Hammill Institute on Disabilities

Journal of Positive Behavior Interventions
2017, Vol. 19(4) 216–227

DOI: 10.1177/1098300717696939
jpbi.sagepub.com
SAGE

An Investigation of Multitiered Behavioral Interventions on Disruptive Behavior and Academic Engagement of Elementary Students

Kimberly R. Bunch-Crump, PhD, BCBA[1], and Ya-yu Lo, PhD[1]

Abstract

This study examined the effects of a multitiered system of support using Check-In Check-Out (CICO) as a secondary intervention and function-based self-monitoring (FBSM) as a tertiary intervention on the disruptive behavior and academic engagement of four elementary students identified as being in need of additional behavioral supports. A multiple baseline across participants' design was conducted to evaluate the effects of CICO and a reversal design was used to evaluate the additive effects of FBSM with one participant whose behavior was determined nonresponsive to CICO due to variability and minimal change in disruptive behavior. Results indicate a reduction in disruptive behavior and increased academic engagement for three participants upon introduction of CICO. Evaluations of the FBSM intervention were rendered inconclusive; however, preliminary data revealed a decrease in trend and level of disruptive behavior for the participant receiving tertiary support.

Keywords

multitiered system of support, positive behavior support, Check-In Check-Out, function-based self-monitoring

School-Wide Positive Behavior Interventions and Support (SWPBIS) is an empirically based, multifaceted systems approach consisting of school-wide and individual interventions delivered across three levels of support to improve socially valued outcomes (Office of Special Education Programs Technical Assistance Center on Positive Behavioral Interventions and Supports, 2015). Research has shown that schools implementing SWPBIS have fewer office discipline referrals (Vincent, Swain-Bradway, Tobin, & May, 2011) and are less likely to use exclusionary discipline practices (Bradshaw, Mitchell, & Leaf, 2010).

Check-In Check-Out (CICO) and function-based self-monitoring (FBSM) are two interventions that have been used within SWPBIS, as a Tier II and a Tier III intervention, respectively, with promising results in supporting the behavioral needs of students (Campbell & Anderson, 2008; March & Horner, 2002; Miller, Dufrene, Sterling, Olmi, & Bachmeyer, 2015; Swoszowski, McDaniel, Jolivette, & Melius, 2013). CICO is supported by research as a secondary-level intervention effective in decreasing problem behaviors, and increasing academic engagement and achievement (Hawken, Bundock, Kladis, O'Keeffe, & Barrett, 2014). CICO consists of a student using a daily progress report (DPR) to complete a five-step process: (a) checking in with a designated school staff member in the morning; (b) obtaining recorded feedback on his or her behavior throughout the day; (c) checking out with school staff before leaving school; (d) returning home to check in with a parent or guardian to review and discuss daily school behavior, and obtain a parent's signature; and (e) returning the DPR to the CICO facilitator the following school day at check-in (Crone, Hawken, & Horner, 2010). Many scholars have theorized and found CICO to be most effective with student behaviors maintained by teacher attention due to the increased adult attention received during CICO (Campbell & Anderson, 2008; Crone et al., 2010; McIntosh, Campbell, Carter, & Dickey, 2009). In a recent review of CICO literature, Maggin, Zurheide, Pickett, and Baillie (2015) identified positive effects of CICO on 28 student cases in eight CICO single case design studies meeting What Works Clearinghouse criteria. Of the 28 participants with whom CICO was effective, 20 displayed attention-maintained

[1]University of North Carolina at Charlotte, USA

Corresponding Author:
Kimberly R. Bunch-Crump, Department of Special Education and Child Development, University of North Carolina at Charlotte, 9201 University City Blvd., Charlotte, NC 28223, USA.
Email: kimberly.crump@yahoo.com

Action Editor: Maureen Conroy

behaviors, and eight exhibited behaviors maintained by escape from challenging tasks. Maggin and colleagues identified seven nonresponders (20%), four of whom displayed escape-maintained behaviors. A review of CICO literature conducted by Hawken et al. (2014) suggested similar findings of nonresponders to CICO. Hawken and colleagues calculated the percentage of nonoverlapping data to determine the effectiveness of CICO for 39 participants across 20 studies meeting their inclusion criteria; they identified 29% of elementary participants and 13% of secondary participants as nonresponders to CICO and hypothesized that these participants may need a more intensive intervention.

To support the behavioral needs of nonresponders to secondary-level support within SWPBIS, such as CICO, researchers suggest the addition of tertiary-level function-based interventions (Lo, Algozzine, Algozzine, Horner, & Sugai, 2010). Function-based interventions involve identifying the function of an individual's behavior to do one or more of the following: (a) altering antecedent variables, (b) teaching replacement behaviors, and/or (c) altering consequence variables (Cooper, Heron, & Heward, 2007). Self-monitoring is one intervention that has been used to effectively accomplish all three (Briere & Simonsen, 2011; Stahr, Cushing, Lane, & Fox, 2006). Self-monitoring, the most commonly used intervention in a self-management program (Briesch & Chafouleas, 2009; Mooney, Ryan, Uhing, Reid, & Epstein, 2005), is the process of self-observing and self-recording behavior (Sheffield & Waller, 2010). Research has indicated that considering the function of behavior when developing a self-monitoring program (i.e., FBSM) can increase its effectiveness (Briere & Simonsen, 2011; Stahr et al., 2006). FBSM uses the assessed function (e.g., attention, escape) of an individual's problem behavior to identify an appropriate behavior to monitor and to serve as the maintaining consequence of the appropriate behavior. The monitoring tool (e.g., checklist, rating scales, cards, forms, electronic device) helps to modify behaviors by serving as an antecedent variable, a reminder of the expected behavior. Identification of the consequence maintaining the problem behavior helps to target and teach a more appropriate recruiting behavior that produces the same consequence. There has been empirical evidence supporting the effectiveness of FBSM to decrease classroom problem behavior and increase academic engagement of elementary students (Hansen, Wills, Kamps, & Greenwood, 2014; Stahr et al., 2006; Waller, Albertini, & Waller, 2011); however, research investigating the effects of FBSM on the behaviors of nonresponders to CICO is limited.

To date, two studies have evaluated the effects of FBSM on the behavior of nonresponders to CICO (i.e., Briere & Simonsen, 2011; March & Horner, 2002). Briere and Simonsen (2011) implemented a multiple treatment reversal design (ABCBC) with counterbalanced conditions to compare the effects of FBSM and nonfunction-based self-monitoring on the behaviors of two middle-school participants who were nonresponsive to CICO. Researchers conducted a functional behavioral assessment (including record reviews, teacher and student interviews, and direct observations) to identify the function of each participant's behaviors and created two self-recording rating scales, one with prompts monitoring an incompatible and replacement behavior serving the same function of the targeted problem behavior and the other not relevant to the function. For FBSM, the participant with task-avoidance behavior monitored his on-task behavior and whether he requested a break when needed. The participant whose problem behavior was maintained by access to peer attention monitored if her interactions with peers and teachers were respectful and responsible. For the non-FBSM, the behavior selected for monitoring consisted of whether the student was responsible or respectful when interacting with others (for the participant with escape-maintained function), or whether the student was on-task and requested a break (for the participant with peer attention function). Results revealed an approximate 50% reduction in percentage of off-task behaviors when FBSM was implemented, and FBSM was more effective than non-FBSM. March and Horner (2002) implemented a multiple baseline across participants' design to investigate a function-based intervention package on the behaviors of three high school students who were nonresponsive to CICO. Results for the participant whose intervention package included self-monitoring indicated a decrease in disruptive behavior (by 20%) and an increase in academic engagement (by 39%) from baseline (CICO) to intervention.

Although research has shown CICO to be effective in decreasing problem behavior and increasing academic engagement and achievement, researchers urge the need for replication studies to aid in findings of the generalizability of its effects (Hawken et al., 2014; Maggin et al., 2015). In addition, with an average of 21% of participants identified as being nonresponsive to CICO, there is a need to investigate the effects of more intensive interventions, such as FBSM, to support CICO nonresponders. The purpose of this study was to examine the effects of CICO and FBSM delivered within a tiered framework on the disruptive behavior and academic engagement of four elementary students. The study addressed three research questions.

Research Question 1: What are the effects of a secondary CICO intervention on the disruptive behavior and academic engagement of participants?

Research Question 2: What are the additive effects of FBSM as a tertiary intervention on the disruptive behavior and academic engagement of participants who were nonresponsive to CICO?

Research Question 3: What are the effects of the intervention(s) on participants' social skills, problem

behaviors, and academic performance as measured distally by the *Social Skills Improvement System* (Gresham & Elliott, 2008)?

Method

Setting

The study took place in an urban, Title I public elementary school in the southeastern region of the United States. The student population ($N = 367$) represented 53% minority students, 65% free and reduced lunch recipients, 9% special education service recipients, and 25% English as a second language service recipients. At the time of the study, the school was in its sixth year of SWPBIS implementation and received state recognition for exemplar implementation for the prior 3 years. As a requirement for exemplar recognition, the school scored at least 95% on the *School-Wide Evaluation Tool* (SET; Sugai, Lewis-Palmer, Todd, & Horner, 2001), and showed at least 2 consecutive years of improvement in state-recognized behavioral, attendance, and academic data. The school had a no out-of-school-suspension policy. During the year prior to the study, 97% of the students received one or fewer office discipline referrals, five students received targeted interventions (Tier II), and four students received individualized interventions (Tier III); none of them participated in this study. All training sessions took place in the school's conference room, which consisted of a rectangular table, chairs, and a projection screen. The interventions took place in the participants' respective general education classrooms. Check-in and check-out meetings occurred in an empty classroom and, on rare occasions, in the hallway.

Participants

Four students were selected to participate based on identification by the school's tiered support team as needing secondary- or tertiary-level behavioral interventions. The team used a compilation of teacher nominations, team member observations, behavioral data (severity, frequency), responsiveness to classroom and administrative supports (e.g., seating arrangements, modified seating requirements, extended time on assignments, specific praise, small group instruction, behavior conferencing, and parent conferences), and office discipline referrals to make decisions. The first author conducted prebaseline observations to verify the occurrence and frequency of nominees' problem behaviors. In addition, each participant's teacher completed the *Social Skills Improvement System (SSIS) Teacher Form* (Gresham & Elliott, 2008). The SSIS is a nationally normed (age and gender) screening tool used to identify problem behaviors that may impede acquisition or performance of social skills, and to provide a broad measure of students' academic performance, by assessing three domains of Social Skills, Problem Behaviors, and Academic Competence (Gresham & Elliott, 2008). The SSIS yields standard scores and percentile ranks for the three domains. Nominees with scores indicating above average in the Problem Behaviors domain and below average in the Social Skills and/or Academic Competence domains and for whom assent and consent were granted were included in the study. At the time of selection, none of the participants received special education services.

Bryce was a 9-year-old African American male in the third grade. Bryce's teacher rated him above average in Problem Behaviors, and below average in both Social Skills and Academic Competence domains of SSIS. Bryce's disruptive behavior included wandering the room, calling out, making noises, crawling or lying on the floor, arguing with peers and the teacher, and refusing to start and complete work. Bryce received three office discipline referrals prior to the study, and began participating in an anger management group during baseline.

Anderson was a 9-year-old African American male in the third grade. His SSIS scores indicated above average in Problem Behaviors, below average in Social Skills, and below average in Academic Competence domain. Anderson's disruptive behavior included calling out; wandering the room; crawling on the floor; lying on the floor, a table, or his desk chair during instruction; and refusing to start and complete work. Prior to the study, Anderson had not received any office discipline referrals. He qualified for and began receiving speech and language services, individual therapy, and anger management group counseling during the course of the study.

Cayenne was an 11-year-old African American male in the fifth grade. Cayenne's SSIS scores revealed above average in Problem Behaviors, and below average in both Social Skills and Academic Competence domains. Cayenne's disruptive behavior consisted of talking to peers at inappropriate times; inappropriate physical interactions with peers through hitting, kicking, or pushing; and inappropriate use of instructional materials (e.g., throwing, tearing up paper). Cayenne received two office discipline referrals during baseline.

Douglas was a 10-year-old African American male in the fourth grade. Douglas's SSIS scores indicated above average in Problem Behaviors, below average in Social Skills, and average in the Academic Competence domain. Douglas's disruptive behavior consisted of talking to peers at inappropriate times, crying, staying out of seat without permission, and calling out. Douglas had not received any office discipline referrals prior to the study or during baseline.

Data Collectors and Implementers

The first author served as the experimenter, primary data collector, and trainer for the CICO implementer. Secondary

data collectors included the second author and an undergraduate student majoring in psychology. The school's assistant principal, with 7 years of experience as a teacher and 12 years as an administrator, served as the CICO implementer and was responsible for training CICO facilitators, participants, teachers, and parents in the implementation of CICO. CICO facilitators were a special education teacher and a lead reading teacher, both with a bachelor degree and more than 10 years of teaching experience. CICO facilitators were responsible for conducting the check-in and check-out meetings.

Materials

Materials for this study included (a) audio recorders to record check-in/check-out meetings; (b) a handheld Sony® IC recorder with voiced interval markings, headphones, a splitter, and an experimenter-developed observation data recording form for data collection of direct observation; (c) DPR; and (d) a self-monitoring mobile device. Descriptions for items (c) and (d) are as below.

DPR. DPRs were used during CICO to record teacher ratings of participants' compliance with school-wide behavioral expectations and to obtain parents' signatures acknowledging review of students' daily behavior ratings. The DPR, printed on standard (8″ × 11″) paper, included a section for (a) student name and date; (b) a list of behavioral goals corresponding with the school-wide behavioral expectations for the classroom (i.e., Be Respectful, Be Responsible, and Be Safe) with rating options of 0 (*did not demonstrate*), 1 (*demonstrated with some teacher/staff prompting*), and 2 (*demonstrated without teacher/staff prompting*); (c) teacher's comments and initials; (d) student's signature; (e) facilitator's signature; (f) points earned; and (g) parent's comments and signature.

Self-monitoring mobile device with I-Connect. During the condition of CICO plus FBSM, a Samsung® Galaxy Tab 2, 7″ touch screen mobile device with Wi-Fi capability, installed with the I-Connect self-monitoring mobile app served as the self-monitoring device. I-Connect is a self-monitoring application that allowed the programming of individualized self-monitoring goals, intervals, and prompts (i.e., screen flash, chime, vibrate; Wills & Mason, 2014). At the end of each interval, the device displayed self-monitoring and self-recruitment of praise questions prompting the student to select from a binary yes/no option by touching the screen.

Dependent Variables and Data Collection

The primary dependent variable was participants' disruptive behavior. Academic engagement was the secondary dependent variable. These two targeted behaviors were not mutually exclusive; academic engagement and disruptive behaviors could occur concurrently. Teachers' SSIS ratings were used for pre- and postintervention comparisons as a distal measure.

Disruptive behavior and academic engagement. Disruptive behavior was broadly defined as participants' behavior that disrupted instruction or the learning of peers, and included talking out, noncompliance, negative verbal or physical interaction with peers or teacher, out of location, and inappropriate use of materials. Academic engagement was defined as a participant (a) orienting toward the presenter or demonstration materials (e.g., whiteboard, computer), (b) responding to the presenter's question or comment, or (c) actively using instructional materials to complete assigned work.

Occurrences of disruptive behavior and academic engagement were recorded for participants during all phases of the study. Cooper et al. (2007) suggested using partial interval recording as a recording measure for direct observation when the goal is to decrease a behavior, as this recording measure has a tendency to overestimate the presence of behaviors. Whole interval recording tends to slightly underestimate the presence of behavior and is suggested for direct measure of behaviors targeted for increase (Cooper et al., 2007). Therefore, the recording measures included a 10-s partial interval recording for the disruptive behavior and a 10-s whole interval recording for the academic engagement, with a 5-s recording period after each observational interval, during each 30-min observational session. The percentage of intervals of disruptive behavior and academic engagement was calculated by dividing the number of intervals in which the targeted behavior (i.e., disruptive behavior or academic engagement) occurred by the total number of intervals observed (i.e., 90) and multiplying by 100.

Interobserver agreement. The second author and an undergraduate student majoring in psychology collected interobserver agreement (IOA) data for students' disruptive behavior and academic engagement. During IOA data collection, observers shared a handheld recorder with voice recorded interval prompts, a splitter, and headphones to ensure both observers began and ended observations on the same interval. IOA was calculated using an interval-by-interval analysis. Overall, IOA data were collected for 23% of observational sessions across all conditions (baseline = 21%, CICO = 20%, FBSM = 29%) and all participants, with a mean agreement of 93% (range = 85%–95%).

SSIS rating. In addition to the initial teacher SSIS ratings used to verify participant nominations, the SSIS was completed at the conclusion of the study. The prebaseline and postintervention scores were compared to analyze the effects of the intervention(s) on the three domains of SSIS (i.e., Social Skills, Problem Behaviors, and Academic Competence).

Experimental Designs and Data Analysis

A multiple baseline across participants' design (Cooper et al., 2007) was used to determine the extent to which a functional relation existed between CICO and disruptive behavior and academic engagement. Visual analysis of the data served as the primary method for data analysis to include systematic evaluation of level, trend, variability, immediacy of effect, proportion of overlapping data, consistency of data across conditions and phases, observed and projected patterns of outcome variables, and external factors and anomalies (Kratochwill et al., 2010). Data on disruptive behavior were used for decision of condition change and sequence of participants entering the intervention phase. Consistent with responsiveness noted in the CICO literature, mastery was established if the participant showed a decrease in variability and a mean decrease in disruptive behavior of more than 20% from baseline to CICO implementation after at least 10 CICO sessions (Ennis, Jolivette, Swoszowski, & Johnson, 2012; Swoszowski et al., 2013; Swoszowski, Jolivette, Fredrick, & Heflin, 2012). Bryce did not meet mastery criterion and received the FBSM intervention. To determine the additive effects of FBSM on Bryce's disruptive behavior and academic engagement, a reversal design (Kazdin, 1982) was used because it allowed for determination of differential treatment effects for CICO alone (i.e., Tier II) and CICO plus FBSM (i.e., Tier III). There were at least five sessions in each condition of the reversal design with desired behavioral changes (e.g., further reduction in disruptive behavior during FBSM) to inform condition change. After two sessions of the reinstatement of the FBSM condition, school administrators transferred Bryce to another classroom and the intervention ended; therefore, a return to CICO was not possible.

Procedures

Baseline (SWPBIS Tier I). During baseline, all students participated in the school's SWPBIS universal behavioral interventions, consisting of school-wide core values and behavioral expectations across school settings, and a school-wide system for recognizing positive behavior. CICO and FBSM were not implemented during baseline.

CICO (SWPBIS Tier II). Prior to the CICO implementation, the first author trained the CICO implementer (i.e., assistant principal) in the implementation procedures. The CICO implementer then trained the facilitators, student participants, teachers, and parents. All trainings lasted between 20 and 30 min and consisted of explicit instruction in (a) the definition of CICO and steps in the process; (b) the importance of positive interactions (e.g., CICO facilitator and student, teacher and student, parent and student); (c) procedures for conducting steps of the CICO process (relevant to trainee); (d) components of the DPR card, assessing points, and determining rewards; (e) an operational definition of the behavior goals; and (f) data collection procedures (relevant to trainee). In addition, student participants received explicit instruction in accepting feedback and discriminating school-wide classroom behaviors using video clips; and CICO implementer received training in the use of researcher-made materials to conduct trainings (e.g., PowerPoint presentations, video clips demonstrating behaviors, scenarios/examples), and how to assess trainee's learning. Training sessions for the CICO implementer, student participants, and parents were conducted on an individual basis. Training sessions for teachers and facilitators took place in small groups. All training continued until mastery was met (i.e., completing their respective portions of the CICO cycle with 100% accuracy in mock situations). CICO implementation consisted of the standard five-step process according to Crone et al. (2010). As suggested by Crone et al., the daily goal was set at 80% for all student participants. Classroom teachers rated student participants' compliance with school-wide behavioral expectations. Students meeting their daily behavior goal earned a reward (e.g., candy, victory dance, sticker). Furthermore, students earned points (i.e., 70% on daily report card = 1 point, 80% on daily report card = 2 points, 90% on daily report card = 3 points; 100% on daily report card = 4 points) toward long-term reinforcers (e.g., basketball game with principal, lunch with administrator). During the CICO condition, SWPBIS Tier I interventions continued.

FBSM (SWPBIS Tier III). Individuals not meeting mastery criterion were considered CICO nonresponders and entered the FBSM condition. Prior to beginning this condition, the first author conducted a functional behavioral assessment (FBA) using the *Functional Assessment Checklist for Teachers and Staff* (FACTS) Part A & Part B (March et al., 2000), the *Student-Directed Functional Assessment Interview* form (O'Neill, Albin, Storey, Horner, & Sprague, 2015), and an experimenter-created A-B-C analysis form. Based on FBA data, researchers created an individualized self-management plan that included self-monitoring via I-Connect and self-recruitment of reinforcement. During the FBSM condition, SWPBIS Tier I and Tier II interventions continued.

Bryce was the only participant meeting the criteria for the FBSM intervention. Prior to beginning the FBSM intervention, Bryce received a 30-min training on how to (a) discriminate between behaviors that complied with and violated the universal classroom rules, (b) monitor and record behaviors, and (c) operate and care for the mobile device. Bryce's FBA identified teacher attention as the function of his disruptive behavior. As a result, Bryce's FBSM training included information on an appropriate replacement behavior to self-recruit teacher attention (e.g.,

raising his hand and waiting for the teacher to acknowledge him) and the incompatible behavior of following the universal classroom rules (i.e., be respectful, responsible, and safe). The training continued until Bryce successfully demonstrated self-monitoring and appropriate attention-recruiting behaviors in mock situations with 90% accuracy. A 10-min training session was conducted with Bryce's classroom teacher on self-monitoring, the use of I-Connect, and the use of differential reinforcement of alternative behavior and incompatible behavior to reinforce Bryce's appropriate responses with positive teacher attention. Specifically, the classroom teacher was asked to withhold attention for Bryce's disruptive behavior and to provide attention in the forms of verbal praise, acknowledgment to answer questions, pats on back, or thumbs up when Bryce displayed the replacement behavior or incompatible behavior.

The self-monitoring mobile device remained on the corner of Bryce's desk and was used during the selected 30-min targeted class session. The application was set to display "following the rules?" at 3-min intervals prompting Bryce to monitor his rule compliance (i.e., incompatible behavior) and "need help?" at 10-min intervals prompting Bryce to evaluate his need to recruit teacher attention (i.e., replacement behavior). The questions appeared with a binary yes/no option that Bryce selected by touching the screen.

Procedural Fidelity

The first author collected procedural fidelity data for 30% of baseline, 51% of CICO, 20% of FBSM, and 80% of training sessions using procedural fidelity checklists specific to each condition and training session. The procedural fidelity checklist for baseline consisted of 15 items adapted from the SET (Sugai et al., 2001). The procedural fidelity checklist for CICO had 13 items requiring the first author to review recorded check-in and check-out meetings (e.g., reminder of behavioral expectations, positive affirmations) and DPR cards (e.g., teacher recorded feedback). The procedural fidelity checklist for FBSM consisted of eight items monitoring the setup of the mobile device and the implementation of the self-monitoring program. Procedural fidelity was calculated using an item-by-item analysis, and was 100% for baseline, CICO implementation, and training sessions, and 92% for FBSM sessions.

Social Validity

Social validity data were collected using researchers-created social validity questionnaires from the CICO implementer (10 items), CICO facilitators (11 items), classroom teachers (25 items), student participants (11 items), and parents (11 items) at the conclusion of the study to assess their perceptions of the effectiveness, importance, and/or practicality of the interventions. All social validity questionnaires consisted of 5-point Likert-type-scale items (ranging from 1 = *strongly disagree* to 5 = *strongly agree*) and open-ended questions.

Results

Disruptive Behavior

Figure 1 displays the results of disruptive behavior for participants. A decrease in the level, variability, and trend of disruptive behavior is evident for three participants during implementation of CICO. In addition, there were slight positive effects of FBSM with Bryce, who was nonresponsive to CICO.

Bryce. Bryce exhibited a moderate level of disruptive behavior (M = 42%) with variability (range = 30%–50%) and an overall increasing trend during baseline. Upon implementation of CICO, there was a reduction in disruptive behavior (M = 24%) with an overall decreasing trend across the first 19 CICO data points, an increase in variability (range = 0%–45%), and a return to the baseline level during the last three CICO sessions. Bryce's change in mean percentage of disruptive behavior (i.e., 18%) and variability indicated that he did not meet mastery criterion for CICO. An FBA was conducted, and FBSM was introduced. During the first phase of FBSM, Bryce's percentages of disruptive behavior slightly decreased with an overall decreasing trend (M = 25%, range = 18%–35%). Upon a return to the CICO alone phase, Bryce's percentages of disruptive behavior showed an overall increasing trend (M = 31%, range = 22%–37%). During the reinstatement of FBSM, Bryce's percentages of disruptive behavior began to show a decreasing trend and a decrease in level (M = 16%, range = 13%–18%). A return to CICO was not possible due to an administrative decision to move Bryce to another class.

Anderson. During baseline, Anderson exhibited a moderate mean level of disruptive behavior (M = 39%), with an overall increasing trend and extremely high variability (range = 7%–85%). When CICO was introduced, there was a consistent reduction in level (M = 17%) and variability (range = 3%–38%) of Anderson's disruptive behavior. Anderson displayed a mean change of disruptive behavior of 22%, exceeding mastery criterion.

Cayenne. Cayenne displayed a moderate (M = 38%) and highly variable (range = 12%–73%) level of disruptive behavior during baseline. Upon introduction of CICO, there was a clear reduction in the occurrence (M = 14%) and variability (range = 3%–25%) of disruptive behavior. Cayenne displayed a mean change of disruptive behavior of 24%, exceeding mastery criterion.

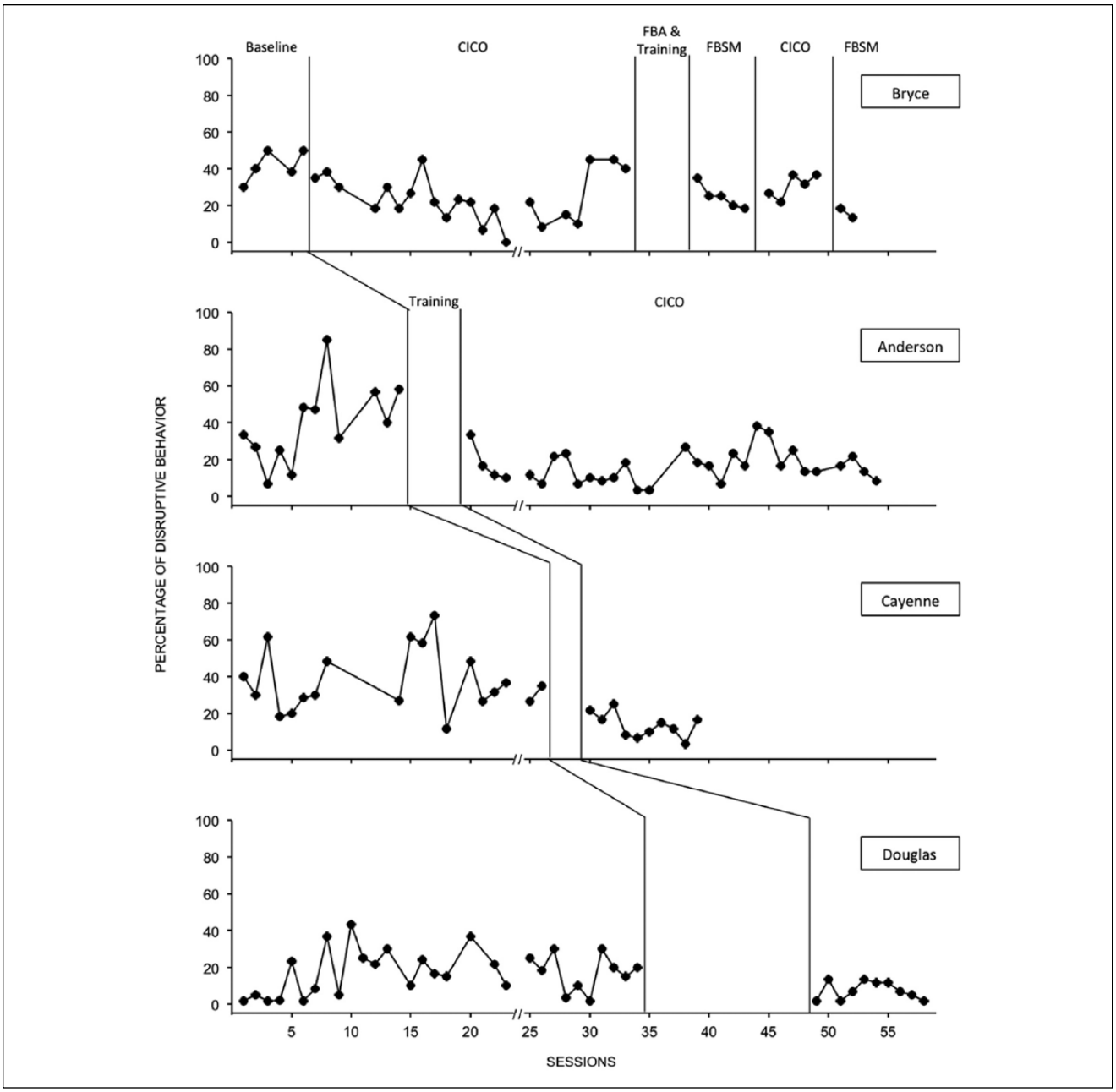

Figure 1. Percentage of disruptive behavior for participants across experimental conditions.
Note. The symbol "//" represents winter break. CICO = Check-In Check-Out; FBA = functional behavioral assessment; FBSM = function-based self-monitoring.

Douglas. Douglas displayed a low (M = 17%) and moderately variable (range = 2%–43%) level of disruptive behavior during baseline. Upon introduction of CICO, there was a clear reduction in the occurrence (M = 7%) and variability (range = 2%–13%) of disruptive behavior. Douglas displayed a mean change in percentage of disruptive behavior of 10%. Even though a 10% decrease did not meet mastery criterion, Douglas's percentage of disruptive behaviors was low and decreased in variability, therefore, he did not receive tertiary-level intervention.

Academic Engagement

Figure 2 displays the results of academic engagement for all participants. Analysis reveals an increase in the level of academic engagement for participants during implementation

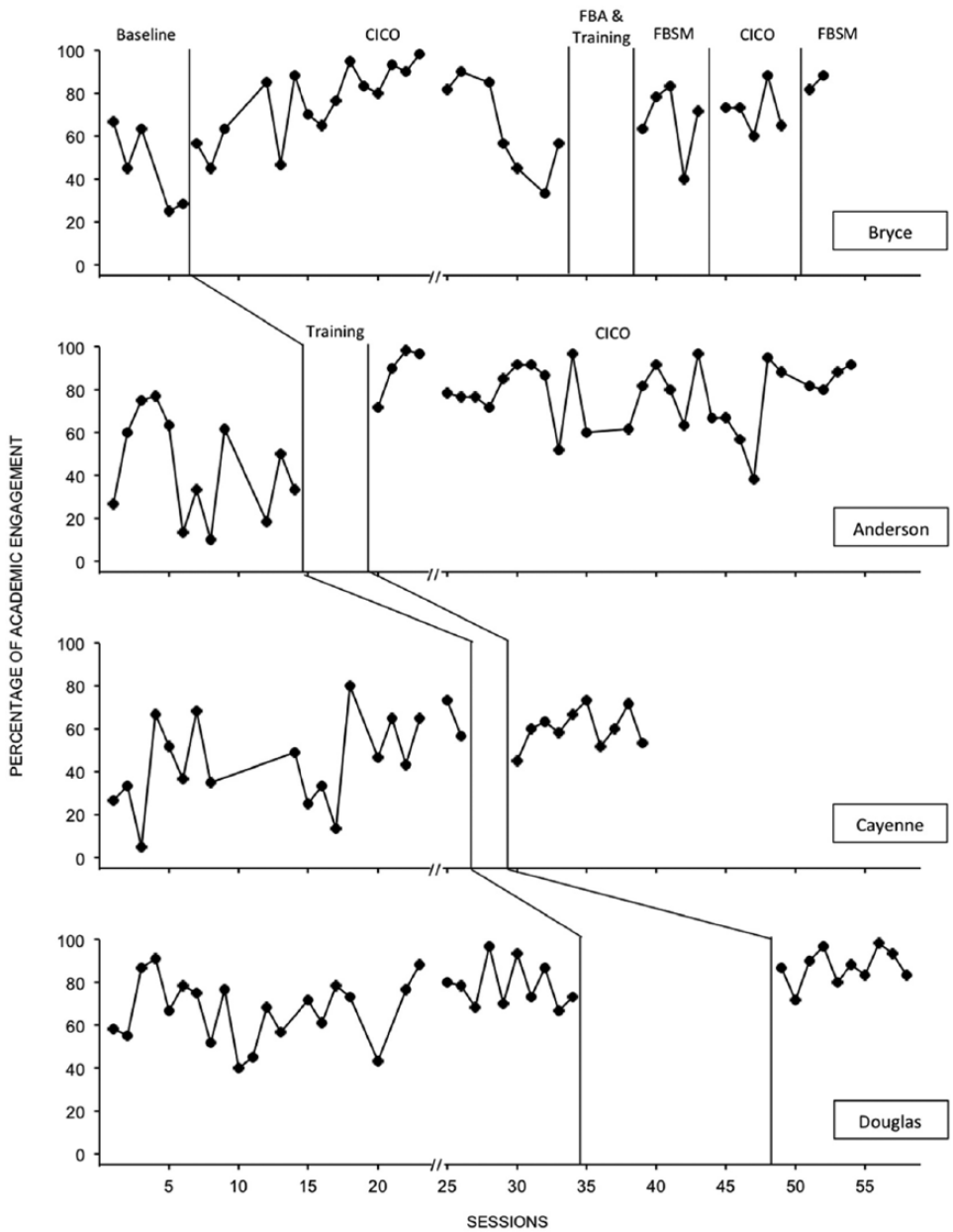

Figure 2. Percentage of academic engagement for participants across experimental conditions.
Note. The symbol "//" represents winter break. CICO = Check-In Check-Out; FBA = functional behavioral assessment; FBSM = function-based self-monitoring.

of CICO. The additive effect of FBSM on academic engagement was inconclusive for Bryce.

Bryce. During baseline, Bryce's academic engagement was in the low to moderate range with high variability (M = 46%; range = 25%–67%) and a decreasing trend. Although highly variable (range = 33%–98%), there was a clear increasing trend in the percentage of academic engagement across the initial 18 CICO sessions. Bryce displayed a mean change in academic engagement of 26%. However, during the last four CICO sessions, Bryce's academic engagement data dropped to a moderate level. During the first phase of FBSM, Bryce's percentage of academic engagement remained highly variable (range = 40%–83%), and his mean percentage of academic engagement was slightly lower (M = 67%) than that observed during the CICO phase. Upon a return to the CICO alone phase, Bryce's percentages of academic engagement increased slightly (M = 72%) with a

relatively stable pattern (range = 60%–88%) when compared with that during the FBSM phase. During the reinstatement of FBSM, Bryce's percentages of academic engagement began to show an increasing trend and decreased variability (*M* = 85%, range = 82%–88%) across two sessions.

Anderson. During baseline, Anderson's mean level of academic engagement was moderate (*M* = 44%) and highly variable (range = 10%–77%). During the CICO implementation, there was a clear change in level (*M* = 79%) and decreased variability (range = 38%–98%) of academic engagement for Anderson, with a mean change of 35%.

Cayenne. Cayenne's percentage of academic engagement was moderate (*M* = 46%) and highly variable (range = 5%–80%) during baseline. Upon CICO implementation, there was a slight change in level (*M* = 60%) and a clear reduction in variability (range = 45%–73%). Cayenne displayed a mean increase in percentage of academic engagement of 14%.

Douglas. During baseline, Douglas's mean level of academic engagement was above moderate (*M* = 71%) and variable (range = 40%–97%). During the CICO implementation, there was a clear change in level (*M* = 87%) and decrease in variability (range = 72%–98%) of academic engagement. Douglas displayed a mean increase in percentage of academic engagement of 16%.

Social Validity

Parents, student participants, the CICO implementer, classroom teachers, and one of two facilitators agreed that CICO was effective in improving participants' social behaviors, whereas the remaining CICO facilitator indicated impartiality (*M* = 4.42, *SD* = 0.67). The parents, one CICO facilitator, and one teacher agreed that CICO had positive effects on students' academic behaviors; whereas the other CICO facilitator, one teacher, and the CICO implementer were impartial, and one teacher disagreed (*M* = 3.55, *SD* = 0.88). However, teachers, parents, and three of four student participants supported continuing CICO (*M* = 4.33, *SD* = 1.32). One teacher commented that the feedback was a great way for the participant to "see his behavior throughout the day." All teachers reported CICO was easily incorporated in the classroom routine (*M* = 5). All teachers, CICO facilitators, and the CICO implementer indicated that CICO was implemented with reasonable time requirements (*M* = 4.50, *SD* = 0.54), and they would use the intervention with other students in need of behavior supports (*M* = 4.66, *SD* = 0.51). Bryce, his mother, and teacher indicated positive effects of FBSM on Bryce's social skills (*M* = 4.67, *SD* = 0.58) and academic behaviors (*M* = 4.67, *SD* = 0.58). In addition, teachers, parents, and student participants agreed that the interventions addressed important behaviors (*M* = 4.66, *SD* = 0.5).

Table 1. SSIS SS Pre- and Postintervention Results.

SSIS domain	Bryce	Anderson	Cayenne	Douglas
Social Skills				
SS Preintervention	70 (3)	71 (3)	75 (5)	63 (1)
SS Postintervention	81 (11)	97 (43)	72 (3)	72 (3)
Change in SS	+11	+26	−3	+9
Problem Behaviors				
SS Preintervention	128 (94)	139 (98)	132 (96)	127 (94)
SS Postintervention	100 (52)	128 (94)	121 (89)	136 (97)
Change in SS	−28	−11	−11	+9
Academic Competence				
SS Preintervention	81 (12)	89 (23)	79 (9)	99 (51)
SS Postintervention	89 (23)	95 (40)	71 (4)	99 (51)
Change in SS	+8	+6	−8	0

Note. Values in parentheses indicate percentiles. SSIS = Social Skills Improvement System; SS = standard score.

SSIS Ratings

Table 1 displays SSIS prebaseline and postintervention standard scores. A comparison of scores revealed that Bryce and Anderson improved in their standard scores in all three domains (i.e., Social Skills, Problem Behaviors, and Academic Competence). Cayenne improved in Problem Behaviors and declined in Social Skills and Academic Competence. Douglas improved in Social Skills, declined in Problem Behaviors, and had no change in the Academic Competence domain.

Discussion

The present study evaluated the effects of CICO as a secondary intervention and FBSM via I-Connect (Wills & Mason, 2014) as a tertiary intervention delivered through a tiered framework on the disruptive behavior and academic engagement of four elementary students. Overall, findings indicate reduced disruptive behavior and increased academic engagement for three of four participants. There was a slight positive, differential effect between CICO and additive FBSM strategy on both disruptive behavior and academic engagement for Bryce; however, there was much overlap in data and an unanticipated early end to the intervention, making the effects inconclusive.

Findings of this study strengthen existing research on the effectiveness of CICO on decreasing disruptive behavior (Wolfe et al., 2016), further support its effects on increasing academic engagement (Hawken et al., 2014), and add evidence of an emerging intervention to support CICO nonresponders (Miller et al., 2015). Results on the effectiveness of CICO in this study were consistent with existing research

indicating approximately 29% of CICO participants were nonresponsive to the intervention and warranting additional supports (Hawken et al., 2014). Although research has demonstrated CICO being most effective for students with problem behavior maintained by adult attention (Maggin et al., 2015; Wolfe et al., 2016), CICO did not provide powerful enough effects for Bryce. An evaluation of trend and level reveals differential effects between CICO and additive FBSM on Bryce's disruptive behavior; however, the overlapping data and inability to continue the analysis render the effectiveness inconclusive. These findings are dissimilar to findings of Briere and Simonsen (2011) and March and Horner (2002), who demonstrated the effectiveness of FBSM on decreasing disruptive behavior of CICO nonresponders. These differences may be due in part to the possibility of inconsistent implementation of differential reinforcement; unfortunately, this is not known as teacher's delivery of differential reinforcement was not included in the FBSM procedural fidelity measure. In addition, data on the frequency of Bryce's use of replacement behavior and rate and immediacy of receiving reinforcers contingent on replacement behavior demonstration were not available. As a result, the degree to which frequency of reinforcement may have affected Bryce's responsiveness to FBSM is unknown. Despite some inconsistent results for Bryce, a comparison of SSIS prebaseline and postintervention measure of participants' standard scores show improvement or consistency in all assessed domains (i.e., Social Skills, Problem Behaviors, and Academic Competence) for three of four students (Bryce, Anderson, and Douglas). These findings are similar to the results from Hunter, Chenier, and Gresham (2014) who found an increase in the social skills standard score on the SSIS teacher ratings for four participants with internalizing behaviors receiving CICO intervention.

This study contributes to the field in several ways. First, the results of this study add to the empirical support of CICO for elementary students with disruptive behavior, aiding in the generalizability of its effects. Second, the results of this study identify FBSM as an emerging intervention for a CICO nonresponder within a tiered framework. Third, CICO and FBSM were found to be socially acceptable interventions by school personnel, parents, and student participants. The involvement of school staff in implementing CICO helps to increase the school's capacity to sustain SWPBIS implementation.

Limitations and Directions for Future Research

There are several limitations of the study; these limitations provide directions for future empirical investigation. First, the CICO's long-term effects and extent to which participants may have been able to maintain positive behavior change with primary level of supports alone is unknown due to the absence of a maintenance condition or a return to baseline (i.e., SWPBIS Tier I). Future researchers may include a maintenance condition to investigate participants' ability to sustain positive behaviors with less intensive supports within the tiered framework. In addition, the evaluation of FBSM was conducted using a B-A-B design with limited data collection for the return to FBSM phase; as a result, a functional relation cannot be determined. Additional research is warranted to investigate the effects of FBSM on the behaviors of CICO nonresponders as empirical research is scarce. Future studies investigating FBSM may also consider including fidelity measures on the teacher's implementation of differential reinforcement. Second, several situations out of researchers' control may have affected participants' behaviors. Bryce and Anderson began counseling services during baseline that continued across all experimental conditions. Anderson began speech and language services during the sixth session of CICO that continued for the remainder of the study. Cayenne moved during the study due to homelessness. It is difficult to determine if, or to what extent, these confounds may have had on students' behavior. Similarly, although direct observations were conducted at the same time and during the same subject area each day, contextual factors (e.g., instructional delivery method, level of difficulty) may have accounted for some of the variability in behaviors. Replication studies should attempt to control for contextual factors, such as ensuring consistent instructional delivery methods (e.g., independent work, group work, partner work, station teaching, whole group instruction) during direct observations. Third, due to limited resources, the first author served as the primary data collector; therefore, there is a possibility for reactivity effects and observer drift. To minimize some of the effects, IOA data were obtained for at least 20% of observational sessions across conditions and student participants. Limited resources also accounted for the differential percentages of fidelity data collected across conditions. Replications should attempt to ensure fidelity and IOA data are conducted at suggested minimums. Fourth, given the unresponsiveness to Bryce's disruptive behavior in light of previous research findings of the favorable effects of CICO on attention-maintained behaviors, additional studies evaluating the relationships of CICO and behavioral function are warranted. Future research may include investigations of (a) adaptations to CICO to address the behavioral function of nonresponders before more intensive interventions are employed and (b) adaptations for students who may have escape-maintained behaviors.

Implications for Practice

This study is a demonstration of the favorable effects of CICO on the disruptive behavior and academic engagement of elementary students and has several implications for

practice. First, schools implementing a multitiered system of support in need of an intervention to support students beyond the universal level may consider the use of CICO to assist in decreasing disruptive behavior and increasing academic engagement. Second, this study serves as a demonstration that CICO can be implemented effectively by school staff, increasing the school's capacity in their SWPBIS implementation efforts. The CICO implementer indicated that the logistics of scheduling presented a challenge to CICO implementation; therefore, schools are advised to commit time to initial implementation tasks (e.g., training, schedules of check-ins and check-outs). Finally, although a functional relation cannot be determined due to design limitations, findings of this study along with the results of other empirical investigations (i.e., Briere & Simonsen, 2011; March & Horner, 2002) show promise of FBSM as a Tier III intervention option for CICO nonresponders, and I-Connect (Wills & Mason, 2014) adds a socially acceptable means for implementation.

Authors' Note

The study was conducted when Kimberly R. Bunch-Crump was a doctoral student in the Department of Special Education and Child Development at the University of North Carolina at Charlotte. The opinions expressed are those of the authors and do not represent views of the U.S. Department of Education.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The research reported here was supported in part by a Leadership Preparation grant from the U.S. Department of Education, Office of Special Education Programs (OSEP), H325D120018, to the University of North Carolina at Charlotte.

References

Bradshaw, C., Mitchell, M., & Leaf, P. (2010). Examining the effects of school-wide positive behavioral interventions and supports on student outcomes: Results from a randomized controlled effectiveness trial in elementary schools. *Journal of Positive Behavior Interventions*, *12*, 133–148.

Briere, D., & Simonsen, B. (2011). Self-monitoring interventions for at-risk middle school students: The importance of considering function. *Behavioral Disorders*, *36*, 129–140.

Briesch, A. M., & Chafouleas, S. M. (2009). Review and analysis of literature on self-management interventions to promote appropriate classroom behaviors (1988–2008). *School Psychology Quarterly*, *24*, 106–118. doi:10.1037/a0016159

Campbell, A., & Anderson, C. M. (2008). Enhancing effects of check-in/check-out with function-based support. *Behavioral Disorders*, *33*, 233–245.

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Columbus, OH: Merrill.

Crone, D. A., Hawken, L. S., & Horner, R. H. (2010). *Responding to problem behavior in schools: The behavior education program*. New York, NY: Guilford Press.

Ennis, R. P., Jolivette, K., Swoszowski, N. C., & Johnson, M. L. (2012). Secondary prevention efforts at a residential facility for students with emotional and behavioral disorders: Function-based check-in, check-out. *Residential Treatment for Children & Youth*, *29*, 1–24. doi:10.1080/0886571X.2012.669250

Gresham, F. M., & Elliott, S. N. (2008). *Social Skills Improvement System Rating Scales*. San Antonio, TX: Pearson.

Hansen, B. D., Wills, H. P., Kamps, D. M., & Greenwood, C. R. (2014). Effects of function-based self-management interventions. *Journal of Emotional and Behavioral Disorders*, *22*, 149–159. doi:10.1177/1063426613476345

Hawken, L. S., Bundock, K., Kladis, K., O'Keeffe, B., & Barrett, C. A. (2014). Systematic review of the check-in, check-out intervention for students at risk for emotional and behavioral disorders. *Education & Treatment of Children*, *37*, 635–658.

Hunter, K., Chenier, J., & Gresham, F. (2014). Evaluation of check in/check out for students with internalizing behavior problems. *Journal of Emotional and Behavioral Disorders*, *22*, 135–148. doi:10.1177/1063426613476091

Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York, NY: Oxford University Press.

Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2010). *Single-case designs technical documentation*. Retrieved from http://ies.ed.gov/ncee/wwc/pdf/wwc_scd.pdf

Lo, Y.-y., Algozzine, B., Algozzine, K., Horner, R., & Sugai, G. (2010). Schoolwide positive behavior support. In B. Algozzine, A. P. Daunic & S. W. Smith (Eds.), *Preventing problem behaviors* (2nd ed., pp. 33–51). Thousand Oaks, CA: Corwin.

Maggin, D. M., Zurheide, J., Pickett, K. C., & Baillie, S. J. (2015). A systematic evidence review of the check-in/check-out program for reducing student challenging behaviors. *Journal of Positive Behavior Interventions*, *17*, 197–208. doi:10.1177/1098300715573630

March, R. E., & Horner, R. H. (2002). Feasibility and contributions of functional behavioral assessments in schools. *Journal of Emotional and Behavioral Disorders*, *10*, 158–170. doi:10.1177/10634266020100030401

March, R. E., Horner, R. H., Lewis-Palmer, L., Brown, D., Crone, D., Todd, A. W., & Carr, E. (2000). *Functional Assessment Checklist for Teachers and Staff (FACTS)*. Eugene: Department of Educational and Community Supports, University of Oregon.

McIntosh, K., Campbell, A. L., Carter, D. R., & Dickey, C. R. (2009). Differential effects of a tier two behavior intervention based on function of problem behavior. *Journal of Positive Behavior Interventions*, *11*, 82–93. doi:10.1177/1098300708319127

Miller, L. M., Dufrene, B. A., Sterling, H. E., Olmi, D. J., & Bachmeyer, E. (2015). The effects of check-in/check-out on problem behavior and academic engagement in elementary

school students. *Journal of Positive Behavior Interventions*, *17*, 28–38. doi:10.1177/1098300713517141

Mooney, P., Ryan, J. B., Uhing, B. M., Reid, R., & Epstein, M. H. (2005). A review of self-management learning interventions on academic outcomes for students with emotional and behavioral disorders. *Journal of Behavioral Education*, *14*, 203–221.

Office of Special Education Programs Technical Assistance Center on Positive Behavioral Interventions and Supports. (2015, October). *Positive Behavioral Interventions and Supports (PBIS) implementation blueprint: Part 1—Foundations and supporting information*. Eugene: University of Oregon. Available from www.pbis.org

O'Neill, R. E., Albin, R. W., Storey, K., Horner, R. H., & Sprague, J. R. (2015). *Functional assessment and program development for problem behavior: A practical handbook* (3rd ed.). Stamford, CT: Cengage Learning.

Sheffield, K., & Waller, R. J. (2010). A review of single-case studies utilizing self-monitoring interventions to reduce problem classroom behaviors. *Beyond Behavior*, *19*(2), 7–13.

Stahr, B., Cushing, D., Lane, K., & Fox, J. (2006). Efficacy of a function-based intervention in decreasing off-task behavior exhibited by a student with ADHD. *Journal of Positive Behavior Interventions*, *8*, 201–211. doi:10.1177/10983007060080040301

Sugai, G., Lewis-Palmer, T., Todd, A. W., & Horner, R. H. (2001). *School-wide evaluation tool*. Eugene: Educational and Community Supports, University of Oregon.

Swoszowski, N. C., Jolivette, K., Fredrick, L. D., & Heflin, L. J. (2012). Check-in/check-out: Effects on students with emotional and behavioral disorders with attention- or escape-maintained behavior in a residential facility. *Exceptionality*, *20*, 163–178.

Swoszowski, N. C., McDaniel, S. C., Jolivette, K., & Melius, P. (2013). The effects of Tier II check-in/check-out including adaptation for non-responders on the off-task behavior of elementary students in a residential setting. *Education & Treatment of Children*, *36*, 63–79. doi:10.1353/etc.2013.0024

Vincent, C. G., Swain-Bradway, J., Tobin, T. J., & May, S. (2011). Disciplinary referrals for culturally and linguistically diverse students with and without disabilities: Patterns resulting from school-wide positive behavior support. *Exceptionality*, *19*, 175–190.

Waller, R., Albertini, C., & Waller, K. (2011). Self-monitoring of performance to promote accurate work completion: A functional based intervention for a 4th grade student presenting challenging behavior. *Advances in School Mental Health Promotion*, *4*, 52–60.

Wills, H., & Mason, B. (2014). Implementation of a self-monitoring application to improve on-task behavior: A high-school pilot study. *Journal of Behavioral Education*, *23*, 421–434.

Wolfe, K., Pyle, D., Charlton, C. T., Sabey, C. V., Lund, E. M., & Ross, S. W. (2016). A systematic review of the empirical support for check-in check-out. *Journal of Positive Behavior Interventions*, *18*, 74–88. doi:10.1177/1098300715595957