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A SYSTEMATIC REVIEW OF STUDENT OUTCOMES AS A FUNCTION OF BEHAVIORAL SKILLS TRAINING OF TEACHERS[1]

REVISIÓN SISTEMÁTICA DE RESULTADOS EN ESTUDIANTES COMO FUNCIÓN DE ENTRENAMIENTO EN HABILIDADES CONDUCTUALES A PROFESORES

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Abstract

Problem behavior of students in school settings have negative effects on several areas of functioning in children. Empirical research has provided conclusive evidence regarding lifetime repercussions when problematic behavior is not treated. Despite evidence of the effectiveness of applied behavior analysis interventions to improve student's behavior, access to these services remains a major challenge. Training teachers and staff in these procedures has been shown to be an effective alternative to achieve a greater reach; however, little attention has been paid to the effect of teacher training on student's outcomes. The current systematic review aims to provide a synthesis of the evidence of teacher's behavioral skills training intended to modify student's behavior. Fifty-three empirical studies were collected from eight databases and eight specialized journals. Overall, we found the studies provide evidence of the effectiveness of teacher training on student's outcomes. We also describe the main characteristics of the study interventions and discuss potential considerations related to training components that can be used to provide more effective training, especially for diverse contexts and communities with fewer resources. Needs for future research are discussed.

Keywords: behavioral skills training, problem behavior, children, teachers, review

Resumen

Los problemas de comportamiento en la infancia tienen efectos negativos en diversas áreas de funcionamiento de los niños. La investigación científica ha

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mostrado evidencia contundente respecto a las repercusiones cuando la conduta problemática no es tratada. A pesar de la amplia evidencia sobre la efectividad de las intervenciones analítico-conductuales en el tratamiento de los problemas de comportamiento en niños, el acceso a estos servicios aún es un reto mayor. Los entrenamientos a profesores y personal educativo en estos procedimientos han mostrado ser una alternativa efectiva para lograr un mayor alcance, sin embargo, se ha dado poca atención a la investigación de los efectos que tienen los entrenamientos sobre el cambio conductual en los niños. La presente revisión tiene el propósito de proveer una síntesis de la evidencia respecto a entrenamientos en habilidades conductuales a profesores orientados a modificar la conducta de niños. Se identificaron 53 estudios en ocho bases de datos y ocho revistas especializadas. En general, los estudios ofrecen evidencia de que los entrenamientos en habilidades conductuales tienen un efecto positivo en la conducta de los niños. Se describen las características de los entrenamientos y se discuten consideraciones potenciales relacionadas con los componentes de los entrenamientos que pueden orientar el diseño de entrenamientos más efectivos. Se discuten necesidades en futuras investigaciones.

Palabras clave: entrenamiento en habilidades conductuales, problemas de conducta, niños, profesores, revisión

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Problem behavior (PB) in children can go on to affect them negatively during their lifetimes. Consequences may include problematic social interactions, academic difficulties, and criminal behavior (e.g., Boisjoli, Vitaro, Lacourse, Barker, & Tremblay, 2007; Fischer et al., 2019; Hagan-Burke et al., 2011; Hodgins, Larm, Ellenbogen, Vitaro, & Tremblay, 2013; Tremblay, 2004; Tremblay & Côté, 2019; Vitaro, Brendgen, Larose, & Trembaly, 2005). In educational settings, teachers' behavior has been shown to influence the onset, maintenance, and elimination of student's PB (Kochenderfer-Ladd & Pelletier, 2008). Frequently, PB is under teacher's control and can be modified when they modify their own behavior (Thomas, Becker, & Armstrong, 1968), but teachers are not always aware of the connection between their actions and their students' behavior or do not feel confident about handling problematic behaviors effectively in school.

Training teachers in applied behavior analysis (ABA) procedures has become a widely used strategy aimed at helping teachers to manage student's PB in educational settings. One of the first publications about teacher training was published in 1974 by Parsonson, Baer, and Baer, in which a training program for teachers on social contingencies is described. One of the contributions of this study was that authors found

that teacher training could be an effective strategy to increase appropriate child behaviors.

During the last decades many researchers have studied effective training procedures for teachers in a variety of contexts and with different needs, which led to a large number of studies supporting behavioral skills training (BST) as an evidence-based instruction package to teach new skills and behaviors to a variety of learners. For example, to teach how to conduct behavioral assessment (McCahill, Healy, Lydon, & Ramey, 2014; Tomlinson, Gore, & McGill, 2018); how to implement positive behavior intervention and support (Stormont, Reinke, Newcomer, Marchese, & Lewis, 2015); and the procedure for correct discrete trial training (DTT) (Alexander, Ayres, & Smith, 2015; Johnsson, Lincoln, Bundy, & Costley, 2016). BST has shown to be effective to modify teachers' behavior via telehealth (Unholz-Bowden et al., 2020) and in an asynchronous fashion (e.g., self-instructional manuals, video modeling, computer-based instruction, e-learning, and interactive computerized training; Gerencser, Higbee, Contreras, Pellegrino, & Gunn, 2019). Both in-person and remote training have plenty of empirical support regarding their ability to improve teachers' implementation of behavioral analytic procedures. Nevertheless, evidence concerning student's outcomes remains limited; many studies have evaluated the effects of trainings on teachers' performance, but few have examined changes in children's behavior as a secondary effect of teacher training.

For example, Kirkpatrick et al. (2019) conducted a systematic review of the literature regarding BST with teachers; they analyzed thirteen studies in which training was delivered predominately with special education teachers serving students with disabilities, and, although student information was reported to some extent, children's outcomes were not collected nor discussed.

Brock et al. (2017) described a comprehensive review and conducted a meta-analysis to address several questions regarding training studies in special education. They considered 118 peer-reviewed single-case-design studies that evaluated implementation of educational practices after practitioner trainings. Among other findings, they reported that BST was associated with the most consistent improvement of implementation fidelity. Besides trainee data, authors collected information regarding student outcomes; they found that two training strategies had significantly stronger effects on student outcomes: providing written material and written feedback. Additionally, two intervention practices had significantly stronger effects on students' outcomes: naturalistic intervention and pivotal response training. Both Brock et al. (2017) and Kirkpatrick et al. (2019)

reviews, included studies in which training was delivered predominately with special education teachers.

A recent review (Slane & Lieberman-Betz, 2021) examined the effectiveness of BST when used to train teachers and other professionals to implement interventions with children, adolescents and young children; they included only those studies using the exact phrase "behavioral skills training". However, considerable number of interventions use the same components of BST (instruction, modeling, rehearsal, and feedback) without labeling as such. Including studies that implement the same components could expand existing information. Thus, the purpose of the present review is to provide a synthesis on students PB as function of teachers BST.

Method

Registration

The protocol of this systematic review was registered in the *International Prospective Register of Systematic Reviews PROSPERO* under the ID 141080.

Search procedures and terms

Three search strategies were utilized in this review. First, searching was performed in eight electronic databases (Springer, Sage, ERIC, EBSCO, Web of Science, Scopus, Wiley, and Redalyc) from April to July 2020. Second, eight journals that specialize in behavior analysis were searched (*Journal of Applied Behavior Analysis, Journal of Behavioral Education, Teacher Education and Special Education, Journal of Applied Research in Intellectual Disabilities, Mexican Journal of Behavior Analysis, Journal of Positive Behavior Interventions, Behavior Modification, and Perspectives on Behavior Science*) in August 2020. Finally, we also considered references from three previously published systematic reviews.

Search terms included combinations of the following words in English and Spanish: "training," "coaching," "instruction," "teacher," "staff," "caregiver," "professor," "personal," "academic," "individuals," "children," "behavioral skills training", "disruptive" "challenging", "aggressive", "school", and "behavior." The results were restricted to peer-reviewed articles published between 2004 and the date the search was conducted.

Inclusion and exclusion criteria

Quantitative, empirical studies were included in this review considering the following criteria: a) studies reporting teacher/staff training in ABA interventions; b) studies reporting student's behavioral outcomes as a secondary effect of teacher training; and c) training must include the four elements of BST (i.e., instruction, modeling, rehearsal, and feedback), the use of the exact phrase "behavioral skills training" was not necessary.

For the purposes of this systematic review, training was defined as any in-person or remote instruction, professional advisory, supervision, or coaching meant to improve teachers' behavioral skills.

Data extraction

Data was extracted using an electronic datasheet designed for the present review. The code sheet included the following areas: a) participant characteristics (teachers and students), b) experimental design, c) training content, d) training delivery method, d) assessment method, e) child outcome, and f) quality of the study.

Main outcome

We designated the main outcome as any change in student's PB that was a secondary effect of teacher training. Problem behavior will refer to either an excess or deficit of behavior (Martin & Pear, 2008; Miltenberger 2020). For example, authors may include PB which frequency or intensity is higher to what is expected (e.g., tantrums, fighting, aggression); on the other hand, authors could include behavior emitted under the expected level of proficiency (e.g., verbal behavior deficiency, lack of academic engagement). Measures in frequency, response rate, effect size, mean difference, and other measurements related to changes in student's PB were recorded.

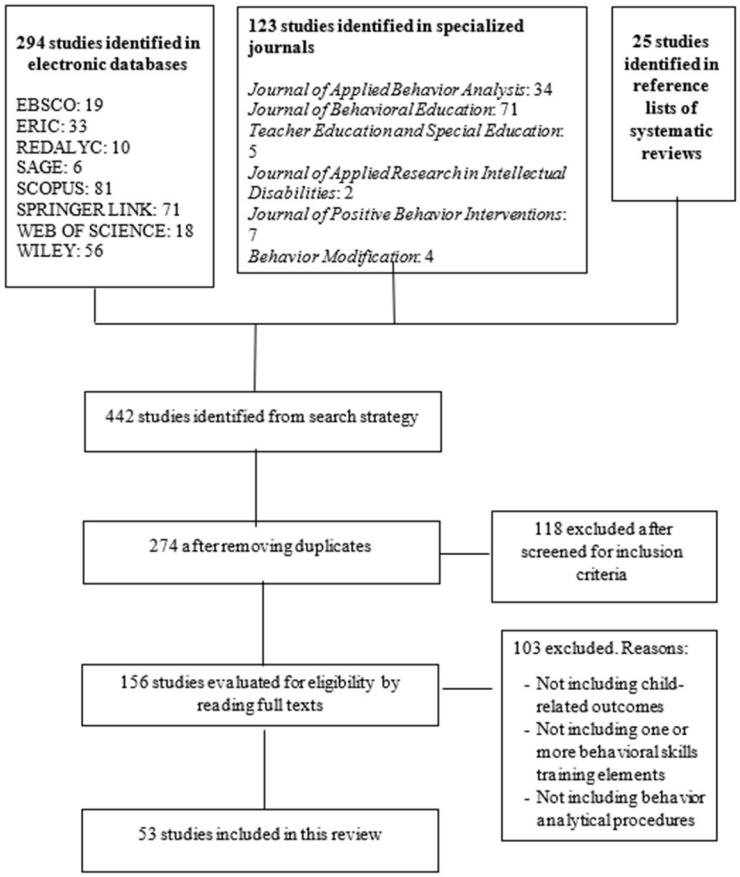
Screening process

Two independent coders (the first and third authors) performed the search and systematically entered the results in the pre-piloted datasheet. In total, 442 studies were identified. After duplicates were removed, the abstracts of 274 studies were independently evaluated by the same two coders using a piloted checklist.

Of the 274 studies, 118 were eliminated after screening, and 156 studies were evaluated for eligibility by reading the full texts. A total of 53 studies were included in the final selection; the PRISMA flowchart in Figure 1 presents the screening process.

Figure 1

Screening Process



Note. Of the 274 studies, 118 were eliminated after screening, and 156 studies were evaluated for eligibility by reading the full texts. A total of 53 studies were included in the final selection.

Inter rater agreement for inclusion

The lead author trained the third author to code the articles. Both coders reviewed and evaluated the studies according to the inclusion criteria, and inter-rater agreement was checked at two instances. First, during the title and abstract reading, inter-rater reliability was

calculated for 60% of the articles (n = 164); this resulted in 81% agreement between coders. For the remaining 19% both coders review the articles together to decide whether to include or to dismiss the article. Second, during full-text reading, inter-rater reliability was calculated for 60% of the articles (n = 95); this resulted in 82% agreement between coders. For the remaining 18% both coders review the articles together to decide whether to include or to dismiss the article.

Assessment of study quality

The Evaluative Method for Evaluating and Determining Evidence-Based Practices in Autism (EMEDEPA; Reichow, 2011; Reichow, Volkmar, & Cicchetti, 2008) was used to evaluate the quality (rigor) of research articles. Two rubrics provide a method for evaluating the quality of the methodological elements, and two levels of elements are included in the rubrics: primary and secondary quality indicators. The primary indicators are elements of research design deemed critical for demonstrating the validity of a study. Secondary indicators, although important, are not deemed necessary to establish study validity. Indicators are operationally defined on a dichotomous scale (evidence or no evidence).

A second instrument provides guidelines for synthesizing the rubric ratings into a research strength rating: Ratings are classified into three levels of research strength (i.e., strong, adequate, and weak). Research articles that meet the criteria for the strong level demonstrate high-quality, concrete evidence. Adequate articles show strong evidence in most areas, and weak articles have many missing elements and/or fatal flaws. The EMEDEPA provides rubrics for both group and single-case designs. Risk of bias did not affect the articles for inclusion.

Results

A total of 53 studies met the inclusion criteria for this review. Studies were published between the years 2004 and 2020 in 26 peer reviewed journals. Table 1 (see Appendix 1) summarizes the characteristics of each study. Characteristics are grouped according to participants, target behaviors, research designs, ABA-based procedures, and study quality.

Participant characteristics

Two types of participants are described in the included studies: teachers and students.

Teachers. The 53 studies included 911 teachers (94% were women). Most studies included general education teachers (88.6%), but some included teacher assistants, special education teachers, paraprofessionals, principals, and undergraduate preservice teachers. We will refer to all of them as teachers. Teaching experience of participants varied from less than one year to 30 years. Age ranged from 19 to 56 years.

Student. A total of 8,885 children and adolescents participated in the 53 studies. Ages varied from two to 18 years old, and they were enrolled in educational institutions (preschool, kindergarten, middle school, elementary school, and Head Start classrooms). Most participants had a developmental disorder, such as autism spectrum disorder, attention deficit/hyperactive disorder, learning disability, oppositional behavior, mental retardation, or displayed at least one problematic behavior such as physical or verbal PB, talking out of turn, engaging in off-task behavior, elopement, non-compliance, or any other PB that interfered with engagement in classroom activities or socially desirable behaviors.

Target behaviors

The target behaviors for student belonged to two general categories: behavior in need to decrease and behavior in need to increase. The first category includes behaviors such as talking out of turn; making unnecessary noise; physical aggression toward peers; running in hallways; non-compliance; being suspended; not staying in his/her seat; verbal aggression; physical aggression; tantrums; prolonged crying; taking objects without permission; stereotypies; work refusal; yelling; vocal outburst; hitting others with hands, feet, or head; spitting; biting; talking about things unrelated to classroom instruction; violation of rules; defiance; and bullying. The second category includes academic engagement (i.e., on-task behavior), compliance, raising hands silently and waiting for the turn to speak, following instructions, voluntary participation during class, assertive communication, and sharing objects.

Training content and delivery method

Topics of BST for teachers involved a variety of behavior analytic procedures and strategies; most frequent matters were functional behavioral assessment, behavior-specific praise delivery, prompt delivery, extinction, differential reinforcement, discrete trial teaching, errorless compliance training, token economy, trial-based functional analysis, functional communication training, Good Behavior Game,

reinforcement, Teacher vs. Student Game, stimulus control, response cost, and BST.

Even though all studies used the four BST components (i.e., instruction, modeling, rehearsal, and feedback) to train teachers, only seven studies explicitly reported the use of BST as a training model (Duncan, Dufrene, Sterling, & Tingstrom, 2013; Flynn & Lo, 2016; Gianoumis, Seiverling, & Sturmey, 2012; Ledford et al., 2017; Mahon, Gunning, Holloway, & Lydon, 2020; Smith & Higbee, 2020; Vargo, Heal, Epperley, & Kooistra, 2014); one investigation implemented the tell-show-do approach (Cook et al., 2017). The remaining studies implemented the four BST elements but did not label the training as such.

Regardless of whether authors labeled the use of BST or not, trainings were not equal; each study implemented BST components in different ways. Instruction was usually delivered synchronously, but duration varied widely. Trainers used direct instruction with the help of slides, videoconferencing, or printed manuals. Modeling was often implemented by trainers in both simulated and real situations; video modeling was also used so teachers could observe recordings featuring professionals implementing the procedures being taught. Rehearsal was most often conducted using role-playing, in which the trainer and trainee simulated a situation so the trainee could apply a procedure. On other occasions, teachers could practice in real situations under supervision and receive feedback on implementation. Feedback, as previous components, varied in duration, timing, and format. When possible, trainers provided immediate, direct feedback; in some cases, a feedback form was used to verify implementation accuracy or provide systematic feedback by considering core items according to each study.

Type of measures

Studies measured dependent variables for student as a secondary effect of teacher's BST by direct observation (69.8%) or through scales and questionnaires completed by teachers and educational staff (30.2%). When direct observation was used, the most common measurement instrument was momentary time sampling, but the Teacher-Child Interaction Direct Observation Scale was also utilized. When data were reported by staff, instruments included the Behavior and Emotional Screening System, the Behavioral Observation of Students in Schools, the Devereux Early Childhood Assessment, the Individualized Classroom Assessment Scoring System, the Adjustment Scales for Preschool Intervention, the Academic Compliance Probability Checklist, the Child Behavior Checklist-Teacher Report Form, the Caregiver-Teacher Report Form, the Sutter–Eyberg Student

Behavior Inventory-Revised, the Teacher Observation of Classroom Adaptation-Checklist, the Student Teacher–Classroom Interaction Observation, and the Mainstream Code for Instructional Structure and Student Academic Response. Studies also used subscales of the Preschool Mental Health Climate Scale (PMHCS), the Child Interaction subscale from the PMHCS, the School Observation Coding System, the Achenbach System of Empirically Based Assessment, the Missouri Assessment Program, and the Stanford Achievement Test-10th Edition.

Student outcomes

Problem behavior in students decreased as function of teachers BST. Results were reported in terms of effect size, mean difference, percentages, frequency, and response rate. Because of this methodological heterogeneity, outcomes among studies could not be compared in terms of amount of improvement by participant; instead, outcomes were grouped into three broad categories according to results reported by the authors: 1) effective, 2) not effective, or 3) mixed. The outcome was considered effective if increases or decreases were reported in target behavior, as intended. If outcomes were the opposite as intended (i.e., increases observed in a behavior intended to decrease or vice versa), the outcome was considered not effective. Finally, the outcome was mixed if the authors reported effective and not effective results for different participants in their study.

Almost all studies (98%) reported that the intervention was effective to improve students' outcomes after teachers BST, only one study reported mixed results in which effectiveness to reduce of-task behavior was observed in three of the four students (D-DiGennaro, Martens, & McIntyre, 2005).

Study quality

According to the criteria provided by the EMEDEPA (Reichow, 2011; Reichow et al., 2008), most studies did not provide sufficient information on methodological procedures to ensure high quality. Over one-third of studies (38%) met the criteria for weak evidence, 36% for adequate evidence, and 26% for strong evidence.

Discussion

This systematic review provides a synthesis on the current published empirical research concerning the effects of teacher's BST on students' behavior. Results add to the literature supporting BST as an evidence-based method to improve student behavior; most studies reported

improvement on target behavior, with only one reporting a mixed result (effective for three of the four participants). We cannot attribute the non-effective result to a specific cause, and that would be beyond the purpose of this review, but future research may focus on investigating the possible variables associated with undesirable outcomes.

Our results are similar to the findings of Kirkpatrick et al. (2019) about the effectiveness of teachers BST to improve target behavior in students, both reviews included studies that implemented the four components of BST, even if authors did not label it as such. This is relevant due to the great number of studies that implement the same strategies using different terms.

Similar to Brock et al. (2017), we identified that some BST components were used more often than others (modeling and performance feedback), but whether labeled as BST or not, all studies included the use of the four BST training components to some extent. However, the procedures varied widely in terms of timing, duration, format, and use of materials. In other words, in each study, the training components were tailored according to the context of their interventions. This adaptability brings both advantages and disadvantages to researchers. On the one hand, a flexible model allows for interventions in many settings and contexts that differ in terms of resource availability, which thus facilitates treatment accessibility. On the other hand, this procedural diversity might generate confusion among researchers. When authors indicate they are using the BST, readers have a clear idea of the fundamental process of this intervention; however, as observed through this review, authors do not consistently use the term "BST," instead opting for other terms (e.g., "training with coaching"). This may lead readers to assume the authors are referring to different models, but by analyzing the procedure in detail, it becomes evident the same four components are being used.

A clear example of the aforementioned confusion is the tell-show-do approach, implemented by Cook et al. (2017). Even though it appears to be a three-component model, it actually consists of (as reported by the authors): 1) teaching the strategy (i.e., tell); 2) modeling the strategy for trainees (i.e., show); and 3) giving the trainees opportunities to practice and receive performance-based feedback (i.e., do). Thus, the four components of the BST were included.

A possible solution to provide some certainty about the use of the BST model is to encourage consensus among researchers about the strategies implemented to train individuals. Using the term "BST" to refer to the use of instruction, modeling, rehearsal, and feedback could provide better understanding among researchers and practitioners and facilitate knowledge generation. However, this might be difficult as

science continues to grow and becomes more specialized. Further, the BST components (together or partially) have been used effectively before being labeled as such, so name consistency may not be all that important when it comes to success.

It has been well established that behavioral interventions are effective in improving student's behavior; unfortunately, these interventions are not available to everyone, especially in developing countries as Mexico where very few people have access to these services for different reasons: 1) the incipient research in this area; 2) the lack of health policies that derive in no institutions to respond to citizenship treatment needs; 3) ABA interventions are usually one-to-one, what makes them costly and time consuming; and 4) the very few existing services are provided at urban areas so people in remote areas struggle to travel to cities to receive treatment. In such context it is of great relevance to disseminate and promote the implementation of teacher's BST as a strategy to deal with some of these access barriers since, in comparison to one-to-one interventions, training teachers entails an inclusive and culturally responsive strategy to reach a greater number of students.

The results of this systematic review could lead to implications regarding decision making to benefit both student and teachers. The identification of effective training methods could potentially increase better outcomes in student at school settings. Future research should analyze the variables of each training component related to better results in student and teachers. This could help the dissemination of efficient trainings oriented to improve student's behavior. Specially, in developing countries as Mexico,

We identified several limitations in this review. First, in the aim of include most of studies that implemented the BST components, we select a variety of search terms that resulted in some studies focused not only on behavioral analytic procedures but also on other approaches to PB or in intervention using strategies other than just the ones based on ABA. In consequence, it would be inappropriate to affirm that results are function exclusively of BST. Future studies should consider include only search terms that directly reflect the conceptual framework of ABA. This will provide more precise data and produce more complex analyses.

Second, this review did not consider inclusion criteria regarding the type of experimental design of studies. This originated a wide scope of designs that leaves more research questions to future research. Potential reviews should consider specific research designs to better understand results.

An issue that deserves more attention by authors is to provide as much information as possible in their studies regarding demographic data for the participants as well as detail on the training procedures, this would help clarify information for the readers.

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Appendix 1

Table 1
Study Characteristics

Author	Journal	Target behavior	Research design	Training content	Outcome	Study quality
Aasheim, et al. (2020)	SAGE Open	1. Talking out of turn and making unnecessary nonverbal noise. 2. Physical aggression toward other students. 3. Running in hallways.	Quasi-experimental pre–post	Incredible Years Teacher Classroom Management (IY TCM) program	Effective	Strong
Allday et al. (2012)	Behavioral Disorders	On-task and off-task behavior	Modified multiple baseline design across subjects and settings	Behavior-specific praise	Effective	Adequate
Alperin et al. (2020)	Clinical Case Studies	Academic engagement, (i.e., on-task behavior), inappropriate physical behavior, inappropriate verbal behavior, noncompliance, and disruptive academic behavior	Case study	Antecedent modification strategies; token economy; and say, show, check model	Effective	Adequate
Budd et al. (2016)	School Mental Health	Behavioral concerns (Devereux Early Childhood Assessment)	Case study	Conceptual basis for Teacher–Child Interaction Training (TCIT); PRIDE procedure. Teachers also learned to reduce unnecessary questions and commands, selectively ignore inappropriate behavior, and refrain from negative talk. "Sit & Watch" procedure.	Effective	Strong
Burke et al. (2011)	Journal of Education for Students Placed at Risk.	Student engagement during academic lessons (the percentage of students who were observed to be on-task during an academic lesson), out-of-school suspension rates (Student-level out-of-school suspension events reported to the school district throughout the entire school year), and report card grades (teacher-assigned grades from each student report card at the first through fourth quarter of the school year as a dependent measure of academic performance)	Posttest-only, quasi-experimental	Establishing clear classroom expectations for student behavior; using prompts and cues to help students be successful; providing verbal reinforcement for student prosocial behavior and academic performance; and utilizing effective methods for correcting student misbehavior. Additional training for administrators included ways to increase implementation of a schoolwide social skills curriculum, intervene with disruptive students, and use data to support building wide change	Effective	Strong
Carter and Van Norman (2010)	Early Childhood Educ Journal	Academic engagement (percentage of intervals in which students are academically engaged)	Single-case multiple-baseline design across classrooms	Three key areas of Positive Behavior Support in the classroom: Creating a consistent and predictable environment, implementing effective and efficient transitions, and acknowledging appropriate behavior	Effective	Adequate
Conklin et al. (2017)	Journal of Behavioral Education	Five class-wide and individual student behaviors: on-task, compliance, hand-raising, out-of-seat, and talking out	ABAB reversal design	1. Teach students replacement behaviors for inappropriate behaviors. 2. Reduce attention to inappropriate behaviors through planned ignoring. 3. Differential reinforcement.	Effective	Strong

Table 1 (continuation)
Study Characteristics

Author	Journal	Target behavior	Research design	Training content	Outcome	Study quality
Conners-Burrow et al. (2017)	Early Childhood Education Journal	Three categories: verbal aggression, physical aggression. and other disruptive behavior (e.g., tantrum, prolonged crying)	One-group, pretest–posttest design	Daily schedule, routines, and transitions and support for social–emotional development, notice and describe appropriate behavior, classroom rules Examine room arrangement and scheduling influences on children's learning and behavior.	Effective	Weak
Conroy et al. (2013)	Journal of Positive Behavior Interventions	Disruption, aggression, defiance, and engagement	Descriptive nonexperimental design	Eight learning modules: (a) basics of behavior and development; (b) rules, expectations, and routines; (c) behavior support plan (BSP); (d) precorrection and active supervision; (e) opportunities to respond and instructional pacing; (f) instructive and corrective feedback; (g) home–school communication; and (h) linking and mastery	Effective	Adequate
Cook et al. (2017)	Journal of Positive Behavior Interventions	Academic engaged time (instances when the student was paying attention to instruction by looking at the teacher or speaker or working on the academic task at hand) and disruptive behavior (defined as behaviors unrelated to the task at hand and were disruptive to learning or the classroom environment)	Quasi-experimental randomized block design	Classroom management and universal prevention practices. Specific praise, approval statements, and positive nonverbal gestures	Effective	Strong
Corsi et al. (2009)	Acta Colombiana de Psicología	Disruptive and prosocial behavior	ABAB Single case design	Instruction, verbal praise and token economy	Effective	Strong
Cuenca et al. (2017)		Agresive and prosocial behavior.	ABA quasi-experimental design	Behavior recording, token economy, extinction, alternative response and following instructions.	Effective	Weak
Dib and Sturmey (2007)	Journal of Applied Behavior Analysis	Stereotypy including inappropriate vocalizations (e.g., screaming, talking, singing, or laughing out of context) and repetitive body movements (e.g., arm flapping, finger wiggling, leg lifting, and rocking)	Multiple baseline design across teacher–student dyads	Discrete trial teaching	Effective	Weak
D-DiGennaro et al. (2005)	School Psychology Review	Off-task behavior for Students B and D, off-task verbal behavior for Student A, and off-task motor behavior for Student C	Multiple-baseline design across consultation dyads	12-step intervention plan and praise delivery	Mixed	Weak
DiGennaro et al. (2007)	Journal of Applied Behavior Analysis	Off-task behavior, work refusal, and disruptive verbalizations	Multiple baseline design across the four dyads	Function-based treatment packages to address student problem behavior (differential negative reinforcement of alternative behaviors and differential reinforcement of alternative behaviors)	Effective	Weak

Table 1 (continuation)
Study Characteristics

Author	Journal	Target behavior	Research design	Training content	Outcome	Study quality
Downer et al. (2018)	School Mental Health	Positive and negative engagement with teachers, peers, and learning activities	Randomized controlled trial	Evidence-based strategies to improve classroom engagement (e.g., modifying transitions and routines, modifying activities and environments, teacher–child relationship building, improving teacher-to-teacher consistency, reinforcement, effective commands, consequences, supporting emotion regulation)	Effective	Weak
Ducharme and Ng (2012)	Behavior Modification	Student compliance and on-task/off-task behavior	Multiple baselines across subjects	Errorless compliance training	Effective	Weak
Dufrene et al. (2012)	Journal of Educational and Psychological Consultation	Disruptive classroom behavior, including noncompliance, yelling, being out-of-area, and aggression	Nonconcurrent multiple baseline design across participants	Use of praise and effective instruction delivery	Effective	Adequate
Dufrene et al. (2014)	Psychology in the Schools	Disruptive classroom behavior was a response class that included noncompliance, yelling, out-of-seat, and being off-task	Multiple baseline design across classrooms	Behavior-specific praise, implementation of the token economy and level system, and implementation of function-based supports	Effective	Adequate
Duncan et al. (2013)	Journal of Behavioral Education	Being off-task, inappropriate vocalizations, and being out of seat/area	ABAB multiple baseline across participants design	Specific labeled praise	Effective	Weak
Eaves et al. (2021)	Journal of Behavioral Education	Academically engaging or disruptive	Alternating treatment design with initial baseline phase	Behavior specific praise and performance feedback	Effective	Weak
Fawley et al. (2020)	Journal of Behavioral Education	Yelling, destructive behavior, and aggressive behavior, and social and behavioral competence	Concurrent multiple baseline design across two classrooms	Principles of learning and behavior management in the classroom to increase positive interactions and reduce problem behaviors in young children: overview of TCIT and the skills for increasing positive attention for appropriate child behavior	Effective	Adequate
Filcheck et al. 2004	Psychology in the Schools	Inappropriate behavior and disruptive behaviors	ABACC treatment comparison design	The level system	Effective	Weak
Flynn and Lo (2016)	Journal of behavioral education	Challenging behavior (i.e., vocal outbursts, utterances above conversational level, elopement, giggling, and self-stimulation) and replacement behavior	Delayed multiple baseline across students design	Trial-based functional analysis and differential reinforcement of alternative behavior	Effective	Strong
Fullerton et al. (2009)	Behavorial Disorders	Noncompliance, aggression, and disruption	Multiple-baseline across-participants design	Use of specific praise statements: (a) definition of appropriate and problem behaviors demonstrated by the target child, (b) explanation of how to use specific praise statements to increase appropriate behavior and decrease problem behavior, and (c) examples of specific and nonspecific praise statements	Effective	Weak

Table 1 (continuation)
Study Characteristics

Author	Journal	Target behavior	Research design	Training content	Outcome	Study quality
Garbacz et al. (2014)	Behavioral Interventions	Protective factors and behavioral concerns	Quasi-experimental pre-post.	Positive attention skills, giving effective commands, skills to praise delivery, behavior management strategies	Effective	Weak
Gianoumis et al. (2012)	Behavioral Interventions	Child maladaptive behavior: crying, screaming, lying on the floor, attempting to leave teaching area beyond one meter from the teacher, and any aggressive behaviors, (e.g., hitting the teacher with hands, feet, or head; spitting; or biting), any non-contextual vocalizations or repeating the teacher inappropriately	Multiple baseline design	Performing a stimulus preference assessment and conducting a neuro-linguistic programming teaching session	Effective	Adequate
Gibson et al. (2010)	Topics in Early Childhood Special Education	Elopement	ABAB design	Functional communication training and responding to elopement	Effective	Weak
Groves and Austin (2017)	Journal Of Applied Behavior Analysis	Verbal disruptions, inappropriate sitting, and off-task behaviors for all children	Alternating treatments design with a pretreatment baseline	Good behavior game	Effective	Weak
Hagermoser et al. (2017)	Journal of Positive Behavior Interventions	Disruptive behavior (e.g., being out of seat, fidgeting, playing with objects, acting aggressively, talking/yelling about things that are unrelated to classroom instruction)	Randomized multiple treatment embedded within a multiple baseline design across participants	Evidence-based classroom management practices: (a) maximizing structure and predictability (e.g., physical layout facilitates engagement, defining and teaching classroom routines), (b) establishing and teaching expectations (e.g., positively stated expectations; teaching/posting behavior expectations), (c) engaging students in observable ways (e.g., opportunities to respond, direct instruction), (d) using a continuum of strategies to recognize appropriate behaviors (e.g., behavior-specific praise), and (e) using a continuum of strategies to respond to inappropriate behaviors (e.g., brief corrections for inappropriate behavior differential reinforcement)	Effective	Strong
Han et al. (2005)	Journal of Abnormal Child Psychology	Social skills and behavior problems	No-treatment comparison group	(a) Understanding the reasons for children's behavior (i.e., what factors are reinforcing the behavior); (b) establishing effective classroom expectations and structure; (c) importance of and techniques for reinforcement of students' positive behavior; (d) use of consistent, fair, and effective discipline; (e) adaptive communication skills; (f) home-school communication; and (g) modeling adaptive problem-solving in naturally occurring situations	Effective	Adequate

Table 1 (continuation)
Study Characteristics

Author	Journal	Target behavior	Research design	Training content	Outcome	Study quality
Hemmeter et al. (2011)	Early Childhood Research Quarterly	Child engagement and challenging behavior	Multiple probe single-subject experimental design across four preschool teachers	Descriptive praise statements to comment on children's positive behavior	Effective	Strong
Hoff and Ervin (2012)	Psychology in the Schools	Disruptive behavior was defined as the violation of rules, defiance, classroom disruption (behavior that interfered with an ongoing activity, such as throwing an object into the air or talking out loud in class without permission), yelling, aggressive interactions, and passive off-task behavior	Multiple baseline across subjects design	Self-management strategies in the classroom	Effective	Weak
Ishii et al. (2020)	International Journal of Environmental Research and Public Health	Behaviors or emotional problems observed in the school environment	Treatment-delayed comparison group	Developmental disabilities, behavior observation, positive attention, clear instructions, environmental settings, praise	Effective	Adequate
Joslyn et al. (2020)	Journal of Behavioral Education	Talking out (e.g., swearing, yelling, making inappropriate comments or threats, whispering) and talking to other students as long as it could be heard by the data collectors	Nonconcurrent multiple-baseline across classrooms, with an embedded reversal in Classrooms 1 and 2	Rules of the Good Behavior Game	Effective	Adequate
Kirkhaug et al. 2016	BMC Psychiatry	Externalizing problems, social skills, internalizing problems, and closeness with the teacher	Quasi-experimental pre-post	Building positive relationships with students and being a proactive teacher; teacher attention, coaching, encouragement and praise; motivating students through incentives; decreasing inappropriate behavior by ignoring and redirecting; decreasing inappropriate behavior, following through with consequences; and emotional regulation, social skills, and problem-solving	Effective	Strong
Knowles et al. (2016)	Preventing School Failure: Alternative Education for Children and Youth	Challenging child behavior (i.e., leaving the assigned area without teacher permission, verbal refusal, property damage, and vocalized disruptions such as grunting and yelling)	Concurrent multiple baseline design across teacher behaviors	Behavior-specific praise	Effective	Adequate
LaBrot et al. (2020)	Journal of Behavioral Education	Appropriately engaged behavior and disruptive behavior	Non-concurrent multiple baseline design	Behavior-specific praise	Effective	Strong
Lastrapes et al. (2018)	Journal of Behavioral Education	Students' off-task behaviors	Nonconcurrent multiple baseline across participants design	Teacher vs. Students Game	Effective	Weak
Ledford et al. (2017)	Journal of Behavioral Education	Number of targeted social interactions, number of total social interactions, and percentage of intervals of engagement	Multiple probe across participants	Instructional behaviors	Effective	Adequate
Mahon et al. (2020)	Journal of Positive Behavior Interventions	Frequency counts of social skills, momentary time sampling of on-task behavior, and frequency counts of problem behavior	Multiple-baseline design across groups	Skills training, group contingencies, and reinforcement to address problem behavior in classrooms	Effective	Adequate

Table 1 (continuation)
Study Characteristics

Author	Journal	Target behavior	Research design	Training content	Outcome	Study quality
Matheson and Shriver (2005)	School Psychology Review	Compliance: Percentage of student compliance to all teacher commands and academic behaviors. Percentage of time during an observation period that the student was engaged in academic behaviors including academic task management activities. Competing behaviors (i.e., aggressive behaviors; disruptive behaviors such as yelling, crying, loud talk, and destruction of materials; inappropriate verbal behavior including laughter and talk about recess or lunch; looking away from the academic task; noncompliance to the teacher's directive or a standing class rule; self-stimulating behaviors; and self-abusive behaviors)	Multiple baseline-across participants	Delivery of effective commands and use of effective commands combined with verbal praise	Effective	Adequate
Mendoza et al. (2015)	Acta de Investigación Psicológica	Bullying and disruptive behavior	Quasi-experimental with repeated measures	Strategies for behavior changing (stimulus control, response cost, alternative response training, anger control, group contingencies, task analysis, and monitoring.	Effective	Weak
Myers et al. (2011)	Education and Treatment of Children	Academic engagement, off-task behavior, disruptive behavior	Multiple baseline design across teachers	Positive behavior support	Effective	Adequate
O'Handley et al. (2018)	Journal of Behavioral Education	Student appropriately engaged behavior and student disruptive behavior	Multiple baseline design across three elementary teachers	Evidence-based classroom management strategies such as BSP	Effective	Weak
Reinke et al. (2008)	School Psychology Review	Occurrences of student disruptive behavior (e.g., talking out during instruction, any behavior reprimanded by the teacher, questions or comments unrelated to the task, hitting or poking a peer, fighting, noises or actions that clearly distracted classroom peers)	Single-case multiple baseline across classrooms	Classroom management strategies, including increased use of praise, use of behavior-specific praise	Effective	Strong
Reinke et al. (2014)	Journal of Emotional and Behavioral Disorders	Disruptive behavior	Large-scale group randomized trial	The IY TCM content includes strategies for increasing proactive teaching, praise and encouragement, incentives, problem-solving, and other strategies for increasing social competence and decreasing problem behavior	Effective	Strong
Sinclair et al. (2021)	Remedial and Special Education	Disruptive behavior, concentration problems, emotional regulation, prosocial behaviors, and academic outcomes	Large-group randomized controlled trial	(a) developing a vision, (b) organizing and structuring the classroom, (c) teaching expectations, (d) using proactive teaching, (e) supporting student motivation, (f) using data to make decisions, and (g) providing effective corrections	Effective	Strong

Table 1 (continuation)
Study Characteristics

Author	Journal	Target behavior	Research design	Training content	Outcome	Study quality
Smith and Higbee (2020)	Journal of Behavioral Education	Amount of time students took to transition from recess to the classroom, as measured by the duration of the transition	Non-concurrent multiple baseline design across teachers	Behavioral skills training component, how to offer praise and corrective feedback	Effective	Adequate
Snyder et al. (2011)	Journal of Applied Developmental Psychology	Positive and negative social behavior	No treatment comparison group	Set of key classroom management skills, such as the use of positive attention, praise and tangible reinforcement, proactive prevention of problems, coaching, limit-setting, and timeout	Effective	Weak
Speight et al. (2020)	Journal of Positive Behavior Interventions	On-task behavior	Multiple-baseline across conditions	(a) Lessons and teaching scripts, (b) team seating arrangement, (c) identifying daily point goals and awarding points, (d) use of behavior-specific praise statements and reprimands, and (e) identification of rewards and allowing students to access rewards at the end of the game	Effective	Adequate
Stormont et al. (2007)	Journal of Behavioral Education	Problem behavior included off-task, oppositional, disruptive, aggressive, and other types of externalizing behavior. Specific problem behavior included (a) yelling (when it was not part of the activity), (b) spitting, (c) hitting, (d) teasing, (e) whining, (f) telling on another child, (g) taking materials from another child, (h) interrupting lessons by blurting out, (i) chewing on materials, (j) sticking tongue out at someone, (k) pretending toys were guns, (l) taking a turn prematurely, (m) waiting more than 5 s to comply with a teacher directive, and (n) engaging in off-task behavior	Multiple baseline design across teachers	(a) Use pre-corrective statements to orient students to the lesson before beginning the lesson and (b) increase rates of specific praise statements when students were following the behavioral expectations	Effective	Weak
Vargo et al. (2014)	Journal of	Rate of hand raises	Multiple baseline	Implement the	Effective	Adequate

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