Received: 25 October 2022 | Revised: 16 March 2023 | Accepted: 16 April 2023

DOI: 10.1002/pits.22934

RESEARCH ARTICLE

WILEY

Effects of check-in/check-out on the behavior of students with autism spectrum disorder who have extensive support needs

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Funding information
Organization for Autism Research

Abstract

Students with autism spectrum disorder (ASD) who have extensive support needs (ESN) may require support to develop appropriate social behavior. School-wide Positive Behavioral Interventions and Supports (SWPBIS) is an evidence-based framework to support the social and behavioral needs of all students. As an evidence-based practice commonly used as a Tier 2 support within SWPBIS, check-in/check-out (CICO) has improved social behavior among students with and without disabilities. However, the literature on the efficacy of CICO does not include students with ASD who have ESN. The purpose of this study was to examine the effects of traditional and adapted CICO as a Tier 2 support within the SWPBIS framework on the adherence to school-wide expectations and challenging behavior of four elementary students with ASD who have ESN. Results of this multiple baseline across participants design study were inconclusive regarding challenging behavior and adherence to school-wide expectations across participants. Further, social validity data collected from all participants indicated the intervention was feasible and an overall positive experience.

KEYWORDS
autism spectrum disorder, challenging behavior, check-in/check-out, extensive support needs, School-wide Positive Behavioral Interventions and Supports

1 | INTRODUCTION

Over the past decade, there has been an increase in the number of students served under the special education eligibility category of autism (i.e., autism spectrum disorder; ASD). Students with ASD often benefit from support to address needs related to social interactions; communication; and restricted or repetitive activities, behaviors, and/or interests (American Psychological Association [APA], 2013). The support needs of students with ASD range from level 1 (minimal support needed) to level 3 (extensive support needed; APA, 2013). At level 3, students with ASD are considered to have extensive support needs (ESN) and may qualify for their state's alternate assessment (Taub et al., 2017).

Students with ASD who have ESN are more likely to exhibit challenging behavior than students without disabilities and students with other disabilities (Jang et al., 2011; Matson et al., 2008). As a result of challenging behavior, students with ASD who have ESN may be subject to restraint and seclusion (Westling et al., 2010) and have strained relationships with teachers (Eisenhower et al., 2015). Further, challenging behavior often is cited as a barrier to inclusive education for students with ASD (Roberts & Simpson, 2016). Because challenging behavior can negatively affect the educational experiences of students with ASD who have ESN, it is critical these students have access to a full continuum of behavioral supports, such as those available through School-wide Positive Behavioral Interventions and Supports (SWPBIS; Zagona et al., 2021).

SWPBIS is an evidence-based, multitiered framework designed to support the social and behavioral needs of all students in schools (Horner & Sugai, 2015; Horner et al., 2010). Schools implementing SWPBIS provide a continuum of supports that increase in intensity (i.e., Tier 1 preventative supports for all students, Tier 2 targeted supports for some students, Tier 3 individualized supports for very few students; Horner & Sugai, 2015). SWPBIS has several documented benefits for students and staff (Noltemeyer et al., 2019) such as improved school climate (Horner et al., 2009), lower office disciplinary referral and suspension rates (Horner et al., 2009; Noltemeyer et al., 2019), increased academic achievement (Horner et al., 2009), and increased teacher-reported wellbeing (Kelm & McIntosh, 2012) across grade levels with diverse student populations.

Although there is a wealth of evidence supporting the benefits of SWPBIS and a well-documented need for a continuum of behavioral supports for students with ESN, these students are not always included in SWPBIS planning or implementation (Kurth & Zagona, 2018; Walker et al., 2018, 2022). However, experts in SWPBIS agree students with ESN should be included in all tiers of SWPBIS, regardless of educational placement (Zagona et al., 2021). This is especially important for students with ESN who may need Tier 3 support, as Tiers 1 and 2 serve as a foundation for effective Tier 3 implementation. To date, there is limited research on the inclusion of students with ESN in SWPBIS, despite two recent calls for research in this area, including a special issue in *Research and Practice for Persons with Severe Disabilities* in 2006 and a re-examination of the state of the research one decade later (Kurth & Enyart, 2016). In their call to action, Kurth and Enyart (2016) concluded that little progress had been made on advancing research in this area.

Because students with ASD who have ESN are more likely to exhibit challenging behavior (Jang et al., 2011), they may require support in addition to Tier 1. Check-in/check-out (CICO) is an evidence-based, commonly implemented Tier 2 support based on a contingency contract that involves frequent student feedback throughout the day (Crone et al., 2010; Maggin et al., 2015) to increase students' appropriate behaviors, decrease challenging behaviors, and improve school–home communication (Hawken & Horner, 2003). CICO involves a six-step process (Crone et al., 2010): (a) the student checks in with a mentor upon arrival to school and receives a daily progress report (DPR); (b) the student gives the DPR to the teacher for recording student performance; (c) the teacher

provides feedback to the student at designated intervals throughout the day and marks points earned on the DPR; (d) the student checks out with a mentor at the end of the day and receives a reward for meeting the goal or constructive feedback when not meeting the goal; (e) the student brings the DPR home to share with caregivers; and (f) the student returns the signed DPR back to the mentor at check-in the following morning.

Research has demonstrated that CICO is effective in reducing challenging behavior and increasing appropriate behavior across grade levels and settings for students without disabilities and with high-incidence disabilities (e.g., learning disability; Park & Blair, 2020; Maggin et al., 2015). Because of its efficiency and feasibility (Crone et al., 2010), teachers may experience fewer barriers to implementing CICO than more complex Tier 3 interventions. Further, CICO is often adapted (including adaptations for virtual instruction; Center on Positive Behavioral Interventions and Supports, 2020) to meet the unique needs of students and is more resource and time efficient than Tier 3 interventions (Majeika et al., 2020). Despite this, evidence supporting the effectiveness of CICO as a Tier 2 support for students with ESN is limited (Maggin et al., 2015; Majeika et al., 2020).

The purpose of this study was to explore the effects of traditional and adapted CICO as a Tier 2 support within the context of a combination of virtual and in-person instruction on the challenging and appropriate behavior of students with ASD who have ESN. Due to the school's blended learning format (i.e., in-person and virtual instruction), traditional six-step CICO was implemented with adaptations for virtual instruction. Adapted CICO included additional embedded EBPs (e.g., visual supports, increased reinforcement) for students with ASD. This study addressed the following research question: What are the effects of traditional CICO and adapted CICO on (a) the adherence to SWPBIS school-wide expectations and (b) the challenging behaviors of students with ASD who have ESN?

2 | METHOD

2.1 | Student participants

Four elementary-aged students participated in the study. To be included, students (a) had a special education eligibility classification of ASD; (b) qualified, or were expected to qualify, for the state alternate assessment; (c) displayed challenging behavior at least three times per day that was not physically dangerous to themselves or others or displayed mild physical aggression or self-injury occurring no more than once per week; (d) had attendance of at least 90% in the previous school year; and (e) had caregiver consent to participate.

Lewis was an 8-year-old Black male with ASD and a learning disability in the second grade. According to the most recent adaptive behavior scores on the Developmental Profile-4th Edition (Alpern, 2020), parent ratings were in the delayed range (i.e., <0.1 percentile) and teacher ratings were in the below average range (i.e., 8th percentile) for Lewis's adaptive behavior. Recent IQ testing was unavailable. He primarily communicated vocally at the multiword level to express his wants and needs, comment, and ask questions and could follow multistep directions. Lewis's challenging behavior included off-task behaviors (i.e., stopping work for more than 8 s or not starting work 4 s after a task direction, making off-topic comments, leaving his seat).

John was an 11-year-old White male with ASD in the fifth grade. According to the most recent adaptive behavior scores on the Adaptive Behavior Assessment System, 3rd Edition (ABAS-3; Harrison & Oakland, 2015), John's general adaptive composite score was extremely low (i.e., <0.1 percentile). According to the most recent IQ testing (Leiter International Performance Scale, 3rd Edition; Roid et al., 2013), his IQ was 58 (0.3 percentile). He communicated vocally supported by picture symbols with one- to three-word phrases to comment, respond to questions, request, and ask questions. His speech was reported as 50%–70% intelligible by the school's speech-language pathologists on their most recent report. He could follow one-step directions. John's challenging behavior included off-task behaviors (i.e., leaving the instructional area, laughing, screaming, crying, singing), physical aggression (i.e., spitting, hitting, throwing objects), and self-injury (i.e., running into walls, hitting his head, dropping to the ground). The research team did not observe self-injurious or aggressive behaviors during the functional behavioral assessment (FBA) observations.

Alex was an 11-year-old White male with ASD in the fifth grade who attended the same classroom as John. Recent IQ and adaptive behavior scores were unavailable. He communicated vocally using one- to three-word spontaneous phrases supported by picture symbols for requesting independently or commenting with prompting. He could follow multistep vocal directions. His challenging behavior included physical aggression (i.e., hitting or attempting to hit caregivers and educators) and off-task behaviors (i.e., leaving his seat, walking away from the instructional area, playing with items in front of his face). The research team did not observe physical aggression more than once a week during FBA observations.

Connor was an 8-year-old White male with ASD in the second grade who attended the same classroom as Lewis. According to the most recent adaptive behavior scores on the ABAS-3 (Harrison & Oakland, 2015), Connor's general adaptive composite score was below average (i.e., 14th percentile) with delays in functional academics, communication, health and safety, and leisure skills. Recent IQ testing was unavailable. He primarily communicated vocally using one- and two-word phrases. He could follow multistep directions, but required verbal or visual prompting to stay on task. Connor's challenging behavior included work refusal (i.e., saying "no," "I can't," or "go home;" emitting off-topic vocalizations; pushing away materials or teachers; delaying the start of independent work; stopping before completing a task).

2.2 | Caregivers

Caregivers were eligible for participation if they were the legal guardian of a student participant and provided written and video consent. Three of the four students' caregivers (i.e., Lewis's father, John's mother, and Alex's mother) chose to participate.

2.3 | School personnel

School personnel were eligible for participation if they were employed by the school district, worked at least part-time at the school where the study took place, and provided written and video consent. Eight school staff members participated in the study, including two special education teachers, four paraprofessionals, and two front office staff members, all of whom served as interventionists. The first special education teacher was a 40-year-old Hispanic female with 5 years of experience in her role supporting students with ASD. She was the primary special education teacher for Lewis and Connor. Two paraprofessionals also supported Lewis and Connor in their classroom. The first paraprofessional was a 56-year-old Black female with 1.5 years in her role. The second paraprofessional was a 59-year-old Black female with 5 years of experience supporting students with disabilities and 14 years supporting elementary-aged students without disabilities.

The second special education teacher was a 42-year-old White female with 7 years of experience in her role supporting students with ASD. She was the primary special education teacher for John and Alex. Two additional paraprofessionals also supported John and Alex. The first paraprofessional was a 47-year-old White female with 5 years of experience. The second paraprofessional was a 46-year-old White female with 16 years of experience. Two female front office staff members served as mentors who were assigned for the specific purpose of CICO. One was the primary mentor for Lewis, John, and Connor, and the other was the primary mentor for Alex.

2.4 | Setting

The study took place at a suburban elementary school in the southeastern region of the United States. The school was recognized by the state as a "Green Ribbon School" for implementing SWPBIS with fidelity, meaning they received a score of at least 80% on the Schoolwide Evaluation Tool (Sugai et al., 2005) or 70% on the Benchmarks of

Quality Indicators (Kincaid et al., 2010). Approximately 53% of the students were White, 29% were Hispanic, and 14% were Black. The school had a Title 1 designation with 57% of students qualifying for free or reduced-price lunch. The study primarily took place in two self-contained classrooms for students with ASD, where the student participants received all academic instruction. When receiving in-person instruction, students attended school Monday through Thursday and received all services as described in their individualized education programs. When the district required all students to engage in virtual learning due to COVID-19, students logged into a class meeting through Microsoft Teams®, and the teacher provided live, virtual instruction. The check-in, feedback, and check-out aspects of CICO occurred in vivo for in-person instruction and via video call (i.e., Microsoft Teams®) during virtual learning. The final step of CICO (i.e., caregiver feedback and signature) took place at each student participant's respective home regardless of in-person or virtual instruction.

2.5 | Dependent variables and measurement

There were three dependent variables measured in this study. The primary dependent variable was adherence to school-wide expectations (i.e., Be Respectful, Be Responsible, Be Safe), measured by the percentage of points each participant earned on their DPR for the day. Teachers and paraprofessionals were responsible for marking points at designated intervals for each of the three expectations across each routine for a total of six possible points per routine (i.e., 0 = *did not display the expectation*, 1 = *displayed the expectation during some of the routine*, and 2 = *displayed the expectation during most of the routine*). Each student participated in 8–12 routines per day. A member of the research team met with teachers and paraprofessionals to establish common guidelines that aligned with the school's expectations to follow for assigning points in a training session before starting the baseline condition to ensure consistency of assigning points.

The second dependent variable was student challenging behavior, measured by the percentage of intervals in which the student exhibited challenging behavior. We measured this using partial interval recording while viewing a recording of the target routine or while virtually attending the session. We chose partial interval recording for challenging behavior because it is likely to overestimate challenging behavior. Challenging behavior was operationally defined for each participant (see Section 2.1). Direct observation of each student occurred during an activity in which the student was most likely to engage in challenging behavior (i.e., target routine). The target routine for Lewis and Connor was independent work, which involved completing activities on previously mastered skills without teacher assistance. For John and Alex, the target routine was writing, which involved writing or copying sentences with one-on-one assistance.

The third dependent variable was adherence to school-wide expectations during the target routine, measured by the percentage of points each participant earned on their DPR for their target routine. Each student's target routine was the same activity for which their challenging behavior data were collected. A student could earn a total of six points for the target routine.

2.6 | Interobserver agreement (IOA)

A member of the research team collected IOA data on the assignment of points and challenging behavior. We collected IOA data on DPR points assigned by the classroom teachers during the target routine for 59.3% of baseline sessions and 71.8% of intervention sessions. The mean IOA was 87.2% (range = 50%–100%) during baseline and 85.5% (range = 0%–100%) across traditional and adapted CICO sessions. We also collected IOA data on students' challenging behavior for 45.8% of baseline sessions and 47.9% of intervention sessions. The mean IOA was 94.6% (range = 88.2%–100%) during baseline and 95.7% (range = 84.8%–100%) across traditional and adapted CICO sessions.

2.7 | Social validity

We evaluated the social validity of the intervention at the conclusion of the study by asking the school staff and caregivers to complete a researcher-created social validity questionnaire addressing the effectiveness and feasibility of CICO. Two teachers, two paraprofessionals, one mentor, and two caregivers completed the online Google Form questionnaire. The questionnaire consisted of six (for school staff) or seven (for caregivers) Likert-type scale questions on a scale from 1 (i.e., *not at all*) to 4 (i.e., *completely*), and four open-ended questions for staff or caregivers to identify areas that could be changed about CICO and what was most helpful about CICO. Supporting Information: Tables 1 and 2 present social validity questionnaire items for staff members and caregivers.

Additionally, we attempted to evaluate the social validity of the intervention from the students' perspective using a four-question survey with two picture-supported response options (e.g., the word "Point" with an image of DPR vs. the words "No Point" with an image of a DPR being crossed out). The pictures included photographs of the student, their mentor, and their individualized DPR. The questions were as follows: (a) Did you like meeting with your mentor before and after school?; (b) Did you like earning points?; (c) Did you like your teachers telling you if you were following the rules?; and (d) Did CICO help you follow the rules? An educator read the questionnaire to students and instructed them to circle their response.

2.8 | Research design and data analysis

We used a single-case multiple baseline across participants design (Cooper et al., 2020) to determine the differential effects of traditional six-step CICO and adapted CICO. Further, we embedded a reversal design (i.e., A-B-A-B-C) for Lewis. We analyzed data visually to examine changes in level, trend, stability, and patterns within and across phases (Ledford & Gast, 2018).

2.9 | Procedures

There were three experimental conditions, including baseline, traditional six-step CICO, and adapted CICO. Before baseline, teachers implemented Tier 1 supports and the first author conducted an FBA for each student.

2.9.1 | Tier 1 implementation

Before baseline, we asked each student's classroom teacher to complete a bi-weekly survey to confirm the student had access to SWPBIS Tier 1 (i.e., teaching of school-wide expectations, reinforcement). Teachers reported implementing Tier 1 supports with 100% fidelity for at least 2 weeks before baseline and continued implementation throughout the study.

2.9.2 | Functional behavior assessment

Although Tier 2 supports, such as CICO, do not require an FBA, researchers have recommended a descriptive FBA to inform potential adaptations (Majeika et al., 2020). The first author met with each student's teacher to complete the Functional Assessment Checklist for Teachers and Staff (FACTS; March et al., 2000). Next, a member of the research team conducted two to three observations to collect additional data to identify the potential function of the student's challenging behavior during the preidentified target routine (i.e., independent work for Lewis and

Connor, writing for John and Alex). Each routine lasted approximately 5–30 min. Lewis's challenging behavior likely functioned to escape task demands and access preferred toys. John's challenging behaviors likely functioned to obtain adult attention. Finally, Alex's and Connor's challenging behaviors likely functioned to escape task demands.

2.9.3 | Baseline

We asked teachers and paraprofessionals to complete a bi-weekly four-item survey to report their Tier 1 implementation fidelity (see Supporting Information: Table 5). Tier 1 fidelity checks continued throughout the study to confirm that Tier 2 supports were necessary (i.e., challenging behavior persisted, even with ongoing access to Tier 1). During baseline sessions, school staff continued to address student challenging behavior in accordance with existing Tier 1 strategies (e.g., redirecting, reteaching expectations, providing rewards for demonstrating school-wide expectations). School staff also completed the DPR at designated intervals throughout the day without providing feedback or the DPR to the student. A member of the research team collected students' challenging behavior data via Zoom® or Microsoft Teams® using a laptop computer webcam or iPad® or by reviewing videos prerecorded with a Go-Pro® or iPad®. Additionally, during the observations, a member of the research team watched for permanent products (e.g., adapted expectations posters) and teaching related to Tier 1 expectations.

2.9.4 | CICO

The CICO intervention took place up to 4 days per week during virtual, synchronous instruction and in-person instruction for the duration of the school day. To mitigate possible effects of virtual and in-person learning, we ensured a transition in the learning environment was based on participant's level of challenging behaviors and did not occur during the same week. The one exception was for Lewis who received 1 day of the first traditional CICO implementation in school before an unexpected transition to virtual instruction. However, traditional CICO implementation was later implemented in person consistently for Lewis after a return to the baseline condition.

Traditional CICO

Traditional CICO involved six steps. First, before the start of the instructional day, the student participant checked in with their mentor. The mentor showed the student their DPR by sharing their screen or showing them the physical DPR and reviewed the school-wide expectations. Second, the mentor asked the student to pick a reward to work for and let the student know the teacher would have the DPR. The student also had access to the digital or physical copy of the DPR. Third, teachers and paraprofessionals provided feedback to the student and marked points on the DPR at designated intervals throughout the day (i.e., after every activity, routine, or subject). Fourth, at the end of the day, the student returned the DPR to the mentor to check-out virtually or in-person. The caregiver attended the check-out with the student during virtual instruction. A teacher or paraprofessional attended check-out with the student during in-person instruction. During check-out, the mentor reviewed the DPR with the student and provided the student with feedback and a reward if the point goal was met. During in-person instruction, the student took the DPR home and the caregiver reviewed the DPR with the student, provided feedback, and signed the DPR.

Adapted CICO

If a student did not make progress in the traditional CICO condition (i.e., no increasing trend or increased level in points after 4 days of implementation, no decreasing trend or decreased level in challenging behavior after 4 days of implementation, or did not meet point goal for at least 2 out of 4 days), we implemented adapted CICO. Data indicated all students were eligible for adaptations. A member of the research team met with the student's special

education teacher to identify the specific target behaviors related to each expectation and determine adaptations needed to the process, DPR, and point goal by following the adaptations problem-solving worksheet (see Supporting Information: Figure 1; Bundock et al., 2020). Adaptations for Lewis included visual supports on the DPR (i.e., visual of target behaviors added to each school-wide expectation) and an additional function-based reward for earning all points for the target routine (i.e., time to play with a toy fire truck). Adaptations for John included visual supports on the DPR (i.e., visual of target behaviors added to each school-wide expectation), green smiley faces to replace the numbers on the rating scale on the DPR, and a midday check-up with an additional reward. The midday check-up provided an opportunity for additional adult attention, which was the likely function of his challenging behavior. Adaptations for Alex included SymbolStix® visual supports representing his expected behaviors related to each school-wide expectation on the DPR, rewards after every academic routine, and an additional function-based reward midday (i.e., outdoor recess) and at the end of the day (i.e., special activity time). Adaptations for Connor included visual supports for operationally defined behaviors on the DPR, a visual reminder in the form of a photograph of the student completing work quietly attached to his desk, and a function-based reward for receiving all his points for the target routine delivered immediately after the routine, in addition to the end-of-day reward from the mentor if his daily point goal was met. Tier 1 implementation and all other aspects of traditional CICO, such as caregiver review, feedback, and signing the DPR remained constant during adapted CICO for all students.

2.10 | Procedural fidelity

We collected procedural fidelity data using a procedural fidelity checklist for 100% of training sessions. We conducted trainings with 100% fidelity. We also collected procedural fidelity for 56.1% of check-in sessions (fidelity: *M* = 95.1%, range = 0%–100%), 50.9% of check-out sessions (fidelity: *M* = 93.7%, range = 0%–100%), 100% of points assignments (fidelity: *M* = 100%), and 92.8% of feedback sessions (fidelity: *M* = 95.6%, range = 0%–100%) using a procedural fidelity checklist. We collected procedural fidelity for 100% of sessions for the caregiver component (i.e., attendance at check-out or signed DPR; fidelity: *M* = 58.1%, range = 0%–100%) by reviewing the returned DPR or asking teachers. Further, we collected procedural fidelity for implementation of Tier 1 supports by reviewing 100% of videos of the target routines and through teacher self-report. Evidence of Tier 1 support was present in 100% of videos. Teachers also self-reported implementing Tier 1 supports with 100% fidelity on a short bi-weekly three-item survey about teaching expectations and recognizing students who displayed behaviors aligned to expectations. Implementation fidelity checklists are available in Supporting Information: Tables 3 and 4 (CICO) and 5 (Tier 1). There were limited differences in implementation fidelity between in-person and virtual instructional environments.

3 | RESULTS

Figure 1 shows the results for each participant's adherence to school-wide expectations and challenging behavior across the experimental conditions. Overall, there was minimal change in adherence to school-wide expectations and challenging behavior during traditional CICO, and changes in behavior were variable with adapted CICO (see Table 1).

3.1 | Lewis

For Lewis, educators implemented two phases of traditional CICO (i.e., one primarily during virtual instruction and one during in-person instruction) before delivering adapted CICO. There were minimal changes in behavior. When

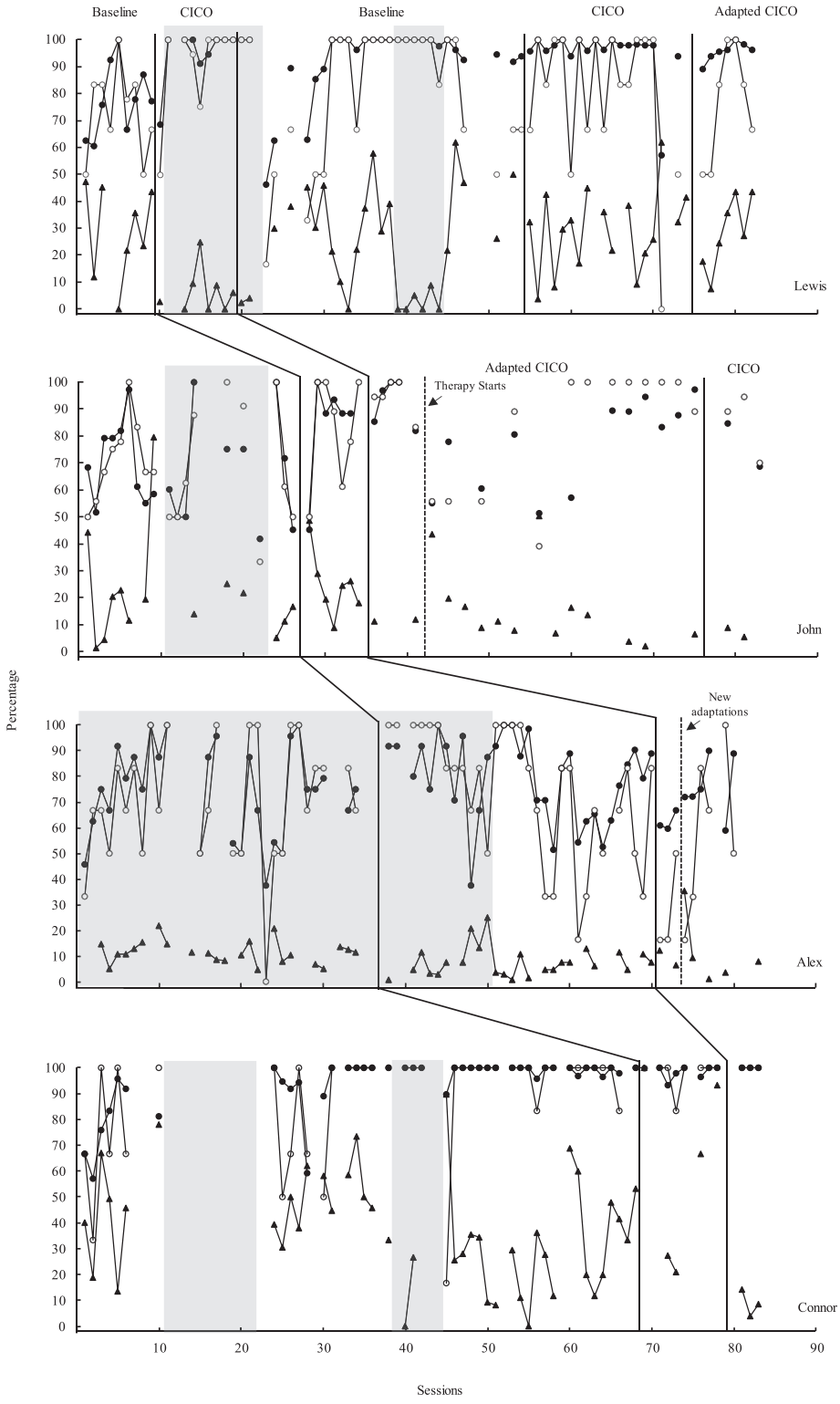

FIGURE 1 Participants' adherence to school-wide expectations and challenging behavior. Closed circles represent percentage of points earned for the day. Open circles represent percentage of points earned for the target routine. Triangles represent percentage of intervals of challenging behavior. Shaded sessions represent virtual instruction.

TABLE 1 Means and ranges of students' adherence to school-wide expectations and challenging behavior.

Student	Dependent variable	Baseline 1	CICO 1	Baseline 2	CICO 2	Adapted CICO
Lewis	Points for day	77.8% (60.4%–100%)	94.9% (68.8%–100%)	92.8% (46.3%–100%)	95.1% (57.1%–100%)	95.3% (88.9%–100%)
	Points for routine	73.5% (50.0%–100%)	91.0% (50.0%–100%)	82.0% (33.0%–100%)	79.2% (0.0%–100%)	72.9% (50.0%–100%)
	Challenging behavior	28.6% (0.0%–47.2%)	6.4% (0.0%–24.7%)	23.2% (0.0%–61.7%)	29.5% (3.5%–44.9%)	30.4% (7.3%–43.6%)
John	Points for day	68.4% (41.7%–100%)	83.9% (45.0%–100%)	n/a	84.7% n/a	81.5% (51.4%–100%)
	Points for routine	69.8% (33.3%–100%)	83.5% (50.0%–100%)	n/a	91.7% (88.9%–94.4%)	86.4% (38.9%–100%)
	Challenging behavior	21.2% (5.1%–79.3%)	24.9% (8.9%–48.7%)	n/a	7.1% (5.3%–8.9%)	15.3% (2.1%–50.3%)
Alex	Points for day	73.0% (37.5%–100%)	79.4% (37.5%–100%)	n/a	n/a	77.1% (59.1%–90.0%)
	Points for routine	70.2% (0.0%–100%)	74.7% (16.7%–100%)	n/a	n/a	66.6% (16.7%–100%)
	Challenging behavior	11.6% (4.9%–22.0%)	7.9% (0.8%–25.0%)	n/a	n/a	4.8% (1.2%–9.6%)
Connor	Points for day	94.4% (57.1%–100%)	98.4% (93.3%–100%)	n/a	n/a	100% (n/a)
	Points for routine	89.5% (16.7%–100%)	97.9% (83.3%–100%)	n/a	n/a	97.9% (83.3%–100%)
	Challenging behavior	37.8% (0.0%–89.9%)	61.7% (21.1%–100%)	n/a	n/a	8.9% (3.8%–14.3%)

Note: Figures in parentheses represent ranges.

Abbreviation: CICO, check-in/check-out.

educators implemented traditional CICO for the first time (virtually), there was an increase in percentage of points for the day and target routine and a decrease in challenging behavior. When educators stopped implementing CICO, challenging behavior increased and percentage of points for the day and the target routine decreased slightly. During both the reinstatement of CICO and implementation of adapted CICO, there was minimal change in percentage of points for the day or routine, or challenging behavior.

3.2 | John

John's baseline sessions occurred during both virtual and in-person instruction. Educators implemented traditional and adapted CICO during in-person instruction. A comparison of John's data during baseline and the traditional CICO conditions showed there was minimal change in challenging behavior with a small increase in adherence to expectations for the day. After 5 days of adapted CICO, John began applied behavior analysis therapy, and came to school 2 days a week instead of 4 days. Data after therapy remained highly variable for six sessions. After the six sessions, there was an overall decrease in challenging behavior and increase in adherence to expectations for the day and the target routine with increased stability across the last six sessions of adapted CICO. A return to the traditional CICO resulted in increased variability for John's adherence to expectations for the day and the target routine.

3.3 | Alex

Alex's baseline sessions occurred during virtual instruction. Educators implemented traditional CICO during virtual and in-person instruction and adapted CICO during in-person instruction. There was minimal change in the percentage of points earned for the day and the target routine and the challenging behavior during either traditional or adapted CICO.

3.4 | Connor

Connor's baseline sessions occurred during both virtual and in-person instruction. Educators implemented traditional and adapted CICO during in-person instruction. Percentage of points earned for the day was high across all conditions after a period of virtual instruction (sessions 11–23) when he was not in attendance due to lack of access to internet at home. When educators implemented traditional CICO, there was an increase in his challenging behavior, thus necessitating adapted CICO. When educators implemented adapted CICO, Connor's percentage of points earned for the day and the target routine remained at 100% with a decrease in challenging behavior across three implementation sessions.

3.5 | Social validity

Overall, two teachers, two paraprofessionals, one mentor, and two caregivers stated that CICO was feasible to implement, the goals of CICO were helpful in supporting students' behavioral progress, and they would implement CICO again. Further, teachers and paraprofessionals stated that CICO contributed to making their academic lessons easier to deliver. Five of the seven participants stated that the intervention was effective in addressing challenging behavior. All students expressed they liked meeting with their mentor, earning points, and receiving feedback from teachers. Additionally, all students reported that CICO helped them follow the rules at school. See Supporting Information: Tables 1 and 2 for school staff and caregivers' individual responses to the social validity questionnaires.

4 | DISCUSSION

We investigated the effects of traditional and adapted CICO as a Tier 2 support within a SWPBIS framework on the adherence to school-wide expectations and challenging behavior of four elementary students with ASD who have ESN. Overall, the effects of traditional and adapted CICO on the adherence to school-wide expectations and challenging behavior were null, as there was not a functional relation. All four student participants were eligible for adaptations to traditional CICO. For two of these students (i.e., John, Connor), data from direct observations and the DPR showed there was some level of decreased challenging behavior and increased adherence to school-wide expectations with overall increased stability when adapted CICO was introduced.

All four participants needed further adaptations or additional, more intensive support beyond traditional CICO. The lack of positive changes in student behavior during traditional six-step CICO implementation aligns with previous research that suggests some students, including those with and without disabilities, may not respond to traditional CICO and that adaptations may be important to address students' needs (Majeika et al., 2020). With adaptations to CICO, data patterns indicated increased stability for John and Connor across a limited number of sessions (last six for John and last three for Connor). For Alex and Lewis, there was minimal change in behavior across both CICO conditions. These results could be due to several uncontrollable variables (e.g., changes in learning environment, inconsistent academic demands, level of caregiver involvement). For example, Lewis's challenging behavior decreased and percentage of points earned on the DPR for the day and the target routine increased with the first implementation of traditional CICO during virtual instruction, but there was no change during the second implementation of traditional CICO. This could be because Lewis's father provided one-on-one support throughout the session during virtual instruction. We operationally defined off-task behaviors for Lewis as stopping work for more than 8 s or not starting work 4 s after a direction. In the virtual learning environment, Lewis's father would redirect him after 1 s using a louder and more forceful tone than the teacher typically used in the virtual or in-person learning environment. This could have affected his behavior in the virtual learning environment.

The lack of behavior change also could be attributed to the function of student challenging behavior (i.e., escape). Despite CICO being effective for escape-maintained behavior (Drevon et al., 2018), some studies suggest that it may be more effective for students with attention-maintained behavior (e.g., Wolfe et al., 2016). Alternatively, these findings also may indicate that the student participants required additional intensive interventions. For example, some students require Tier 3 supports despite having participated in lower-level tiers (Sugai & Horner, 2009). This may have been particularly important for Alex, who began to display more aggressive behavior after he transitioned to in-person instruction. CICO, with or without adaptations, may have been insufficient to address his social and behavioral needs (Crone et al., 2010).

4.1 | Contributions of this research

Although our findings are inconclusive, this study is significant in that it adds to the literature base related to the application of SWPBIS for students with ESN. Currently, this line of research is developing and very few intervention studies have examined the effects of SWPBIS on the behavior of students with ESN. Furthermore, this study adds to the literature on CICO implementation, as students with ASD who have ESN are not represented in the CICO literature. Findings from this study support the need for additional research in this area. Reporting null results, such as these in this study, helps the special education community define the scope for which EBPs are effective (Cook & Therrien, 2017). This is particularly important for educators working with individuals with ASD who have ESN (Cook & Therrien, 2017). A recent critique of the newest iteration of EBPs for individuals with ASD identified a failure to include studies with null effects in systematic reviews as problematic (Ledford et al., 2021). By

reporting null findings, there is an opportunity for other researchers to replicate to find the limits of the scope of EBPs (Cook & Therrien, 2017).

Also of significance is that we conducted this study partially in the virtual learning environment. In response to COVID-19, the Center on Positive Behavioral Interventions and Supports (2020) released guidelines for continuing implementation of CICO during virtual learning. Although the Center on Positive Behavioral Interventions and Supports recommended the continuation of support across tiers during virtual learning, there is no known research on Positive Behavioral Interventions and Supports, specifically CICO, implemented in the virtual learning environment. Although we did not observe desired changes in challenging behavior across participants in the virtual learning environment, this study demonstrated the feasibility of implementing CICO with fidelity during virtual instruction.

4.2 | Limitations and directions for future research

There are several limitations of this study that warrant future research. First, although we provided training to three of the four caregivers, we were unable to measure caregivers' participation via review of permanent products (i.e., signed DPR). We could not reliably determine whether the DPR was sent home or returned to school, because the educators were responsible for recording the CICO sessions. John and Alex's teacher collected and saved their DPRs, but this was not the case for Lewis and Connor. As a result, we relied solely on teacher reports, making these data potentially less reliable. Future research should focus on implementation fidelity of the caregiver component of CICO.

Second, at times we were unable to gather observational data on challenging behavior and procedural fidelity due to technology failures (e.g., errors in the meeting invite, internet outages), because of the ways in which we conducted observations (i.e., attended virtual sessions, accessed teachers' recordings). This resulted in some missing data. Relatedly, the times during which we observed and collected procedural fidelity data were consistent, preplanned, and limited to one routine. Thus, it was not possible to determine if CICO was implemented with fidelity across the entire day. Although overall levels of procedural fidelity for educator-implemented components were acceptable (i.e., greater than 90%) when we could observe, procedural fidelity ranged from 0% to 100%, indicating a need for further training. Additional research is needed on the type and duration of training needed for caregivers and educators whose children/students participate in CICO to achieve high fidelity. Furthermore, researchers should consider ways to check procedural fidelity at multiple points throughout the school day.

Although not in response to limitations of this study, future research should address the impact of adapted Tiers 1 and 2 supports on the behaviors of students with ESN, because research in this area is limited. Researchers should consider how Tier 1 supports can be adapted to meet the needs of students with ESN and which Tier 2 supports may be most appropriate. Even if students with ASD who have ESN require Tier 3 supports in addition to Tiers 1 and 2, their inclusion in SWPBIS is critically important because SWPBIS has been shown to reduce punitive practices and can build a more inclusive school environment (McDaid et al., 2022).

4.3 | Implications for practice

Results from this study provide several implications for practice. First, these findings suggest students with ESN can be included feasibly in CICO, even if they may require additional support. Because SWPBIS can promote inclusion within schools and Tiers 1 and 2 serve as a foundation for Tier 3 supports, educators should consider traditional and adapted CICO for students with ESN before implementing more intensive, individualized behavior support plans. This study possibly serves as a model for adaptations to Tier 2 supports within a SWPBIS framework to promote greater inclusion of students with ESN in SWPBIS and the school community. Adaptations used in this study

included visual supports, additional check-ups, function-based rewards, and increased frequency of rewards. These adaptations are based on EBPs for students with ASD (Steinbrenner et al., 2020) and potentially may be used for students with ASD who have ESN to increase access to and meaningful participation in Tier 2 supports. Importantly, educators implementing CICO adapted with EBPs for students with ASD should ensure it is implemented with fidelity across all settings for the entire school day, which may increase effectiveness. Second, our data suggested that not all students with ESN will respond to Tiers 1 and 2 supports alone, and these students may require more intensive behavioral support at Tier 3. However, it is beneficial for educators to ensure students have access to the full continuum of supports across all three tiers. Finally, CICO may be implemented to increase school-home communication for students with ASD who have ESN and who exhibit challenging behavior. Both caregivers who completed the social validity questionnaire reported that CICO increased school-home communication.

ACKNOWLEDGMENTS

The study was supported by the Organization for Autism Research (OAR). The contents of this article do not necessarily represent the policy of OAR and endorsement by OAR should not be assumed.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Carpenter, M. E., Lo, Y.-y., Walker, V. L., Masud, A. B., & Tapp, M. C. (2023). Effects of check-in/check-out on the behavior of students with autism spectrum disorder who have extensive support needs. *Psychology in the Schools*, 60, 3504–3519. https://doi.org/10.1002/pits.22934