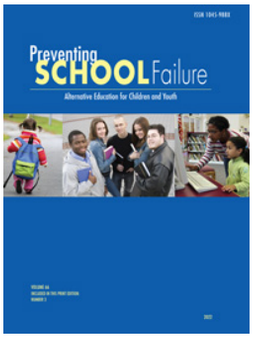

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ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/vpsf20

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To cite this article: Mimi McGrath Kato, Angus Kittelman, K. Brigid Flannery & Dana Cohen Lissman (2022): Adapting and monitoring daily CICO implementation in high schools, Preventing School Failure: Alternative Education for Children and Youth, DOI: 10.1080/1045988X.2022.2106933

To link to this article: https://doi.org/10.1080/1045988X.2022.2106933

Published online: 03 Aug 2022.

PREVENTING SCHOOL FAILURE: ALTERNATIVE EDUCATION FOR CHILDREN AND YOUTH
https://doi.org/10.1080/1045988X.2022.2106933

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RESEARCH ARTICLE

Adapting and monitoring daily CICO implementation in high schools

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ABSTRACT

Previous research has demonstrated a need for contextual fit when implementing behavior supports in high schools (Flannery et al., *The High School Journal, 96*(4), 267–282, 2013; Flannery & Kato, *Preventing School Failure: Alternative Education for Children and Youth, 61*(1), 69–79, 2017). As high schools move beyond the implementation of Tier 1 and begin to implement Tiers 2 and 3, school implementation teams must identify effective interventions that fit the high school context. The current study assessed whether Check-In Check-Out (CICO; Hawken et al., *Responding to problem behavior in schools: The check-in, check-out intervention* (3rd ed.). The Guilford Press, 2021), with strategic contextual adaptations, could be implemented with fidelity and whether high daily implementation fidelity was related to student behavior performance. Teacher feedback quality was also explored. Results showed high fidelity implementation at the systems and procedural level for all participants and a significant, small correlation between procedural fidelity and daily points earned.

KEYWORDS

Behavior support; check-in check-out; high school; tier 2

Multi-tiered systems of support, such as School-wide Positive Behavioral Interventions and Supports (SWPBIS; https://pbis.org), are increasingly being adopted by high schools (Flannery et al., 2009, 2013; Lane et al., 2015; Maggin et al., 2015; Wolfe et al., 2016). A key facilitator of successful implementation of any intervention is the goodness of fit with the setting in which it is being delivered (Chambers & Norton, 2016). More specifically, previous research has demonstrated a need for contextual fit when implementing SWPBIS in high schools, identifying key contextual variables for consideration such as the developmental age of students and the complex organizational structure of high schools (Flannery et al., 2013; Flannery & Kato, 2017). As high schools move beyond the implementation of Tier 1 and begin to implement Tiers 2 and 3, school implementation teams must identify effective interventions that fit the high school context.

Ensuring contextual fit often requires adaptation; however, it is critical to preserve the core features believed to produce the intervention's targeted behavioral changes (Castro et al., 2004; Elliott & Mihalic, 2004; Harn et al., 2013; Mejia et al., 2017; Webster-Stratton et al., 2011). According to Castro and Yasui (2017), "both fidelity and adaptation can be attained under well-planned modifications (strategic adaptations) that resolve emerging implementation problems, while still adhering" (p. 624) to the original intervention's core features. By ensuring a better contextual fit, such adaptations can increase engagement among participants and increase intervention effectiveness (Castro & Yasui, 2017).

Check-in check-out (CICO)

Check-In Check-Out (CICO; Hawken et al., 2021) is a well-established and empirically validated Tier 2 intervention (Bruhn et al., 2014; Crone et al., 2010; Drevon et al., 2019; Hawken & Horner, 2003; Maggin et al., 2015; Simonsen et al., 2011). The purpose of CICO is to supplement Tier 1 by (a) providing more frequent instruction regarding expected behavior, (b) increasing structured contact between students and adults in schools, (c) providing a formal mechanism for students to receive positive (as well as corrective) feedback on their behavior, and (d) increasing opportunities for reinforcement contingent on expected behavior (Everett et al., 2011). To accomplish these objectives, six key procedures have been identified: (1) checking in with a pre-identified adult in the morning; (2) using a daily point card for teachers to indicate student daily progress on school-wide expectations; (3) receiving frequent specific feedback and praise on behavior from adults; (4) reviewing goals and progress at the end of the day with a pre-identified adult; (5) taking the daily card home for caregiver signature and positive feedback; and (6) ongoing review of student data to determine needed changes (Hawken et al., 2021). Once a student demonstrates success using CICO, a key element of fading the intervention is to have the student score themselves and continue to recruit teacher feedback to learn the standards expected by the teacher (Hawken et al., 2021). Here, the student is building self-monitoring skills, as demonstrated by having the same score as the teacher, and the accuracy of self-assessment is a valued outcome before the student proceeds with fading (Hawken et al., 2021).

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Although CICO is frequently among the commonly implemented Tier 2 interventions in schools, it has lower rates of adoption and less empirical support in high schools (Boyd & Anderson, 2013; Bruhn et al., 2014; Crone et al., 2010; Hawken & Horner, 2003; Simonsen et al., 2011). Kittelman et al. (2018) found that high schools implementing CICO found it necessary to adapt the intervention to better fit their organizational structure and context. However, the extent to which high school implementation teams can adapt and implement CICO with high implementation fidelity is understudied.

Implementation fidelity

Broadly, implementation fidelity indicates whether a selected intervention is delivered as planned. While there are a variety of conceptual models to define fidelity, most agree that it is a multi-dimensional construct (Harn et al., 2017; Sanetti et al., 2021; Sanetti & Fallon, 2011). Hansen (2014) included adaptation itself as a dimension of fidelity, indicating that adaptation can be a natural feature of an original intervention rather than a diversion from it. These multidimensional definitions of fidelity can help ensure thorough implementation of an intervention while also allowing for strategic contextual adaptation (Fixsen et al., 2005; Odom et al., 2020).

CICO implementation fidelity is often measured using permanent products, procedural checklists, self-report, and observation (Bruhn et al., 2014; Cheney et al., 2008; Filter et al., 2007; Hawken et al., 2014). These strategies are designed to measure both system-level features of the intervention, which ensure adequate infrastructure is in place to support implementation, and procedural-level features, ensuring those carrying out the intervention (students, teachers, coordinators) are adhering to designed procedures. When incorporating CICO adaptations, such as those designed to facilitate implementation in a new context, fidelity components must be monitored regularly to understand how students are responding to the intervention within these conditions (Malti et al., 2016).

Purpose of the study

The purpose of this study was to assess whether CICO, with strategic contextual adaptations, could be implemented with fidelity in two high schools and whether high daily implementation fidelity was related to student behavior performance. The study aimed to answer the following descriptive research questions:

1. Can CICO with adaptations be implemented in high schools with systems-level and procedural fidelity?
2. Do teachers provide high quality feedback with fidelity to students participating in CICO?
3. To what extent do students and teachers agree on student points earned (accuracy of self-assessment)?
4. Is CICO procedural fidelity associated with student points earned?

Method

Participants and settings

Participants included CICO coordinators, students, and teachers across two high schools. The two high schools were in the Pacific Northwest in different school districts. According to data from the National Center of Education Statistics (NCES) for the 2018–2019 school year (most recent available), high school A was in a midsize, suburban school district with 21 total schools (four public high schools). High school B was in a midsize, city school district with 11 schools (two public high schools). Total student enrollment was 1,391 for high school A and 1,508 for high school B. Table 1 includes additional high school demographic information. Both schools had an implementation team that received coaching and support from research staff to plan and implement the intervention.

Student participants included 23 ninth grade students from the two high schools that participated in CICO during the 2019–2020 school year. Sixteen students were from high school A and seven students were from high school B. Of the 16 students from high school A, 13 identified as male (81%) and three as female (19%). Eleven of the students identified as White (69%), three identified as Hispanic/Latino (19%), and two as Black (13%). Eight of the students had IEPs (50%). Of the seven students from high school B, four identified as female (57%) and three identified as male (43%). Four students identified as White (57%), two identified as Hispanic/Latino (29%), and one did not identify (14%). Two of the students had IEPs (29%). All students participated in a brief (approximately 30 minutes) orientation and training session delivered by a CICO coordinator prior to beginning the intervention. This student training included a brief orientation to the protocols required for CICO, including when and where to check in/out, how to use the mobile application, and a review of expected behaviors. In addition, students identified their behavioral goals and put them into their own words.

Across the two schools, a total of five CICO coordinators participated in the study. The primary responsibilities of the CICO coordinator were to conduct the morning check ins and afternoon check outs with each student and to coach and support student and teacher participants as needed (Hawken et al., 2021). Three coordinators were from high

Table 1. Demographic characteristics of the two high schools.

Characteristics	High school A	High school B
Enrollment	1,391	1,508
Male	700 (50%)	810 (54%)
Female	691 (50%)	698 (46%)
White	774 (56%)	984 (65%)
Hispanic/Latino	439 (32%)	320 (21%)
Asian	20 (1%)	37 (3%)
Black	19 (1%)	36 (2%)
American Indian/Alaska Native	21 (2%)	25 (2%)
Native Hawaiian/Pacific Islander	11 (1%)	10 (1%)
Two or more race/ethnicity	107 (8%)	96 (6%)
Free lunch	841 (61%)	646 (43%)
Reduced price lunch	102 (7%)	145 (10%)
Teacher/student ratio	23.67	24.98

school A and two were from high school B. Two were male and three were female. Four were in non-teaching support positions in their school (i.e., transition coordinator, campus security) and one was a certified special education teacher. Collectively, they had an average of 3.6 years (range = 1–7) working in their respective schools and an average of 4.6 years (range = 3–7) working in their assigned position at the time of the study. One coordinator had two years of experience as a CICO coordinator in another school, while four had one or fewer years of experience as a CICO coordinator. All received four hours of training prior to the study. Training included an overview of the features of Tier 2 interventions, a thorough orientation to the CICO rationale, features and process, their role in supporting students on the intervention, and how to use the mobile application to support daily monitoring and decision making.

Teachers were the final participant group in the study. Teacher participants included all teachers of each student participant. All teachers participated in a brief (approximately 20 minutes) orientation and training session delivered in a staff meeting by the school implementation team in partnership with research staff at the beginning of the school year. This teacher training included a brief orientation to the CICO process, their role, how to give positive corrective feedback, and how to provide behavior ratings using the mobile application. Teacher participants then received a "booster" email with procedural reminders prior to each student's enrollment in CICO.

Adapted intervention procedures

An adapted version of CICO was delivered to student participants (see Figure 1). Researchers adapted CICO to fit the high school context in two ways. The first adaptation sought to recognize the developmental level of the student by increasing the student role in intervention implementation. As part of CICO orientation and training, students were taught to rate themselves on the school-wide behavior expectations at the end of each class before prompting the teacher to do so, thereby facilitating a consensus conversation around the student's daily performance. The second adaptation aimed to increase intervention efficiency for users (coordinators, teachers, students, and implementation team) and increase the precision and transparency of procedural implementation fidelity. To accomplish this, a mobile application was designed and developed (see Figure 2). All intervention data were collected through the mobile application, which automatically summarized students' daily points for more efficient and accurate management of data and decision making. Students and teachers entered ratings into the application, and teachers had the opportunity to enter specific typed comments that were visible to both the student and the coordinator. Coordinators could login to the application throughout the day to review procedural fidelity and student and teacher behavioral ratings for each period.

Measures

Systems-level fidelity of implementation

Systems-level fidelity of implementation was measured using an implementation checklist, which was based on the CICO Intervention Development Checklist developed by the Missouri Department of Elementary and Secondary Education (2018, pp. 204–206). The research team adapted the checklist with input from field test participants to document the presence or absence of program level CICO features, including adaptations. The checklist is designed to align with the key features of CICO and encompasses the

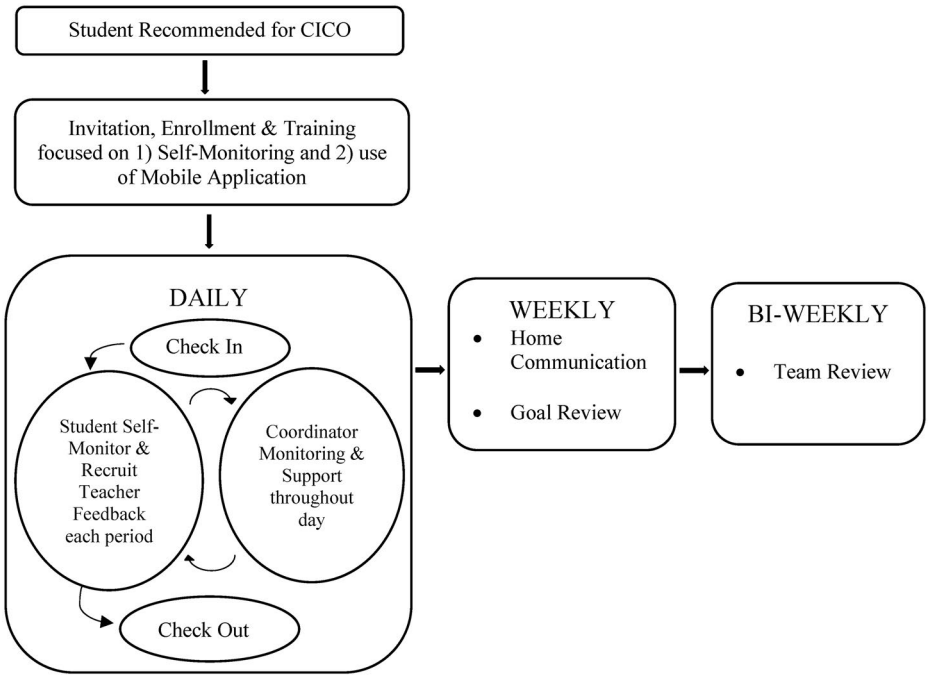

Figure 1. Adapted version of CICO for high school context.

Figure 2. CICO mobile application teacher data entry screen.

full range of implementation components that make up this Tier 2 intervention. Thus, the measure has seven subscales: (a) ten items that focus on *program design* criteria needed to ensure systems-level support and integration of the intervention (e.g., process for collecting, summarizing, and using CICO data for decision-making is in place and used), (b) two items focused on the *reinforcement system* (e.g., reinforcers are available for student participation when checking in and checking out), (c) five items on *teaching staff to implement the intervention* (e.g., routines established and defined for providing teacher training and support), (d) two items focused on *teaching students to participate in the intervention* (e.g., routines established and defined for student check in check out cycle), (e) two items on *teaching families to participate in the intervention* (e.g., routines established and defined for family training and communication), (f) six items on *plans for fading and graduation* (e.g., a flowchart that describes plans for gradually fading out use of the CICO process, daily data intervention components are developed), and (g) three items on *evaluation of program outcomes* (e.g., a plan for monitoring intervention outcomes is developed).

Procedural fidelity

Procedural fidelity was measured for CICO coordinators, students, and teachers. For CICO coordinators, a Coordinator Fidelity of Implementation Checklist was used. The checklist was developed by the research team to document the procedural steps required by the CICO coordinator (Hawken et al., 2021). The checklist documents three components of the check-in (i.e., positively acknowledge student at check-in, determine if student is ready for the day, provide student with the mobile device) and check-out (i.e., positively acknowledges student at check-out, review daily ratings and provide positive feedback).

For students and teachers, procedural fidelity was measured daily for each class period using the mobile application. For each period, students logged into the application to (a) select whether they greeted their teacher before class ("yes" or "no") and (b) self-rate (e.g., 0, 1, or 2) whether they met each of the school-wide behavior expectation goals. The student would then hand the teacher the device and the teacher would login to the application using a secure person identification number. Once logged in, the teacher would (a) select whether the student greeted them before class ("yes" or "no") and (b) provide a rating (e.g., 0, 1, or 2) on how well the student met each of the school-wide behavior expectations. Each teacher was also prompted to indicate whether they provided verbal feedback to the students ("yes" or "no") after entering their ratings. See Figure 2 for a screen capture of the teacher data entry screen. Student self-scores are provided for teacher reference in grey at the right of the screen. When substitute teachers were present, students were taught to (a) rate themselves on whether they met the school-wide behavior expectations and (b) indicate whether there was a substitute teacher. Substitute teachers were not trained to use the mobile system, so no teacher scores were entered when there was a substitute.

Four components made up the combined student and teacher procedural fidelity score for each period:

1. Did the teacher indicate that the student greeted them?
2. Did the student self-rate on the school-wide behavior expectations?
3. Did the teacher rate the student on the school-wide behavior expectations?
4. Did the teacher indicate that they provided verbal feedback to the student?

Student points earned

Daily student points earned on CICO was measured as the percent of CICO points earned across all periods on ratings of school-wide behavior expectations. As described above, for each period, teachers rated (0, 1, 2) whether students met each of the school-wide behavior expectations. Students in high school A could earn up to 10 points per period because there were five school-wide behavior expectations and students in high school B could earn up to six points per period because there were three school-wide expectations. Like calculating the daily mean procedural fidelity score, the CICO daily mean points earned score was created by averaging the percent of points earned across all periods in the day. For example, if a student in high school A earned 50% (5/10) of their points in period 1, 70% (7/10) in period 2, 100% (10/10) in period 3, and 80% (8/10) in period 4, then the daily mean points earned score was 75%. If regular classroom teachers were not present to rate students (e.g., substitute teacher), students' self-ratings on the school-wide behavior expectations for that period were used instead. There were only two of the 372 days of CICO participation across students in which there was no teacher rating for all periods of the school day.

Daily student and teacher agreement

Student and teacher agreement on ratings of school-wide behavior expectations was calculated for each period and then averaged across periods to create a daily mean agreement score. For example, if a teacher and student agreed on the score for three of the five expectations in period 1, then total agreement would be 60% (3/5). To obtain a daily mean agreement score, an average percent agreement on school-wide behavior expectations across periods was calculated. For example, if agreement was 50% in period 1, 60% in period 2, 100% in period 3, and 20% in period 4, then daily mean agreement was 57.5%.

Teacher feedback

Teacher feedback to students occurred at the end of each class period as the teacher and student reviewed their ratings together. Feedback was provided verbally and/or in writing using the mobile application. Whether or not verbal teacher feedback was provided was documented by teachers selecting "yes" or "no" in the space provided in the application. Teachers also had the option to provide open-ended written comments into the application by directly typing or using speech-to-text (e.g., "asked great questions").

Data collection procedures

The systems-level CICO fidelity of implementation checklist was conducted by research staff with the implementation team each term at each school. Each item was given a consensus rating by the team (0 = not in place, 1 = partially in place, 2 = fully in place) and scores were summarized by subscale and overall. The Coordinator Fidelity of Implementation Checklist was completed by members of the research team using direct observation a minimum of six times for each coordinator (three check-ins and three check-outs) across the first week of implementation. Inter-rater agreement (IRA) was conducted on 30% (10/33) of the direct observations. Research staff provided technical assistance to coordinators on any procedure that did not meet fidelity. The direct observation and completion of the Coordinator Fidelity of Implementation Checklist protocol was repeated at the beginning of the second semester to reestablish procedural fidelity for each CICO coordinator.

Data on procedural fidelity, points earned, student and teacher ratings agreement, and teacher feedback were automatically uploaded into a project database when students and teachers used the mobile application. To be included in the study, students (a) must have participated in CICO for at least one school day in the 2019–2020 school year, and (b) must have used the mobile application in either three (3/4 = participated in 75% of possible daily periods) or four periods (4/4 = participated in 100% of possible daily periods). The average number of days the 16 students from high school A participated in CICO was 20 (*range* = 2–60; *median* = 20) and the average number of days of participation for the seven students from high school B was eight (*range* = 1–25; *median* = 5). The total number of days of CICO participation for students across both high schools was 372, with most days from students in high school A ($n = 317$) compared to high school B ($n = 55$).

Data analyses

For research question 1, descriptive analyses were used to assess the extent to which CICO systems-level and procedural components were implemented with fidelity across the two high schools. Specifically, to obtain a total systems-level implementation fidelity score, an average score on each subscale was calculated by adding the total score for each item in the subscale, dividing by the total possible points in that subscale and multiplying by 100 to arrive at a percentage score per subscale. The total systems implementation fidelity score was then calculated by averaging the scores across subscales. To obtain a procedural fidelity score for coordinators, an average score was calculated by adding the number of components completed on the Coordinator Fidelity of Implementation Checklist, dividing by the total possible components, and multiplying by 100 to arrive at a percentage score. Similarly, for students and teachers, procedural fidelity was calculated by adding the number of components completed, dividing by the total possible components, and multiplying by 100 to arrive at a combined

percentage score for each period. If a regular classroom teacher was present, a score (0 or 1) was assigned to each of the four components described above, and then a percentage calculated for the period (1/4 components = 25% period procedural fidelity). The period procedural fidelity scores were then averaged across periods to create a daily mean procedural fidelity score. For example, if procedural fidelity was 25% in period 1 (1/4 components), 50% in period 2 (2/4 components), 100% in period 3 (4/4 components), and 75% in period 4 (3/4 components), then the daily mean procedural fidelity score for that day was 62.5%. If a student indicated that there was a substitute teacher, only one procedural fidelity component (self-rate on school-wide behavior expectations) was used in the score for that period.

For research question 2, we conducted two sets of analyses. First, data from the mobile application were summarized to indicate how frequently teachers reported that they provided verbal feedback to students. Next, we completed a thematic analysis of all written teacher comments, which were optional and open-ended (Baron, 2008). There was a total of 131 teacher comments across all 23 students. The thematic analyses included an open coding process (Patton, 2002), in which the first author reviewed all 131 teacher comments and developed a list of five categories and operational definitions ranging from positive (e.g., "great work today!") to negative (e.g., "throwing objects at wall and people; walking around nonstop"). Table 2 includes a list of the five categories, operational definitions, and examples. At least four teacher comments needed to be in each of the five categories (minimum 3%) to warrant a standalone category (4/131 teacher comments; Patton, 2002). For inter-rater agreement (IRA), after the first author completed coding all standalone teacher comments, the third author randomly coded 30% (39/131) of the comments using the same categories and operational definitions developed by the first author. Total IRA between the first and third author was 97% (38/39). The two authors then met to discuss disagreements until 100% agreement was reached.

For research question 3, we conducted descriptive analyses to obtain the mean teacher-student agreement score across all students for both schools. To do this, we averaged daily teacher-student agreement score across for each student and then created mean agreement scores for all students in each high school. To assess research question 4, we first created mean procedural fidelity and student points earned scores by averaging individual student daily percent scores to create a total procedural fidelity and percent points earned score for each student. We then averaged these variables across all students in each school. For the second part of research question 4, we conducted repeated measures, within-subjects correlation using R (R Core Team, 2018) with the rmcorr R package (https://cran.r-project.org/web/packages/rmcorr/; Bakdash & Marusich, 2017) to examine the correlation between daily procedural fidelity and points earned scores across days for all students. This specific correlational technique was selected because it assesses the within-subject association between pairs of measures assessed at multiple timepoints across multiple individuals (Bakdash & Marusich, 2017). Of the 23 students, two only participated in CICO for one day, so these two students were not included in the within-subjects repeated measures analyses.

Table 2. Categories, operational definitions, and examples of open-ended teacher responses.

Category	Operational definition	Example
Positive	Only positive encouraging language	Great work today!
Corrective & positive	Instructive; points to what student needs to improve and provides positive encouragement	Needs to stay in seat and use better language, but did a nice job paying attention today
Corrective	Instructive; points to what student needs to improve	Pick a better seat for success
Neutral	Observation; description; no value placed	Tardy and fell asleep
Negative	Clearly negative report of student behavior or direct negative comment toward student	Throwing object at wall and people; walking around nonstop

Results

Implementation fidelity

Research question 1 hypothesized that CICO with adaptations could be implemented with systems- and procedural-level fidelity in high schools. Systems-level fidelity was documented by the CICO Fidelity of Implementation Checklist. Participating schools averaged 55% implementation early in the fall (63% for high school A and 47% for high school B) and reached an average of 93% implementation fidelity by the spring (95% for high school A and 90% for high school B). Data is reported by subscale in Figure 3.

Procedural-level fidelity for all participant groups was documented by the Coordinator Fidelity of Implementation Checklist and by student and teacher fidelity components in the mobile application. Coordinator fidelity of implementation averaged 100% fidelity at check-in and 92% fidelity at check-out. Average daily procedural fidelity across 23 students and their teachers was 88%.

Teacher feedback to students

Research question 2 aimed to determine the quality of feedback that teachers provided during CICO, which is an aspect of teacher implementation fidelity. This was assessed for both verbal and written feedback. According to teacher self-report in the mobile application, verbal feedback was provided to all students by all teachers on average 86% of opportunities (88% for high school A and 79% for high school B).

To assess written feedback provided by teachers, a total of 131 written comments were rated across five operationally defined categories (positive, positive and corrective, corrective, neutral, negative). Table 2 provides operational definitions and examples of each category. In all, 40% (53) of

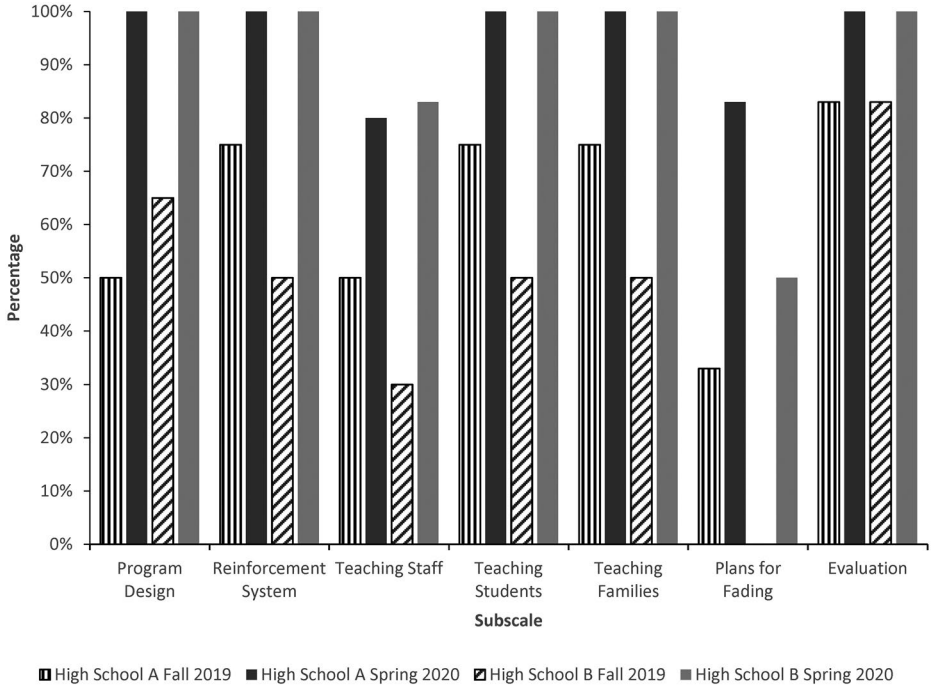

Figure 3. CICO implementation fidelity checklist scores.

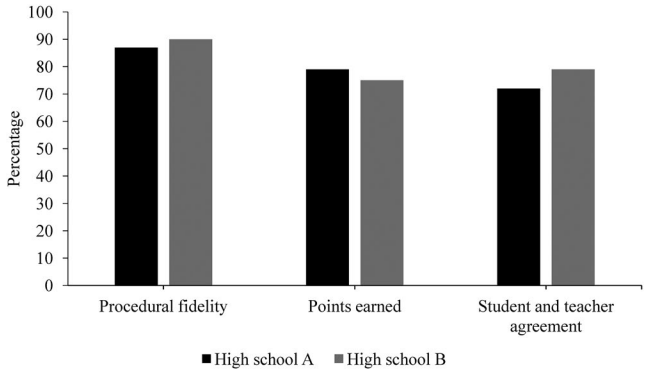

Figure 4. Daily CICO procedural fidelity, points earned, and student-teacher agreement mean scores across high schools.

teacher written comments were rated as being positive ("Great turn around, thanks for working hard after your break!"), 12% (16) were positive and corrective ("Keep it up! Ask for more help instead of packing up early)," 13% (17) were corrective ("Need to participate more fully"), 30% (39) were neutral ("Fell asleep"), and 5% (6) were negative ("Don't argue with other students").

Student and teacher agreement on student points earned

For research question 3, we sought to assess the extent students and teachers agreed on ratings of student behavioral alignment with school-wide expectations. Across both schools, the mean agreement scores on school-wide expectations across all 23 students were 74% ($M = 72\%$ for high school A; $M = 79\%$ for high school B; see Figure 4).

Daily procedural fidelity and student points earned

Research question 4 assessed whether daily procedural fidelity was positively and significantly associated with student points earned. As noted above, across both schools, the daily mean procedural fidelity score across students was 88% ($M = 87\%$ for high school A; $M = 90\%$ for high school B). The daily mean points earned score across students in both schools were 77% ($M = 79\%$ for high school A; $M = 75\%$ for high school B). Based on the findings from the repeated measures within-subjects correlation across students and days on CICO, there was a significant, small positive correlation between procedural fidelity and daily points earned; $r = .26$, $p < .001$, CI = 0.16–0.36.

Discussion

CICO is a well-established Tier 2 intervention with limited demonstration of successful implementation in high schools (Bruhn et al., 2014; Kittelman et al., 2018). This descriptive study is the first to document the implementation of CICO in traditional high school settings with two strategic contextual adaptations: (1) students were taught to rate themselves at the end of each class on the school-wide behavior expectations, and (2) a mobile application was developed and used to increase efficiency of CICO data collection and to provide additional procedural-level fidelity data. Specifically, the study sought to evaluate whether the adapted intervention could be implemented with high systems-level and procedural fidelity in the high school setting. Further exploring the concept of procedural fidelity for teachers, the study assessed the quantity and nature of teacher feedback provided to students as part of the CICO intervention. Additionally, other areas of inquiry included whether

students would rate themselves similarly to teachers on adherence to behavioral expectations each period and whether the points students earned through teacher behavioral ratings correlated with student and teacher procedural fidelity.

Establishing implementation fidelity is an essential first step in determining whether behavioral outcomes are the direct result of the intervention or the result of unrelated external factors (Gresham, 2009). It is encouraging that in this study the core features of CICO were implemented with high fidelity (over 90%) within one school year using a set of high school specific adaptations. As noted previously, both schools had an implementation team that received coaching and support from research staff to plan and implement the intervention. Schools started planning over the summer so that by the fall they had begun development of key features, as reflected in the moderate fall scores on the implementation checklist. Coaching and support took the form of attending team meetings two times a month, guiding planning discussions and developing an action plan, then maintaining ongoing communication with team members to problem solve and respond to questions. High school A had the support of a district PBIS coach while high school B did not. The systems-level features that schools struggled most to put in place included *Teaching Staff to Implement* and *Plans for Fading*. Teaching staff to implement CICO and ensuring teacher procedural fidelity was challenging due to many of the contextual issues that exist in high schools, such as their size and organizational structures (Flannery & Kato, 2017). Initial staff training took place in fall all-staff meetings and booster sessions were held mid-year in the same format. Teachers also received an informational email that contained procedural reminders and a link to a brief instructional video each time they had a student become enrolled in CICO. Ongoing, targeted training for individual teachers proved to be more challenging due to schedules and availability, so was done inconsistently. Last, the *Plans for Fading* feature was the slowest to be fully implemented. While teams had basic structures in place for fading, they did not fully implement this feature until shortly before students began to demonstrate success over time and indicate a readiness to plan for fading.

Beyond systems-level fidelity, high student and teacher procedural fidelity was also attained, indicating that coordinators, teachers, and students were willing to engage in CICO. It also indicates that the training and ongoing support provided to CICO participants were sufficient to carry out the intervention as designed. The adaptation of using a mobile application for data collection may have contributed to the strong fidelity of implementation. For example, the precision of the student and teacher procedural fidelity data made available to the teams through the mobile application also provides teams with more information to ensure the intervention is being implemented with fidelity. At the student level, the daily coaching conversations at check-ins and check-outs between the student and coordinator focused partially on procedural fidelity since this information was made readily available through the mobile application. School teams also had access to and used the fidelity data available through the mobile application to assess whether the intervention was having the intended impact, and to problem solve when it was not. For example, teams could examine multiple aspects of fidelity to better understand which components may be more challenging for a student (i.e., greeting the teacher, scoring themselves, prompting the teacher for a score, and receiving teacher feedback). The availability of fidelity data at this more granular level allows for the development of more targeted solutions when students are not making adequate intervention progress.

Another unique component of CICO procedural fidelity examined in this study was teacher feedback. Positive teacher feedback is a key feature of the intervention, and teachers providing positive, constructive feedback at the end of each period are essential to the success of the intervention (Hawken et al., 2021). When a teacher provides positively framed feedback, they are helping to build a relationship with the student and are helping build behavioral momentum (Nevin & Shahan, 2011). Through this study teacher feedback to students was analyzed in two ways: (1) verbal, and (2) written. First, verbal feedback was provided by teachers to students in 86% of possible opportunities, demonstrating that teachers were consistently adhering to CICO fidelity expectations for this component. The most common reported reason a teacher did not provide verbal feedback was that they were busy with other tasks at the end of the period.

Through analysis of the written teacher comments in the mobile application, we were able to determine if the comments were or were not positively framed. This provides an early understanding of the dimension of process fidelity, or quality, of the feedback. Analyses showed that just over half (52%) of written teacher comments to students were framed positively and very few (5%) were framed negatively, which is encouraging. Positively framed feedback is a key ingredient in CICO and helps to build student behavioral momentum (Hawken et al., 2021). To increase the use of positively framed feedback, additional training for participating teachers would be beneficial to help them understand the importance of positive feedback and how to deliver feedback in a positively framed manner. While written feedback was somewhat positive, it is possible that the verbal feedback to students was framed differently. This is an area for future study.

One of the key adaptations in the current study was that, from the time they began the intervention, students rated themselves on the school-wide behavior expectations and then prompted the teacher for ratings. Self-scoring is sometimes used as a strategy for students fading from CICO intervention. Here, however, it was introduced earlier and for all students to reflect the students' developmental age and to increase the visibility of self-monitoring skill development. Interestingly, students and teachers agreed on behavior ratings in 74% of comparison opportunities. This suggests that, when trained, student participants were able to predict with some accuracy the teachers' assessment of their behavior, which is a key element in student success on CICO (Hawken et al., 2021). During training, students were taught to rate their own behavior "through their

teachers' eyes" as a strategy to begin to build self-monitoring skills. The fact that student ratings were largely in agreement with teacher ratings indicates that these students were in the process of developing those skills. Further study could analyze changes in ratings agreement over time to better understand the pattern of skill development.

Last, the purpose of ensuring fidelity is to achieve intended outcomes, so we also aimed to evaluate if a relation between procedural fidelity and student behavior ratings existed. The small, significant positive correlation between procedural fidelity and daily points earned indicates that there is a positive relation between the students and teachers participating in CICO with high procedural fidelity and students meeting their daily behavioral goals (e.g., points earned). This finding is not surprising because there is such an extensive research base demonstrating the positive effects of CICO, when implemented with fidelity, on student outcomes (Boyd & Anderson, 2013; Bruhn et al., 2014; Crone et al., 2010; Harrison, 2013; Hawken & Horner, 2003; Maggin et al., 2015; Simonsen et al., 2011). However, there is less evidence of such outcomes at the high school level, so this finding is promising. Further empirical validation of the adapted CICO intervention is needed to examine the relation between CICO and improvements in other student outcome areas (e.g., attendance, office discipline referrals).

Limitations

There are several limitations that must be considered when interpreting the results of this study. First, the sample size included a limited participant pool of 23 9th grade students participating in CICO in two public high schools. Replicating the findings with a larger and more diverse population of students (e.g., disabilities, races/ethnicities, and grade levels) and high schools in different settings (e.g., city, town, rural) would be helpful for the generalizability of these findings. Second, of the 23 students, the study only included daily procedural fidelity and points earned data for students who used the application in at least three of four periods each day. Because of this inclusion criteria, it is possible that omitting data for students with fewer than three of their four possible periods of participation per day could have biased the results to some degree (e.g., increased the strength of the relation between points earned and daily student procedural fidelity). Third, data used to calculate CICO points earned and student procedural fidelity were entered into the mobile application directly by teachers and students. Because procedural fidelity was not confirmed through direct observation, it is possible that participants may have completed certain components with poor quality. For example, while it is encouraging that such a high rate of verbal feedback was given to students, some of the feedback from teachers was punitive or broad.

Conclusion

There is extensive empirical support for CICO with elementary and middle school students, but a substantial gap exists around its implementation in high schools. The current study aimed to address this gap by piloting an adapted CICO intervention in two high schools with 23 students. Overall, findings indicated that, with contextually relevant adaptations, CICO can be implemented with both high systems-level and student and teacher procedural fidelity in high schools. Further, findings show that with training, high school teachers provided a high rate of positive feedback to students on CICO. In addition, students were able to successfully learn to rate their own behavior in the classroom and to have a high alignment with teacher ratings, demonstrating potential for high school students to successfully develop self-monitoring skills using CICO. Further, the small, significant positive correlation between student and teacher procedural fidelity and daily points earned indicates that the intervention may be effective in changing student behavior, although further experimental validation is needed. Together, these findings extend those from previous research into this new setting and has promise for increased use of this evidence-based intervention with high school students.

Disclosure statement

The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

Funding

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305A180015, to University of Oregon.

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