student's level of engagement and disruptive behaviors in the classroom.

Conclusion

General education teachers will have students who are disruptive to the learning environment of their classroom. Schools have been using PBIS techniques to assist students who require extra support to be academically and behaviorally successful. CW-FIT Tier 1 effectively improved overall student engagement in classrooms, and Tier 2 helped many students who were less responsive to Tier 1. For students who are less responsive than classroom peers at the Tier 2 self-recording level, a more intensive intervention needs to be developed and used. Consideration should be given to implementing Tier 3 interventions in general education classrooms. Interventions such as the one used in the current study can utilize the support of parents and peers to allow students who are less responsive at Tier 1 and 2 to decrease their disruptive behaviors while continuing to access the general education curriculum. This study supports the notion that the focus of tiered support should be on the intensity of the interventions. Tiers 1, 2, and 3 refer to the support given to a student, not to the students themselves or to a setting. Additionally, electronic messaging facilitated a two-way communication between parents and teachers that effectively contributed to providing this more intensive support.

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