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A Systematic Review of Precorrection in PK-12 Settings

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Abstract

Precorrection is a proactive strategy designed to prevent problem behavior from occurring by identifying contexts likely to occasion problem behavior and facilitating the occurrence of appropriate behavior. To determine the evidence base for this practice we applied the Council for Exceptional Children's (CEC) *Standards for Evidence-Based Practices in Special Education* to the body of research on precorrection. We identified 10 single-case research design articles that (a) evaluated the effects of a precorrection intervention, (b) occurred in a PK-12 traditional school settings, (c) used experimental or quasi-experimental design, and (d) were published in a peer-reviewed journal. We identified five articles meeting an 80% weighted criterion of CEC's quality indicators. These five articles contained over 20 participants with *positive effects* based on CEC standards; therefore, we concluded precorrection to be an evidence-based practice using a weighted coding criterion to examine the evidence-based determination (retaining the presence and absence coding for each item constituting each quality indicator). Implications for future research and practice are outlined.

Keywords: precorrection, positive behavioral interventions and supports, PBIS

Across the United States, educators are seeking practical, effective strategies for supporting students with and at risk for emotional and behavioral disorders (EBD) as these students exhibit a range of behaviors (e.g., externalizing and internalizing) that are detrimental to the students themselves as well as the classroom climate. For example, challenging behaviors exhibited by students with externalizing behaviors (e.g., noncompliance, disruption, and aggression) in both

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classroom and nonclassroom settings (e.g., cafeteria, hallway, and playground) can prevent meaningful learning from occurring. These challenging behaviors in the classroom often disrupt instruction and prevent students' engagement in academic tasks (Johns, Crowley, & Guetzloe, 2008). Challenging behaviors in nonclassrom settings can also be difficult, creating uncomfortable and, at times, unsafe contexts for students—especially when the ratio of children to adults is large (Lewis, Powers, Kelk, & Newcomer, 2002). When challenging behaviors occur, they can result in incidents that negatively impact positive school climates, distract from classroom learning, and result in office discipline referrals which require both student and administrator time (Haydon & Scott, 2008).

For more than 20 years, researchers and policy makers have called for proactive and preventative discipline practices to help prevent problem behaviors from occurring and facilitate student success in school (e.g., Sugai, Sprague, Horner, & Walker, 2000; Walker et al., 1996). These practices are preferred to more reactive practices or zero tolerance approaches to discipline, which have been shown not only to be ineffective at decreasing problem behaviors in the long term but exacerbate the problem by creating punitive student-teacher relationships (Sugai et al., 2000). To address this concern, in 1997 the reauthorization of the Individuals with Disabilities Education Act (IDEA) called for the use of "positive behavioral interventions, supports, and strategies." The practices, often referred to as school-wide positive behavioral interventions and supports (PBIS), can be characterized as a school-wide approach to teaching, reinforcing, and monitoring expected behaviors in order to prevent problem behaviors from occurring (Sugai & Horner, 2008).

PBIS involves a three-tiered framework of supporting students' behavior with Tier 1 designed to support the behavior of all students. Tier 2 is designed to provide targeted supports for students in small groups (approximately 10–15%) or using low-intensity strategies (e.g., precorrection, instructional choice; Lane, Menzies, Ennis, & Oakes, 2015). Tier 3 is designed to provide support to students with the greatest level of need (approximately 5% of students) using intensive, individualized supports (Lane, Menzies, Ennis, & Bezdek, 2013). Three-tiered models are also addressing academic and social components as well as PBIS to meet students' multiple needs in an integrated fashion (e.g., comprehensive, integrated, three-tiered [Ci3T] models of prevention; Lane, Oakes, & Menzies, 2010). This widespread focus on PBIS across many tiered systems of support is encouraging given PBIS can have marked impact of the culture and climate of a school as well as

decreased office discipline referrals for students (Sugai et al., 2000). Specifically, PBIS involves a shift in focus from a reactive approach to school discipline a proactive and positive and approach, involving an instructional approach to behavior in which students are taught behavioral expectations in much the same way educators have approached academic needs historically. This requires a systems-level change, as it draws on the collaboration and expertise of all adults in a school (Carr et al., 2002). Strategies that prevent problem behaviors from ever occurring should be utilized whenever possible.

Precorrection

Precorrection is a low-intensity PBIS strategy designed to prevent problem behavior from occurring by identifying contexts (e.g., settings, times of day) likely to occasion problem behavior (Lane et al., 2015). Precorrection is defined as "an antecedent instructional event designed to prevent the occurrence of predictable problem behaviors and to facilitate the occurrence of more appropriate replacement behavior" (Colvin, Sugai, Good, & Lee, 1997, p. 346). Precorrection can involve simple statements such as, "When we get to the lunch room, what are the three things we need to remember to be responsible?" to prompt students to answer, "Walk on the right, be responsible for your food and surroundings, and talk in a quiet voice." These gentle reminders can be an effective way to teach (and reteach) students what is expected in given contexts as they maximize structure and predictability while demonstrating positive interactions between adults and students (Ennis, Schwab, & Jolivette, 2012). Precorrection is a versatile strategy requiring little time to implement, useful with general and special education PK–12 students in classroom and nonclassroom settings (Lane et al., 2015).

In 1993, Colvin, Sugai, and Patching created a seven-step precorrection model to contribute to an effective setting for instruction. In 2015, Lane and colleagues modified these steps to reflect current standards (e.g., the importance of assessing social validity), identifying an eight-step precorrection model: (a) identify the context and predictable behavior, (b) define the expected behavior, (c) modify the context to occasion the expected behavior, (d) provide opportunities for behavior rehearsal, (e) provide strong reinforcement for displaying the expected behavior, (f) provide prompts for the expected behavior, (g) monitor student progress, and (h) provide opportunities for student feedback (see ci3t.org/pl). This framework provides a systematic way to address both academic and behavioral challenges (Haydon & Scott, 2008; Sprague & Thomas, 1997).

Much of the existing research using precorrection has paired it with other interventions. For example, several studies have examined the effects of the multi-step precorrection model paired with active supervision on the effects of student behavior (e.g., Colvin et al., 1997; DePry & Sugai, 2002). Similarly, Haydon and colleagues explored the impact of precorrection and active supervision when an explicit timing procedure (announcing a timed goal for transitions and displaying a timer as a prompt) was added (Haydon & DeGreg, 2012; Haydon & Kroeger, 2016). Stormont, Smith, and Lewis (2007) and Smith, Lewis, and Stormont (2011) both examined the effects of teacher-delivered precorrective statements followed by teacher praise (and/or feedback) for engaging in desired behaviors. Finally, both DePry and Sugai (2002) and Haydon and Kroeger (2016) also included a daily review of data (review of graphed data with the teacher) to help facilitate improvements in student behavior. These additions to simple precorrective statements are logical companions to precorrection, especially as they all fit within the seven-step (Colvin et al., 1993) or eight-step (Lane et al., 2015) precorrection procedures. For example, both active supervision and explicit timing can function as content modifications (i.e., Step 3), praise can function as reinforcement (i.e., Step 5), visual timers can function as prompts (i.e., Step 6), and daily data reviews can function as tools for monitoring student progress (i.e., Step 7). These steps have been widely implemented in a variety of settings.

Establishing an Evidence-Base for Precorrection

In 2014, the Council for Exceptional Children (CEC) released the *Standards for Evidence-Based Practices in Special Education* outlining standards for evaluating the scientific rigor of empirical studies according to quality indicators, as well as guidelines for determining how much evidence is needed to determine whether or not a practice is evidence based. Currently, precorrection is a widely-used strategy with research to support its effectiveness. However, no research team to date has applied CEC's 2014 standards to this body of research. Therefore, the purpose of this study is to (a) examine the descriptive variables of studies included in the search, (b) explore the degree to which precorrection studies met the quality indicators reflective of scientifically rigorous research, using a presence versus absence coding criterion and (c) determine if precorrection is an evidence-based practice as defined by CEC, using a weighted coding criterion.

Method

Article Selection Procedures

To obtain all relevant articles we used a four-step search process: (1) electronic search, (2) hand search, (3) ancestral search, and (4) editor/author contact. First, we searched four electronic databases using the terms precorrection, pre-correction, precorrect, and pre-correct (because of the varied spellings in recent publications). Databases were Academic Search Complete, Educational Resources Information Center (ERIC), Professional Development Collection, and PsycINFO. The electronic database search returned 69 results, excluding duplicates, replicated with 100% reliability by a second author. The first and fourth authors both independently read the 69 article titles and abstracts to determine whether or not they met inclusion criteria, coding them as 0 = *does not meet inclusion criteria* and 1 = *meets inclusion criteria*. The two authors identified the same 12 articles (100% agreement) to be read in full to determine which met inclusion criteria. Next, during full reads of the manuscripts, both authors again coded 0 = *does not meet inclusion criteria* and 1 = *meets inclusion criteria* across four inclusion criteria (description to follow). After full reads of the manuscript, both authors identified the same nine articles from seven journals (100% agreement).

To complete the second step of our search, two authors conducted independent ancestral searches of the nine articles. We reviewed the citations and references and noted any articles with potential to meet our inclusion criteria. This search revealed an additional six articles for consideration, with 82.35% agreement (agreements $n = 28$, disagreements $n = 6$) between the two authors. Upon review of the abstracts, no additional titles were added to the search.

Third, two authors conducted a hand search in the university library of journals where an identified article(s) was published: *Education & Treatment of Children, Journal of Behavioral Education, Journal of Instructional Psychology, Journal of Positive Behavior Intervention, Preventing School Failure,* and *School Psychology Quarterly*. Beginning at the initial identified publication (January 1997) through current month (July 2016), journals were hand searched by reading titles for possible inclusion, and if of interest abstracts, to identify any additional articles meeting search criteria missed by the electronic search. A total of 452 issues were hand searched. If a journal was not physically available in the university's library, authors reviewed the electronic table of contents. Interrater reliability (IRR; calculated using point-by-point agreement for each issue to obtain a percentage for each journal, then averaging

the journal percentages) across all journals was 96.14% (range, 93.06–100%). The hand search yielded no additional articles for inclusion.

Fourth, we emailed all corresponding or first authors of included studies ($n = 8$; two articles had same first authors) and journal editors ($n = 6$) to see if any in-press manuscripts met our inclusion criteria. We received an additional manuscript to be evaluated for inclusion, which was again coded for inclusion criteria as outlined above and found to meet our criteria. In total, following all four search methods, we identified 10 articles, all utilizing single-case design, to be coded for both descriptive variables and quality indicators.

Inclusion Criteria

Included studies met the following criteria. First, studies needed to have examined the effects of a precorrection intervention. Given the limited research on precorrection used in isolation from other behavioral tactics, studies involving precorrection and another strategy (i.e., active supervision, praise) were included (e.g., Colvin et al., 1997; Lewis et al., 2000). In addition to this main inclusion criteria, studies were included if they (a) occurred in a PK-12 traditional school setting—studies in alternative educational settings were excluded because of the unique needs of students served in those settings; (b) used experimental or quasi-experimental design; and (c) published or in press in a peer-reviewed journal. These inclusion criteria were defined to locate relevant published research demonstrating the use of precorrection to improve the behavior of students with and/or at-risk for disabilities served in traditional, general education schools; a clear definition of setting and participants is desired to clearly determine a practice's status as evidence-based (Cook et al., 2015).

Coding Procedures

Training. The first author was trained in QI coding by the second and third authors. Training consisted of coding six (three single case; three group design) practice articles using a QI matrix for single-case and group comparison design methodology (Lane, Common, Royer, & Mueller, 2014). The QI matrix has also been used in other published systematic reviews of low-intensity teacher-delivered strategies including Common et al. (2015) and Royer, Lane, Dunlap, and Ennis (2016). After independently coding, authors compared results, including discussing and resolving any discrepancies. Training criterion was set at three consecutive articles with ≥ 85% IRR (as calculated by dividing the number of agreements by the total number of agreements plus disagreements and multiplying by 100). The first and second author's mean IRR was 96.43% (*SD*=4.82; range, 86.36—100%).

Descriptive coding. To understand the descriptive context for all included studies, we coded the following descriptive characteristics: (a) context and setting, (b) participants, (c) intervention agent, (d) description of practice, (e) implementation fidelity, (f) internal validity, (g) outcome measures/dependent variables, and (h) data analysis (see Table 1). IRR of descriptive coding was verified by a second coder. IRR (calculated using point-by-point agreement) for descriptive coding was 91.11%.

Quality indicator coding. To evaluate articles for the presence or absence of QIs of methodologically sound interventions as defined by CEC (2014), the first author coded articles for the following QIs: (1.0) context and setting, (2.0) participants, (3.0) intervention agent, (4.0) description of practice, (5.0) implementation fidelity, (6.0) internal validity, (7.0) outcome measures/dependent variables, and (8.0) data analysis, with specific QI coding procedures reviewed subsequently. The second author coded 100% of articles for reliability. After coding, authors compared results, including discussing and resolving any discrepancies ($n = 12$ of 218), and calculated IRR (calculated using point-by-point agreement) for each article and each QI component. Mean IRR for articles was 94.46% (range, 85.71–100%) and QI components was 94.55% (range, 80.00–100%). Additionally, the third author coded all articles for verification, and all three coders met to discuss ratings. There were only three instances where the third author was in disagreement with the other coders. All discrepancies were addressed and resolved among the three coders prior to analysis.

Methodological Quality Indicators

QI 1.0. Context and setting. To meet QI 1.1 a study had to provide information on at least one demographic variable to describe the context/setting (e.g., region, locale, size, grade levels). In addition, it had to be clear or determined with limited inference that the context was a traditional school setting to determine if it should be included in the review.

QI 2.0. Participants. To meet QI 2.1 a study had to provide information on at least one demographic variable to describe participants (e.g., age, gender, ethnicity). Some included studies identified all students in a school as participants, in which instance school demographics were used to provide information on participants. When a whole class or school was the unit of analysis, we required authors to report at least one demographic item (e.g., ethnicities represented, socioeconomic status) for the group to meet QI 2.1. To meet QI 2.2, if students with disabilities were included as participants, a study had to define their disability or risk status, including the method of determination

used (i.e., standardized assessment, interdisciplinary team). We did not require risk status be reported in whole class or school studies since it was not an eligibility requirement for large group participation, but it was desirable to describe how the class or school was selected for the study.

QI 3.0. Intervention agent. To meet QI 3.1 a study had to describe at least one demographic background variable of the intervention agent. To meet QI 3.2 a study had to describe intervention training procedures as well as how training to criterion was achieved (e.g., role play for accuracy, check for understanding). The only exception was if a script was used and it was evident the intervention agent was capable of reading a script upon review.

QI 4.0. Description of practice. To meet QI 4.1 a study had to describe the intervention procedures with sufficient detail to allow for replication. Likewise, to meet QI 4.2 a study had to describe the intervention materials (if needed) with sufficient detail to allow for replication.

QI 5.0. Implementation fidelity. To meet QI 5.1 a study had to describe assessment of fidelity of intervention procedures. This may have been collected using a checklist of intervention procedures or direct observation of intervention agent behaviors. To meet QI 5.2 a study had to describe fidelity of intervention procedures related to dosage. This could have been achieved by reporting the length of time the intervention was implemented daily as well as how long the intervention was in place, the latter available from a graph. To meet QI 5.3 a study had to clearly state if fidelity of implementation was assessed throughout the intervention (i.e., across phases, % of all sessions, throughout the intervention).

QI 6.0. Internal validity. All studies included in this review used single-case research design methodology; therefore items 6.4, 6.8., and 6.9 were not applicable to this review and baseline conditions (as opposed to control/comparison) were used to evaluate items 6.2 and 6.3. To meet QI 6.1 a study had to systematically manipulate the independent variable, which was achieved by using an experimental design and measuring treatment fidelity of the intervention. To meet QI 6.2 a study had to include a detailed description of baseline conditions. To meet QI 6.3 a study had to explicitly state baseline (and withdrawal) conditions did not have exposure to the intervention (measurement of this was preferred). To meet QI 6.5 a study had to utilize a design that allowed for three demonstrations of effect (e.g., A-B-A-B, multiple baseline). To meet QI 6.6 a study had to have at least three baseline data points and an established pattern of undesirable

performance. To meet QI 6.7 a study had to utilize a design that controlled for common threats to internal validity (i.e., through the use of established single case designs).

QI 7.0. Outcome measures / dependent variables. To meet QI 7.1 a study had to have socially important outcomes, which may have been measured through formal social validity assessment. To meet QI 7.2 and 7.3 a study had to define and report the results of all dependent variables measured. To meet QI 7.4 a study had to measure dependent variables with acceptable frequency (i.e., at least three data points per phase, unless adequate justification provided) and timing (i.e., assessment at times proximal to study, unless adequate justification provided). To meet QI 7.5 a study had to measure interobserver agreement (or alternate form of internal reliability) and report reliability at acceptable levels (i.e., ≥80%). As all studies included in this review used single-case research design methodology, item 7.6 was not applicable to this review.

QI 8.0. Data analysis. As all studies included in this review used single-case research design methodology, items 8.1 and 8.3 were not applicable to this review. To meet QI 8.2 a study had to include a graph that allowed for clear interpretation of outcome variables.

Evaluation Procedures for Classifying the Evidence Base of Practices

Upon completion of QI coding, CEC (2014) standards were used to evaluate the level of evidence for precorrection. CEC (2014) defined practices as evidence based, potentially evidence based, mixed effects, insufficient evidence, or negative effects based on the number of studies meeting QIs classified as having *positive effects, neutral or mixed effects,* and *negative effects.* For a single-case design study to have *positive effects* it must have met all QIs and have a minimum of three cases, 75% of which must demonstrate a functional relation and therapeutic trend between the intervention and dependent variables, with the remaining being neutral or mixed (i.e., no counter-therapeutic trends). For purposes of this review, we applied an 80% weighted QI criterion (Lane, Kalberg, & Shepcaro, 2009) to include articles of high quality that did not meet all QIs in the evidence-based decision-making process. A weighted criterion allows for the inclusion of studies that did not meet all indicators but were rigorous and of high-quality.

For a practice to be considered *evidence-based*, five single-case studies with *positive effects* and 20 or more cases are required (or a combination single case and group comparison studies). Further, no studies can have negative effects and the ratio of positive to neutral/mixed effects must be 3:1 or greater (CEC, 2014). To be considered *potentially*

evidence-based, two to four single-case studies with *positive effects* are required. No studies can have negative effects and the ratio of positive to neutral/mixed effects must be 2:1 or greater. To be considered *mixed evidence* there must be a minimum of two single-case studies with the ratio of positive to neutral/mixed effects less than 2:1 or one or more studies showed negative effects (ensuring negative effects are not more numerous that positive effects). To be considered *negative effects* there must be more studies with negative effects than positive effects. If none of the above criteria are met, a practiced is defined as having *insufficient evidence*.

Data extraction and analysis. In addition to determining if a study had *positive effects* according to CEC (2014) guidelines, we were interested in three methods of further analysis: (a) visual analysis, (b) percentage of non-overlapping data points (PND), and (c) between-case standardized mean difference (BC-SMD) effect sizes. To begin, and as part of determining if a study had *positive effects*, visual analysis (e.g., level, trend, stability) of all graphed data was conducted to determine a functional relation between the intervention and the dependent variables; visual analysis is considered the gold standard in single-case design evaluation (Gast & Ledford, 2014). Second, PND was calculated to determine what proportion of data in the treatment phase exceeded the highest/lowest baseline datum point. PND has a high degree of reliability and is reported as a percentage; PND of >70% is considered an effective intervention, 50–69% is considered questionable, and <50% is considered ineffective (Scruggs & Mastropieri, 1998). Finally, we extracted data from each study using WebPlotDigitizer (Version 3.11; Rohatgi, 2017) for entry into the online BC-SMD calculator (Pustejovsky, 2016). BC-SMD effect sizes are comparable to standardized mean differences from between-group experimental designs (e.g., Cohen's *d*) and can be calculated for single case studies using multiple baseline or reversal/withdrawal designs containing three or more cases. This approach models single-case data with a hierarchical linear model to take into account the nested structure of single-case design data (Valentine, Tanner-Smith, Pustejovsky, & Lau, 2016). Because calculating BC-SMD effect sizes requires three or more cases we were able to employ this method for five of the included studies. BC-SMD effect sizes can be interpreted as small (0.20–0.49), medium (0.50–0.79), or large (≥ 0.80) following other standardized mean difference effect size interpretation (e.g., Busk & Serlin, 1992).

Table 1

Descriptive Coding of Included Precorrection Single-Case Research Design Articles

CEC (2014) Quality Indicator	Colvin, Sugai, & Good, 1997	Sprague & Thomas, 1997	Lewis, Colvin, & Sugai, 2000	DePry & Sugai, 2002	Miao, Darch, & Rabren, 2002
1.0 Context and Setting	Elementary school currently implementing a school-wide initiative to improve behavior in a rural/suburban community in the Pacific Northwest; Transitions (entering school, entering cafeteria, exiting school)	Regular elementary school; Self-contained classroom for students with severe intellectual disabilities	Elementary school currently implementing a school-wide initiative to improve behavior in a rural/suburban community; Playground	Elementary school in a rural community in the Pacific Northwest currently implementing effective behavioral support school-wide - 350 students (grades 4–6); 6th grade general education social studies classroom	Public school in southeast Alabama; Special education resource room during reading instruction
2.0 Participants	475 students (K-5) and 42 staff members (24 certified, 18 classified, one principal)	10-year-old male with a severe ID	475 students (K-5) and 42 staff members (24 certified, 18 classified, one principal)	26 6th grade students	6 1st grade students with mild disabilities (5 female, 1 male; 2 DD, 1 ESL, 2 ID, 1 MD)

(continued)

Table 1 *(continued)*

CEC (2014) Quality Indicator	Colvin, Sugai, & Good, 1997	Sprague & Thomas, 1997	Lewis, Colvin, & Sugai, 2000	DePry & Sugai, 2002	Miao, Darch, & Rabren, 2002
3.0 Intervention agent	Transition area supervisors and teaching staff	Researcher	Playground monitors (educational assistants) and teaching staff	6th grade female teacher with 20 years' experience	Special education doctoral student
4.0 Description of practice	*Precorrection*—reminders of desired behavior before entering transition areas *Active supervision*—moved around, looked around, interacted with students	*Precorrection*—systematically modified context, conducted behavioral rehearsals, prompted the expected behavior, and provided praise for expected behavior	*Precorrection*—reminders of school-wide social skills curriculum and rules before being released for recess *Active supervision*—moved around, looked around, interacted with students	*Precorrection*—prompted to engage in the desired behavior, including immediate reinforcement *Active supervision*—circulated around and scanned the classroom, reinforced appropriate responding *Daily Data Review*—discussion of the teacher's impressions of student behavior, review of graphed data.	*Precorrection*—employed three precorrective reading strategies: reading visually similar sounds, reading vowel sounds, and stopping between sounds when reading words

5.0 Implementation fidelity	Collected via DO of active supervision for 100% of sess; implementation fidelity of precorrection not reported	Not reported	Collected via DO of active supervision for 100% of sess; implementation fidelity of precorrection not reported	Collected via DO of active supervision and precorrection for 25% of sess with an average of 92% implementation	Not reported
6.0 Internal validity	Multiple-baseline design across transition periods	A-B-C-B withdrawal design (baseline = functional analysis)	Multiple-baseline design across recess periods	A-B-A-B withdrawal design	Multiple-baseline design across groups
7.0 Outcome measures	DVs = supervisor measures—escorting, scanning, interacting; student measures—problem behavior; IOA=one third of sess with 88% agree; SV Not reported	DVs = participant responsiveness, problem behavior, task accuracy; IOA = participant responsiveness - 100% of sess with 100% agree, problem behavior min of 2 per phase (total 13 obs) with 88% agree, task accuracy min of 2 per phase (total 13 obs) with 85% agree; SV not reported	DVs = recess monitor behavior—move > 15′ from previous spot, interact with student, interaction with adult, whistle/gesture; student behavior—inappropriate playground behaviors; IOA=30% of student sess with 82% agree, 13% of monitor sess with 83% agree; SV not reported	DVs = student behavior—minor behavioral incidents; teacher behavior—use of active supervision and precorrection; IOA = 85% agree of student behavior; SV collected post-IV from the teacher perspective with positive results	DVs = percentage of correct sounds and words, on-task behavior, maintenance test of correct words; IOA not reported; SV Not reported

(continued)

Table 1 *(continued)*

CEC (2014) Quality Indicator	Colvin, Sugai, & Good, 1997	Sprague & Thomas, 1997	Lewis, Colvin, & Sugai, 2000	DePry & Sugai, 2002	Miao, Darch, & Rabren, 2002
8.0 Data analysis	Decreased problem behavior in all three transitions. Increased scanning behavior in all three transitions	Problem behavior decreased. Task accuracy not reported. Responsiveness only collected to identify experimental sess	Problem behavior during unstructured activities decreased; Problem behavior during structured activities was low across all settings and phases; No clear effect on monitor behavior	Minor behavioral incidents decreased as a function of the intervention	Increased accuracy of reading both sounds and words, maintenance test percent correct, and on-task behavior
CEC (2014) Quality Indicator	Stormont, Smith, & Lewis, 2007	Smith, Lewis, & Stormont, 2011	Faul, Stephensky, & Simonsen, 2012	Haydon & DeGreg, 2012	Haydon & Kroeger, 2016
1.0 Context and Setting	2 Head Start centers currently implementing PW-PBIS; Teacher-directed small group settings	3 Head Start centers (2 in self-contained buildings, 1 in a private daycare) currently implementing PW-PBIS; Teacher-directed large group circle/ greeting time	Urban middle school—1,000 students (grades 5–8, ages 10–14), currently implementing SW-PBIS; Math and reading classes for Owen, math and science classes for Tom	Urban middle school in the Midwest—534 students (grades 6–7); 34% African American, 66% Caucasian; 90% free/ reduced lunch; 50% moved in and out of district each year; 7th grade health class	Urban high school in the Midwest—517 students (grades 9–10), with a STEM and SW-PBIS program; Interdisciplinary classroom (history, English)
2.0 Participants	Group A: 7 students—3 females, 4 males; Group B: 9 students—5 females, 4 males; Group C: 9 students—3 females, 6 males	Student 1: 56-month old female, Student 2: 60-month old male, Student 3: 57-month old male with a speech/language impairment; All students had problem behavior greater than 75th percentile on the SSRS	Owen - 11 year old male in 5th grade with a 504 plan and high levels of off-task behavior; Tom - 12 year old male in 6th grade with high levels of off-task behavior	20 7th grade students	60 Black, non-Hispanic students

3.0 Intervention agent	2 Head Start teacher. 1 teacher assistant, all with experience in Head Start Centers.	3 Head Start teachers, all with experience in Head Start Centers	Owen—same (female) teacher for math/reading; Tom—math teacher, science teacher	34 year old in her 4th year of teaching,	Lead female teacher with 21 years teaching experience
4.0 Description of practice	*Precorrection*—precorrective statements to orient students to behavioral expectations for a lesson *Praise*—increased rates of specific praise	*Precorrection*—precorrective statements at the beginning and conclusion of the lesson; *Praise*—increased rates of specific praise for entire large group and target student *Feedback*—brief feedback provided at the end of each observation session	*Precorrection* - used a script to prompt both students to engage in expected behaviors	*Precorrection*—reminders of desired behaviors before entering the room *Active Supervision*—stood at door, greeted students, scanned classroom, provided verbal/nonverbal feedback *Explicit Timing*—displayed timer, announced a 2-min goal to get seated and ready to learn with free time for meeting goal	*Precorrection*—prompts of the desired behaviors upon entering the room *Active Supervision*—circulated around the classroom, scaned the class, interacted with students, acknowledged demonstrations of expected behaviors *Explicit Timing*—announced a 4-min time limit to begin their warm-up, timing the transition, and announcing when time is up *Daily Data Review*—daily graphed feedback and brief notes shared with teachers

(continued)

Table 1 *(continued)*

CEC (2014) Quality Indicator	Colvin, Sugai, & Good, 1997	Sprague & Thomas, 1997	Lewis, Colvin, & Sugai, 2000	DePry & Sugai, 2002	Miao, Darch, & Rabren, 2002
5.0 Implementation fidelity	Collected via DO using the Teacher Behavior Observation Form measuring specific behavior praise, precorrection, and reprimands for 100% of sess	Collected via DO using the Multi Option Observation System for Experimental Studies (MOOSES) for 100% of sess	Collected via DO of prompt delivery for 100% of sess with 100% implementation	Collected via DO using a checklist with 95% fidelity for 33% of sess	Collected via DO using a checklist with 100% fidelity for 100% of sess with IOA on 15% of sess
6.0 Internal validity	Multiple baseline across teachers design	Multiple baseline across teachers design	Alternating treatment design (prompt, no prompt) with baseline	A-B-C-B-C design (B = active supervision + precorrection; C = active supervision + precorrection + explicit timing)	Multiple baseline design across settings (two tier) with an embedded withdrawal (one data point) design
7.0 Outcome measures	DVs = student behavior—problem behavior; teacher behavior—specific behavioral praise, precorrection, reprimands; IOA = 20% of sess with 80% agree for student behavior, 22% of sess with 95%, 100%, and 95% agree for each respective teacher	DVs = student behavior—aggression, on-task behavior; teacher behavior—precorrective statements to target student and large group, behavior-specific praise (with and without expectations), nonspecific praise, reprimands;	DVs = Off-task behavior; IOA = 40% of baseline and 31% of alternating treatment sess with 99% and 98% agree respectively; SV = not reported	DVs = Teacher redirections, transition time; IOA = 48% of sess with 98% agree for teacher redirections and 100% agree for transition time; SV = 9 questions collected post-IV from the teacher perspective with positive ratings	DVs = Problem behavior, transition time; IOA = 44.4% of sess with 93.7 agree for problem behavior and 100% agree for transition time; SV = 9 questions collected post-IV from the teacher perspective with positive ratings

	behavior; SV collected post-IV from the teacher perspective with positive ratings	IOA = 60% of sess with 96% agree; SV = collected post-IV from the teacher perspective with positive ratings			
8.0 Data analysis	Decreased problem behavior as a function of the teachers' use of praise and precorrection	Decreased aggression and increased on-task behavior as a function of the teachers' use of praise and precorrection	Decreased off-task behavior resulted during the prompting condition for both students	Decreased teacher redirections and transition time during the active supervision + precorrection phase. Further decreases were observed when the explicit timing procedure was added.	Decreased problem behavior and transition time

Note. agree = agreement, DD = developmental delay, DO = direct observation, DV = dependent variables, ESL = English as a second language, ID = intellectual disability (mental retardation), IOA = inter-observer agreement, IV = intervention, K = kindergarten, LD = learning disabilities, MD = multiple disabilities, PW-PBIS = program-wide positive behavior support, QI = quality indicator, sess = sessions, SRSS = Social Skills Rating System (Gresham & Elliot, 1990), STEM = science technology engineering and math, SV = social validity, SW-PBIS = school-wide positive behavior support.

Results

Descriptive Statistics of Studies Included

Included studies were published from 1997–2016 in seven unique journals. Two studies (Smith et al., 2011; Stormont et al., 2007) were conducted in Head Start programs, five in elementary schools, two in middle schools (Faul, Stepensky, & Simonsen, 2012; Haydon & DeGreg, 2012), and one in a grade 9–10 high school (Haydon & Kroeger, 2016). Interventions were implemented schoolwide for two studies (Colvin et al., 1997; Lewis, Colvin, & Sugai, 2000), classwide for four studies, and with an individual student (Sprague & Thomas, 1997), pair of students (Faul et al., 2012), or groups of students (Miao, Darch, & Rabren, 2002; Stormont et al., 2007). Five studies provided information on the region within the United States where the intervention took place, six described the city/town area (i.e., rural, urban, rural/suburban), and three described school demographics. Additionally, six studies included details about the implementation of school- or program-wide implementation of initiatives to improve behavior (i.e., positive behavior support). See Table 1 for additional descriptive information.

Methodological Quality Indicators

1.0. Context and setting. All studies met QI 1.0, describing context and setting. Authors reported school and classroom type (e.g., Head Start; middle school health class; self-contained special education). Three studies (Haydon & DeGreg, 2012; Haydon & Kroeger, 2016; Lewis et al., 2000) provided specific school demographics including total enrollment, ethnic breakdown, and socioeconomic status in the form of free- and reduced-price lunch participants; five studies provided information on the region within the United States where the intervention took place, six described the city/town area (i.e., rural, urban, rural/suburban); Haydon and Kroeger (2016) reported the school's percentage of students receiving special education services; Haydon and DeGreg (2012) reported a transience rate of over 50%.

2.0. Participants. Nine studies (90%) met QI 2.1 participant demographics and QI 2.2 risk status. For example, Miao et al. (2002) reported disability status for all six participants and IQ or Woodcock-Johnson test scores with enough detail to infer high-quality administration. Faul et al. (2012) had two participants without disabilities, but described gender and behavioral risk factors to meet QI 2.0, including how the students' needs were not met through a check-in, check-out intervention and researchers confirmed off-task behavior through

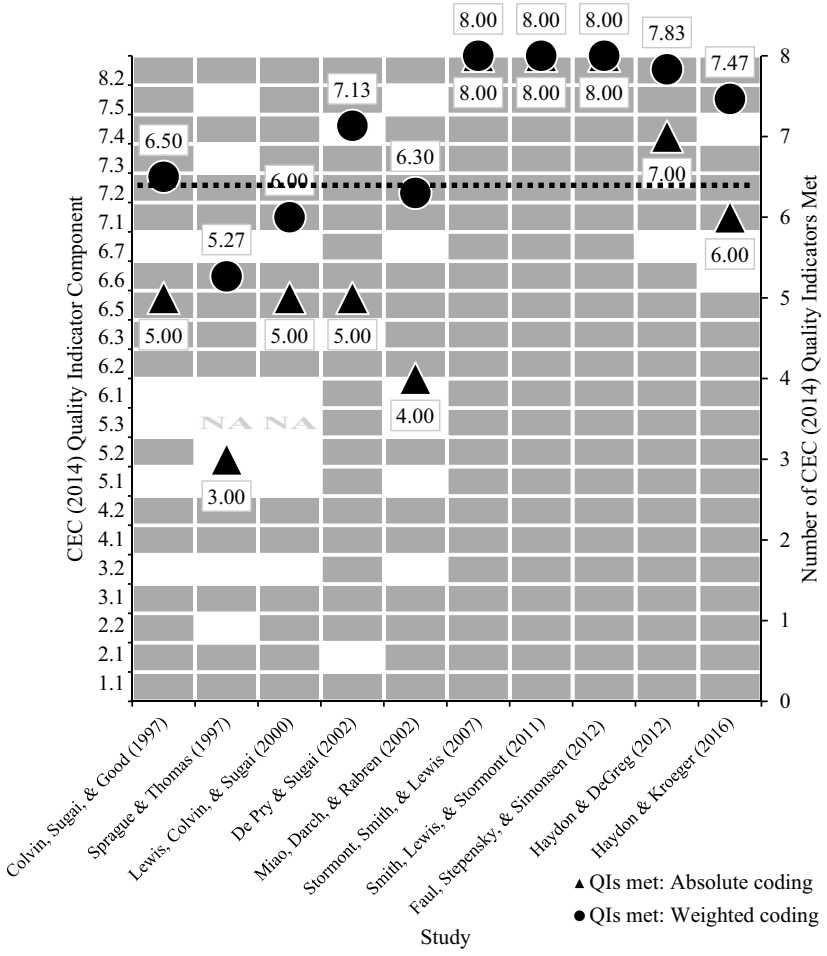

Figure 1. Precorrection studies (abscissa) and CEC (2014) QI components met (primary ordinate; shaded cells = component met, white cells = component not met). *Note*. Secondary ordinate (right *y* axis) displays number of QIs met by absolute coding (triangles; 8.0 QIs required) and weighted coding (circles) to be considered methodologically sound. The weighted coding criterion (6.40; 80%) is indicated by the horizontal dotted black line. Components not applicable are marked NA. CEC = Council for Exceptional Children; QI = quality indicator.

informal observations. For example, when a school contacted a research team for support with transition behavior (Haydon & Kroeger, 2016), it was helpful when authors confirmed through observation students needed support in this area. Smith et al. (2011) reported details on the types of behavior patterns displayed by students (e.g., externalizing).

3.0. Intervention agent. All studies described the role of the interventionist to meet QI 3.1 and though not relevant to the focus of our review, seven also provided background variables. In all studies, teachers provided precorrections, and when active supervision was included, supervisory staff did as well. In one instance, the researcher was integrated into the participant's daily routine and became the teacher for various academic lessons (Sprague & Thomas, 1997). Five studies (50%) described training procedures and reported the interventionist was either given a check for understanding, met a training criterion, or was provided a script to ensure precorrections were standardized (Faul et al., 2012), thus meeting QI 3.2.

4.0. Description of a practice. All studies described procedures and materials used to meet both components of QI 4.0. For example, Colvin et al. (1997) described how paraprofessionals supervised and reminded students of rules before entering the building, how teachers reminded students of cafeteria rules before entering the lunch area, how the principal made precorrective announcements, and provided example scripts and announcements used in the intervention.

5.0. Implementation fidelity. Six studies (60%) met QI 5.1 for reporting implementation fidelity related to adherence, eight (80%) met QI 5.2 for implementation fidelity related to dosage, and six of eight (75%) met QI 5.3 for reported implementation fidelity regularly throughout the study (QI 5.3 was not applicable for two studies when both QI 5.1 and 5.2 were not met). De Pry and Sugai (2002) used direct observation of teacher implementation and reported results, while Haydon and DeGreg (2012) had observers use a treatment integrity checklist. Haydon and Kroeger (2016) used a treatment integrity checklist, with the additional use of a secondary observer for each session to calculate IOA on implementation fidelity.

6.0. Internal validity. Six studies (60%) met QI 6.1 having systematically manipulated the independent variable. All studies described baseline sufficiently to meet QI 6.2. For example, De Pry and Sugai (2002) illustrated how the teacher lectured, where students sat, and the percentage of intervals active supervision and precorrection occurred in baseline and withdrawal phases. Eight (80%) studies met QI 6.3 for keeping baseline isolated from intervention components. For example, Haydon and Kroeger (2016) stated during withdrawal

phase active supervision, precorrection, and explicit timing were not used. Stormont et al. (2007) described how the three teachers in the multiple-baseline design were repeatedly directed to not discuss the intervention until the study ended, and where two groups were in the same room they were on opposite sides so as to not be overheard when one began the intervention before the other. Faul et al. (2012) reported during non-intervention phases, teachers did not prompt or say anything to students at the door other than "Hi."

All studies met QI 6.5, having employed a single-case design that allowed for three possible demonstrations of experimental effect. Multiple-baseline designs were employed across teachers (Smith et al., 2011; Stormont et al., 2007); settings such as entering school, entering the cafeteria, and leaving school (Colvin et al., 1997); recess periods and grade levels (Lewis et al., 2000); reading groups (Miao et al., 2002); and class periods (Haydon & Kroeger, 2016). Faul et al. (2012) used an alternative treatment design with baseline as students attended different classes throughout each day. Other designs included A-B-A-B withdrawal (De Pry & Sugai, 2002; Sprague & Thomas, 1997) and A-B-C-B-C (Haydon & DeGreg, 2012).

Nine studies (90%) met QI 6.6 for having a minimum of three data points in baseline and withdrawal phases. Four studies (40%) met QI 6.7, having controlled for threats to internal validity by executing a properly designed single-case design with implementation fidelity.

7.0. Outcome measures / dependent variables. All studies met QIs 7.1 and 7.2 for reporting socially valid outcomes and having defined and described measurement of DVs. Four studies (De Pry & Sugai, 2002; Haydon & DeGreg, 2012; Haydon & Kroeger, 2016); both Smith et al. (2011) and Stormont et al. (2007) had teachers complete a social validity assessment at the end of the study with very positive results. Nine studies (90%) met QI 7.3 for reporting effects for all outcome measures. Eight studies (80%) met both QIs 7.4 and 7.5, with at least three data points per phase and having reported IOA ≥ 80% for DVs.

8.0. Data analysis. All studies met QI 8.2 with graphed outcome measure data allowing for standard visual analysis. Colvin et al. (1997) completed additional analyses: correlations between supervisor interactions with students and problem behavior frequency and hierarchical linear modeling to evaluate the effect of active supervision and precorrection on reduction of problem behavior.

Evaluation of the Practice

To determine into which evidence-based practice category precorrection could be categorized, we followed CEC (2014) procedures for classifying the evidence base of practices. Though three studies (Faul

et al., 2012; Smith et al., 2011; Stormont et al., 2007) met 100% of QIs, we were interested in evaluating how many met 80% of QIs following Lane, Kalberg, and Shepcaro's (2009) recommendation for using a weighted criterion to ensure well-constructed studies were included when evaluating the overall body of evidence. Using this 80% criterion, seven studies were determined to be methodologically sound and eligible for use in classifying the evidence base of precorrection with weighted totals ranging from 6.5 to 8.0 (see Figure 1).

Next we classified the seven studies as having *positive effects*, *neutral or mixed effects*, or *negative effects* following CEC (2014) guidelines. Of the seven studies meeting ≥ 80% of quality indicators, six showed a functional relation based on visual analysis. Five of these six studies (Colvin et al., 1997; De Pry & Sugai, 2002; Haydon & DeGreg, 2012; Smith et al., 2011; Stormont et al., 2007) had three or more cases with 75% or more demonstrating a therapeutic change, thus able to be categorized as a study with *positive effects*. Finding five single-case design studies with *positive effects* and a total of at least 20 participants, we classified precorrection in traditional PK-12 settings as meeting CEC (2014) criteria for an *evidence-based practice* using a weighted coding metric.

Data extraction and analysis. We used three indicators to evaluate effectiveness of precorrection interventions: (a) visual analysis, (b) PND, and (c) BC-SMD (see Table 2 for a summary of PND, BC-SMD, and effect classification). Eight studies had a functional relation between the precorrection intervention and dependent variables based on visual analysis. PND ranged from 3.13 to 100% across studies and from 37.50 to 100% across studies meeting 80% of QIs. BC-SMD effect sizes were calculated for the five studies meeting the prerequisite of having three or more cases. These five studies contained nine outcome measures (e.g., disruptive behavior, on-task behavior), on six of which precorrection was classified as having a large effect. Two outcome measures demonstrated a medium effect and one showed minimal effect.

Discussion

This study used the CEC's (2014) *Standards for Evidence-Based Practices in Special Education* to examine the body of research on precorrection. Despite being an important area of focus as schools shift to more proactive and preventative discipline practices, this review is the first to examine this body of research. We identified 10 articles, all using single-case research design, that (a) evaluated the effects of a precorrection intervention, (b) took place in a PK-12 traditional school setting, (c) used an experimental single-case design, and (d) was pub-

Table 2

Indicators of Precorrection Study Effects

Study	Outcome measure(s)	PND	BC-SMD Estimate	BC-SMD SE	95% CI range	EBP effects classification
Colvin, Sugai, & Good, 1997	Problem behavior	69.57	2.1779	0.4830	1.3432–3.1835	positive
Sprague & Thomas, 1997	Problem behavior	88.24	-	-	-	n/a [< 80% QIs, < 3 cases]
Lewis, Colvin, & Sugai, 2000	Problem behavior (unstructured)	30.23	2.0446	0.3208	1.4365–2.6875	n/a [< 80% QIs]
	Problem behavior (structured)	3.13	0.0821	0.2497	−0.4035–0.5696	
DePry & Sugai, 2002	Minor behavior	100				positive
Miao, Darch, & Rabren, 2002	Correct responses (sounds)	89.29	2.2125	0.5677	1.2450–3.9430	n/a [< 80% QIs]
	Correct responses (words)	96.43	1.5548	0.6255	0.6663–2.8681	
	On-task behavior	89.29	0.6248	0.4479	0.1056–1.4905	
Stormont, Smith, & Lewis, 2007	Problem behavior	60.00	1.0835	0.4250	0.4027–1.9624	positive
Smith, Lewis, & Stormont, 2011	Aggressive behavior	86.67	0.7774	0.3359	0.1344–1.4415	positive
	On-task behavior	91.11	3.2147	0.4211	2.4294–4.0684	
Faul, Stephensky, & Simonsen, 2012	Off-task behavior	75.00	-	-	-	n/a [< 3 cases]
Haydon & DeGreg, 2012	Redirections	50.00	-	-	-	positive
	Transition time	37.50				
Haydon & Kroeger, 2016	Problem behavior	77.14	-	-	-	n/a [no functional relation]
	Transition time	40.00				

Note. BC-SMD = between-case standardized mean difference, CI = confidence interval, EBP = evidence-based practice, PND = percentage of non-overlapping data points, SE = standard error. n/a = studies did not meet weighted criteria or had fewer than three cases reported.

lished in a peer-reviewed journal. We acknowledge omitting dissertations and theses which may have reported null outcomes poses concerns (e.g., publication bias). However, of these 10 articles, three met all quality indicators outlined by CEC. This is noteworthy as the standards call for both rigorous methodology and clearly articulated procedures. An additional four articles met a weighted criterion (i.e., 80% of 8.0 quality indicators or 6.4+), suggesting adequate methodological rigor (Lane et al., 2009). Of these seven articles, five established a functional relation and had three or more cases, with a minimum of 75% of participants displaying therapeutic results. Therefore, precorrection meets the CEC requirements for being denoted as an evidence-based practice, but only when a weighted criterion was used (Lane et al., 2009).

While this is an important finding, we note there would have only been evidence to classify precorrection as a potentially evidence-based practice if absolute coding was used. This is important given other low-intensity strategies, often assumed to be evidence-based, have not had sufficient evidence to be deemed evidence based. For example, teacher-delivered behavior-specific praise has been determined to be a potentially evidence-based practice using a weighted coding criterion (Royer, Lane, Dunlap, & Ennis, 2016). Similarly, instructional choice was determined to have insufficient evidence to make an evidence-base determination using a weighted coding criterion (Royer, Lane, Cantwell, & Messenger, 2017). It is also important to note only three of the ten articles investigated precorrection only, most (including all five meeting requirements to be considered for an evidence-based practice) evaluated the effects of precorrection paired with another low-intensity strategy. As noted, many of these other strategies (e.g., active supervision, praise) can be identified as steps within the Colvin, Sugai, and Patching (1993) seven-step and Lane, Menzies, Ennis, and Oakes (2015) eight-step precorrection procedures.

Despite the designation of an evidence-based practice, additional research in this area is warranted. For example, all studies utilized single-case design research methodology. Future investigations using group design methodology, including randomized control trials with larger populations would be helpful in establishing the generalizability of the findings. Further, future research using precorrection with students with disabilities is warranted, as only three studies examined the effects of precorrection on students with disabilities in traditional school settings (e.g., Sprague & Thomas, 1997) with an additional study examining the effects of precorrection on students with high levels of off-task behavior (Faul et al., 2012). Many of the other studies looked at the performance of all students in a school (Colvin et al.,

1997; Lewis et al., 2000) or a classroom (e.g., DePry & Sugai, 2002). While students with disabilities were inevitably included in these samples, their specific areas of eligibility were not defined nor were their specific levels of responding isolated for evaluation.

Across this body of literature, studies addressed nine (of 22) of the QI components applicable to single-case research as outlined by CEC. However, there were areas where methodology and/or reporting could have been strengthened. For example, QI 3.2 *intervention agent training* often included a description of training procedures (e.g., one-on-one professional development, faculty training); however, not all studies reported how the criterion for interventionist training was reached (e.g., check for understanding, role play demonstration). This is an important component to confirm all intervention agents are adequately trained to implement the intervention with fidelity, especially considering precorrection is a low-intensity, antecedent-based strategy implemented by teachers or other adults in the school building (Lane et al., 2015).

Another example is related to the collection of treatment fidelity, QI 5.1 *adherence*. Several studies used direct observation of adult behavior (e.g., supervisory behavior, student-teacher interactions) as a measure of adherence fidelity. While this can be a desirable approach to measuring treatment fidelity, it is important that researchers collect data on all aspects of the intervention. If observing all teacher behaviors using direct observation recording methods (e.g., frequency, interval recording) is not possible, this can be accomplished using a checklist of all intervention components. Further, Haydon and Kroeger (2016) not only used an outside observer to collect treatment fidelity data using a checklist, they also had a second observer collect IOA of treatment fidelity for a set percentage of observations. We highly encourage researchers to consider this approach to facilitate accuracy of treatment fidelity measurement just as has become common practice for dependent variable measurement.

Similar to QI 5.1, QI 6.1 *control of the independent variable* requires a study to both control and systematically manipulate the independent variable. If QI 5.1 is not met, then neither is 6.1, as even if a study has a design that allows for the systematic manipulation of the independent variable, it is not sufficiently controlled for if we do not have a clear understanding of whether or not (and to what extent) the intervention was implemented as designed. Further, QI 6.7 *control for threats* cannot be met if QI 5.1 is not met and the designs used do not control for threats to internal validity. This was the most commonly omitted quality indicator in this body of research. While four studies did not meet it based on a lack, or limited collection, of treatment integrity,

two other studies missed this indicator because the study design did not control for threats to internal validity or because data collection was not conducted as planned (e.g., limited withdrawal phase) compromising the control for threats to internal validity. While applied research may occasion the altering of planned applications, researchers should be aware of this important component for quality research methodology and plan collection of treatment integrity and select research designs accordingly.

Limitations

These findings should be interpreted in light of several potential limitations. First, electronic search terms do not always capture all articles relevant to a search. Although four different search procedures were used in an effort to identify all possible articles for inclusion, steps 2 through 4 (ancestral search, archival search, editor/author contact) were all based on the findings from the initial electronic search.

Second, although the CEC (2014) standards are well articulated, they allow for individual interpretation which is why we established procedures for ensuring consistency across raters. Specifically, in an effort to minimize error as a result of individual interpretation or oversight when reviewing an article, we trained all coders on sample articles prior to analyzing included studies and had three coders independently read and discuss each article. Further, we have sought to outline in the method how we considered each quality indicator. Finally, we used an established QI matrix for single-case and group comparison design methodology (Lane et al., 2014) used in peer-reviewed systematic reviews (e.g., Royer et al., 2016). However, the IRR suggest coders were highly accurate. Nonetheless, the potential for error exists, conceivably impacting the conclusion drawn from this review.

Third, the evaluation of the effects of precorrection alone is difficult given only three articles (30%) of those reviewed investigated precorrection in isolation. Five studies (50%) looked at combining active supervision and precorrection, with two of these studies also adding in explicit timing procedures and/or daily data review. The remaining two studies (20%) combined precorrection with praise. While the accompanying strategies are in line with steps of the multistep precorrection model (Colvin et al., 1993; Lane et al., 2015), it is important to note when considering precorrection an evidence-based practice it can only be established as such when used in conjunction with other strategies.

Fourth, the review focused on a very large age range: PK through high school. We encourage future research teams to conduct additional inquiry to continue to explore the efficacy of precorrection—in

isolation and as part of packaged interventions theoretically grounded in applied behavior analysis—across the age span in more depth. In other words, to what extent is this strategy effective with high school students with challenging behavior educated in inclusive settings? Additional inquiry is needed to establish generalizability of findings.

Fifth, we utilized three different indicators of treatment effects: visual analysis, PND, and BC-SMD (where applicable). While our determination of classifying effects as *positive*, *neutral or mixed*, or *negative* was visual analysis, it is important to note potential limitations with the other measures used. To begin, PND has been criticized by researchers (e.g., Ma, 2006). Further, PND is a highly stringent indicator, as one outlier (low or high datum point; floor or ceiling effect) during baseline can result in a low PND in studies where a functional relation or overall changes in level are present (Jenson, Clark, Kircher, & Kristjansson, 2007; Strain et al., 1998). Conversely, single-case design effect sizes, which would include BC-SMD, have been criticized for resulting in inflated effects (Jenson et al., 2007). Future reserchers may want to explore other methods for indicating an intervention's magnitude of effect and/or compare the relation between mulitple effect indicators (e.g., Losinski, Cuenca-Carlino, Zablocki, & Teagarden, 2014).

Implications for Practice

Based on the results of this review, we encourage practitioners to consider the use of precorrection, a low-intensity, antecedent-based strategy (Lane et al., 2015). One of the most encouraging outcomes is the utility of precorrection across settings (i.e., Head Start to high school), in both classroom and non-classroom settings (i.e., transitions, playground), and with a variety of intervention agents (i.e., researchers, teachers, school staff). Furthermore, precorrection has demonstrated effectiveness when implemented in conjunction with or as part of a multi-step precorrection model. Researchers and school personnel should consider pairing other low-intensity, antecedent-based strategies, such as active supervision (e.g., Lewis et al., 2000) and explicit timing (e.g., Haydon & DeGreg, 2012), with precorrection to help occasion appropriate student responding. Likewise, consequent strategies such as delivering behavior-specific praise for engaging in the appropriate precorrected behavior (e.g., Stormont et al., 2007) and daily data reviews to facilitate teacher understanding of changes in behavior and encourage implementation with fidelity (e.g., Haydon & Kroeger, 2016) are great strategies that fit within the multi-step precorrection model and have demonstrated effectiveness.

Further, precorrection can be used within a three-tiered PBIS or Ci3T framework to support the behavior of all students (e.g., Colvin

et al., 1997; De Pry & Sugai, 2002; Lewis et al., 2000). Much of the prevention logic used to develop the multi-step precorrection procedures is consistent with the PBIS framework (Colvin et al., 1993; Ennis et al., 20I2; Lane et al., 2015). For example, the common language used as a part of PBIS to define and teach expectations across settings is a great starting point for defining the desired behavior for students (step 2). Likewise, praise offered for meeting the expected behavior can be tied to the PBIS reinforcement system in place (e.g., behavior-specific praise paired with schoolwide tickets; step 5). These strategies can be used with all students (i.e., as a Tier 1 strategy) or in response to schoolwide or individual-student data to address specific needs (i.e., as a Tier 2 strategy or component of a Tier 3 intervention; Ennis et al., 2012).

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Note. References with an asterisk indicate studies included in the systematic review.

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