

Inclusion

Inclusion Practices for Elementary Autistic Students: A Systematic Review

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Abstract

The number of autistic students educated in general education classrooms in the United States has increased over recent decades. To ensure meaningful participation and learning for this population, there is a critical need to identify evidence-based, inclusive practices. Through systematic review, the authors examine characteristics and methodological rigor of the current research base on inclusive practices for elementary school-aged autistic students. Findings highlight the dearth of research on evidence-based practices for fostering inclusion of elementary-aged autistic students in general education. Consistent with previous findings, the methodological rigor across studies varies greatly. Future research is needed defining inclusion, identifying evidence-based practices, and determining how to effectively implement evidence-based practices.

Inclusion Practices for Elementary Autistic Students: A Systematic Review

Autism spectrum disorder (ASD), a neurodevelopmental disorder characterized by social communication differences and restricted and repetitive behaviors, impacts approximately 1 in 36 individuals in the United States (U.S.; Maenner et al., 2023). During the 2021-2022 academic year, around 828,000 students in the U.S. between the ages 5- and 21-years-old received special education services under the educational classification of autism (U.S. Department of Education, 2023). During that year, nearly 41% of autistic students were educated in a general education environment for the majority of the school day (U.S. Department of Education, 2023).

Originally recognized as a distinct disability category in the 1990 amendments to the Individuals with Disabilities Education Act (IDEA), prevalence rates of autism have grown over the past several decades in large part due to research, advocacy efforts and broadening of diagnostic criteria. At the same time, the number of autistic students receiving some amount of instruction in general education settings has increased dramatically, similar to increases among students with other disabilities, such as emotional and behavioral disabilities and intellectual disability (Morningstar et al., 2017; Williamson et al., 2020).

In the U.S., access to general education for students with disabilities¹ is often used synonymously with the term educational “inclusion.” Under the IDEA, the assumption is that a student with disabilities will be educated in the general education environment as often as possible (IDEA, 2004; Yell et al., 2020). If the student is unable to be successful in that setting even with appropriate supplementary aids and services, the law requires education for students with disabilities to be provided in the least restrictive environment, or the environment closest to

¹ In the education literature and according to education-related legislation, autism is considered a 'disability' classification. Out of respect for potential differences in language preferences across disabilities, we say "students with disabilities" only when referring broadly to students with any IEP-related classification, but otherwise refer to autistic students as 'autistic' as is preferred by many autistic individuals.

the general education that the student can be successful with supplementary aids and services. Although the law does not include the term “inclusion,” it emphasizes the importance of access to the general education environment, general education peers, and meaningful progress in the general education curriculum (IDEA, 2004). Educators often assume they are practicing inclusion by integrating a student with disabilities with non-disabled peers for some portion of the school day or placing a student with disabilities in a general education classroom, often termed an “inclusion class.”

There is no commonly accepted definition of school inclusion (Finkelstein et al., 2021). The Council of Chief State School Officers (CCSSO; 2020) defined inclusive education as “a schoolwide culture and practice of valuing each student as a learner across general education classrooms rather than a particular program or place.” Inclusive practices, therefore, are the “strategies/behaviors that teachers use to ensure that students with diverse abilities can learn in regular classrooms” (Finkelstein et al., 2021, p. 4). Within an inclusive education model, districts and school personnel support students with disabilities in the general education environment using inclusive practices, including but not limited to: (a) accommodations and modifications, (b) curriculum adaptations, (c) individualized and intensive supports, and (d) collaborative teaming (Leifler et al., 2021; Ottley et al., 2023). According to Ottley and colleagues (2023), inclusion involves systems change, with a focus on building an identity of inclusion, leveraging supports, community resources, training and supporting personnel, and building system structures with a commitment to inclusion.

With increased emphasis on inclusion and inclusive practices for students with disabilities, including autism, there has also been an increased attention to evidence-based practices (EBPs; Hume et al., 2021; NAC, 2015; Steinbrenner et al., 2021). Numerous systematic

reviews have been conducted to identify EBPs across grade levels and disability classifications, including autism, but less focus has been placed on the setting in which the intervention was implemented. Olsson and Nilholm (2023) found that among 80 of the most-cited reviews of research on education interventions for autistic students, three explicitly addressed inclusion or examined general education to some degree. A 2019 review by Kuntz and Carter examining interventions for students with intellectual disability in inclusive secondary education classes included some autistic students ($n = 50$; 28% of total participants). The authors found five approaches (i.e., peer support, systematic instruction, self-management, peer-mediated communication, & placement changes from special education to general education) were effective across studies and learning domains. In addition, few studies addressed content area instruction or academic performance variables beyond academic engagement. There remains a lack of knowledge about whether EBPs primarily identified for autistic students can be successfully implemented in inclusive environments as well as how to effectively support autistic students to progress in the general education curriculum, more generally.

Three recent literature reviews have focused on examining the efficacy of inclusion and inclusive practices for autistic students in preschool through twelfth grade (Dean & Chang, 2021; Leifler et al., 2021; Mason et al., 2022). While these reviews covered a variety of interventions targeting social, behavioral, academic, and adaptive outcomes, they each defined inclusion differently. Definitions primarily focused on the amount of time autistic students spent in the general education environment or with general education peers. For example, Mason and colleagues included studies under five categories that focused on physical placement: (a) general education whole group; (b) general education small group; (c) pull-out with general education peers; (d) reverse inclusion, where general education peers went to a special education

classroom; or (e) specials. Also focusing on physical placement, Dean and Chang (2021) included studies where autistic students were in the general education environment or with general education peers for at least part of the day. Leifler and colleagues (2021) investigated inclusive practices as changes in the physical, pedagogical, and psychosocial learning environments to support autistic students, a definition aligned with some of the key factors identified by CCSSO (2020) and Ottley et al. (2023). Authors of all three reviews used What Works Clearinghouse (2013; 2020) standards for examining methodological quality. Some EBPs identified across reviews included peer-mediated interventions, antecedent based interventions, pivotal response treatment, video modeling/ prompting, and comprehensive manualized treatment models. Results of these reviews found research related to inclusion of autistic students varied in methodological rigor, consistency in methods, intervention types, outcomes examined, and definitions of inclusion (Dean & Chang, 2021; Leifler et al., 2021; Mason et al., 2022).

Notably, while past literature reviews on EBP in inclusive settings have been important in providing broad context, most reviews have included studies using one type of study design (i.e., group design or single case design) and that focus on a single outcome domain (e.g., behavioral, social, etc.). To have a comprehensive, exhaustive understanding of the current state of EBP promoting inclusion in autistic elementary-aged students in the U.S., it is important to consider all possible study designs [i.e., both group and single case design (SCD)] and outcomes across domains (e.g., behavioral, social, academic, etc.), rather than examining a single domain.

The National Clearinghouse on Autism Evidence and Practice conducted a review of single case and group design research from 1990-2017 to determine EBPs for autistic students, aged birth to 22 (Hume et al., 2021; Steinbrenner et al., 2021). The 2021 review was an update to earlier reviews (Odom et al., 2010; Wong et al., 2014) and evaluated focused interventions,

rather than evaluating comprehensive manualized treatment models such as TEACCH. Focused interventions are intended to address a single skill or goal (Steinbrenner et al., 2021). The research team identified 28 focused intervention EBPs from the review. In 2009 and 2015, the National Standards Project at the National Autism Center (NAC) also conducted an analysis of interventions for autistic students. Unlike the Steinbrenner et al. review, the NAC included an evaluation of interventions for autistic adults and included comprehensive treatment models. Both reviews were based on the organization's own evaluation criteria, which were built from prior recommendations for standards in the field (NAC, 2015; Steinbrenner, 2021). Results of their 2015 review included 14 EBPs for children and youth and one intervention for adults (NAC, 2015). There was considerable overlap between the reviews; 19 interventions were determined as EBPs or potential EBPs across the two reviews (<https://autismpdc.fpg.unc.edu/evidence-based-practices>). Both sets of researchers included studies conducted in clinical settings as well as home, hospital, community-based settings and schools, but there was not a focus on the efficacy of interventions in general education settings. Steinbrenner and colleagues acknowledged that 50% of interventions were conducted in education settings, but the majority of studies were in individual settings, with interventions implemented by researchers. The question remains on what inclusive, focused interventions will effectively support autistic students in the general education setting.

Given the lack of focus on how to effectively support autistic students in general education settings, it is important to investigate the quality and efficacy of interventions designed to support elementary level autistic students in general education settings. In this systematic review, we aimed to determine the status and methodological quality of existing quantitative and single case design research on inclusive practices (i.e., focused interventions) for autistic

students in U.S. elementary school, general education settings. To do so, we addressed the following research questions:

1. How do researchers define “inclusion” and “inclusive practices?”
2. What are the characteristics (e.g., participant characteristics, setting, intervention agent description, study design, independent and dependent variables) of the current research base on inclusive practices for elementary school-aged, autistic students?
3. To what extent did researchers address standards for special education research quality?
4. Which interventions could be considered “evidence-based practices?”

Method

Search Process

The review process was conducted by first and third authors, who are doctoral students in clinical psychology, and the fourth author, a professor of clinical psychology with expertise in autism, in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Page et al., 2021; Figure 1) guidelines. PsycInfo and ERIC electronic databases were searched in October of 2020 by the three independent reviewers with no automation tools to identify studies published in peer-reviewed journals from 2011-2020. We were interested in interventions studied in the last decade to reflect current research and practice. The following Boolean terms were used: “inclusion” OR “inclusive settings” OR “inclusive strategies” OR “inclusive interventions” AND “autism” OR “asd” OR “autism spectrum disorder” AND “school” OR “classroom.” Articles were originally restricted to publication years between 2011 and 2020, peer-reviewed articles, written in English, excluding dissertations. A search with the same keywords and databases was conducted in January 2023 to identify any

additional studies that were published after the initial search. The only modification to the second search was restricting the publication year to range from 2020 to 2022.

Eligibility Criteria

Articles retrieved from the initial search were included in the present review based on the following inclusion criteria: (a) at least one participant had either a clinical diagnosis or educational classification of autism, (b) at least one participant was between the ages of 5- and 12-years-old, (c) the study involved an intervention in elementary school classrooms described as an inclusive practice or implemented in an inclusive setting, (d) the study was conducted in the U.S., and (e) the study was published in a peer reviewed journal between the years of 2011 and 2022. Studies were excluded if they failed to meet any of the inclusion criteria, were off-topic, qualitative, were not conducted in an elementary school setting, or did not experimentally manipulate an independent variable (e.g., systematic reviews, meta-analysis, observational studies).

Selection Process

The selection process consisted of three steps conducted by the same three authors conducting the search process. First, the two doctoral students conducted a title screening, excluding articles with terms in the titles that clearly did not match the search criteria (e.g., genetic studies) or those deemed as irrelevant to the review aims (e.g., focused *only* on teacher outcomes). Any articles that were too ambiguous to exclude were retained for the next step of the review process. Next, articles accepted through the title review process were independently assessed in an abstract review using the same exclusion criteria. Finally, the full text of the remaining studies was assessed by the same two authors using the same exclusion criteria. Articles whose full text met all inclusion criteria are synthesized in the current review.

Articles for title and abstract review were divided and independently coded between the first and third authors. The fourth author then randomly selected 20% of the articles to code for inter-rater agreement. The inter-rater agreement was 93% for title review and 100% for abstract review. Disagreements were discussed until there was a consensus among all three raters. All articles in the full-text review were then independently coded by the two doctoral students who conducted the title and abstract review. Inter-rater agreement was 97% for the full-text review conducted in October 2020. Any discrepant codes were resolved by the third rater. Sixteen articles were included in this systematic review following the full-text review.

In the search conducted in January 2023, inter-rater agreement was calculated for all of the two independent raters' codes across the title, abstract, and full-text review. Inter-rater agreement was 94% for title review, 96% for abstract review, and 88% for full-text review. Discrepant codes were resolved by the fourth author. No additional articles met criteria.

Coding Categories for Characteristics

Each article was entered into a spreadsheet and coded for (a) participant characteristics (e.g., age, gender, diagnosis/identification), (b) setting, (c) intervention agents, (d) research design, (e) dependent variable(s), (f) independent variables, (g) study outcomes, and (h) definitions of inclusion and inclusive practices. Independent variables were then classified as either evidence-based or not evidence-based in accordance with the second phase of the National Standards Project (NAC, 2015) and the National Clearinghouse for Autism Evidence and Practice (Hume et al., 2021; Steinbrenner et al., 2021).

Coding and Analysis of Study Quality

The methodological rigor of the included studies articles was assessed using the Council of Exceptional Children's (CEC) standards for identifying EBPs (Cook et al., 2015). There are

24 group design quality indicators (QIs) and 22 SCD QIs in the areas of Context and Setting, Participants, Intervention Agents, Description of Practice, Implementation Fidelity, Internal Validity, Outcome Measures/Dependent Variables, and Data Analysis. Descriptions of QIs are presented in the results section to provide context for each area of assessment.

For each QI, relevant components of each study were entered into a spreadsheet. Then, each study was independently assessed for QIs by the first and third authors. If the study substantially reflected the required components of a QI, the reviewer entered a “1.” If the study did not substantially report evidence of the QI component, the reviewer entered a “0.” No partial credit was assigned for any QI. For example, for the participant demographics QI (2.1), we looked for evidence of age or grade, gender, and race/ethnicity as minimally required components. If a study had just one of those components, a “0” would be entered. The second author, a special education professor, conducted a reliability check of 10 randomly selected articles. Initial reliability was 94%; disagreements were discussed amongst authors and adjusted based on consensus.

Results

In this systematic review, we analyzed the study characteristics and QI components of 16 studies that met criteria for inclusion. Studies were published in eight of the 12 years examined as part of this review (i.e., from 2011-2022). Nine of the 16 included articles investigating inclusive practices for elementary autistic students were published in the years 2012 and 2013. Fewer articles were published in the most recent five years ($n = 3$), and no articles on the topic were published in 2020-2022. An average of 1.33 articles were published per year during this decade. In the sections that follow, we discuss the results of the systematic review by research question and study component. For conciseness, we report results of the second research

question describing study characteristics together with results of the third research question on methodological quality. For example, we describe the participant characteristics, followed by the quality of describing the participant characteristics, as defined by Cook et al. (2015) QIs for research in special education. There were a total of 12 SCD and four group design studies. Characteristics of the studies are presented in Tables 1 and 2. Tables 3 and 4 include results of the QI assessment, representing SCD and group design, respectively.

Definitions of Inclusion and Inclusive Practices

To analyze definitions of inclusion and inclusive practices, we reviewed whether authors provided an explicit definition of inclusion or inclusive practices or described practices aligned with definitions by CCSSO (2020), Finkelstein et al. (2021), Leifler et al., (2021), and Ottley et al., (2023). Of the reviewed studies, only Sainato et al. (2015) included a definition of inclusion:

Inclusive kindergarten programs must allow for social participation, the support of children's academic growth, and access to the general education curriculum as well as foster successful participation in assessment in preparation for first grade... Inclusive classrooms provide direct access to general education curricula and promote the development of social competency (p. 211).

Authors of 11 studies (69%) did not explicitly define inclusion, but used the terms “inclusive settings” or “inclusion” interchangeably with general education placement or alluded to placement in a general education classroom/setting as being an inclusive setting. For example, Strain et al. (2011) described general education as an inclusive setting, stating, “In addition, in order to evaluate the feasibility of [Prevent-Teach-Reinforce] implementation to support inclusive educational opportunities, the model was tested in general education classrooms” (p. 161). Three studies described inclusive settings as placement on the playground with

neurotypical peers and one study alluded to a lunchtime club that included neurotypical peers as being an inclusive setting. Brock et al. (2018) described autistic students sharing a recess with non-autistic students, and Locke et al. (2019) described autistic students as being physically placed in the general education setting for at least 80% of the day, “to ensure they had consistent access to general education peers” (p. 4), but neither explicitly spoke about inclusion or inclusive settings. Banda et al. (2019) discussed an autistic student’s placement in general education with “inclusion support from a special education teacher” (p. 105), but did not define “inclusion support.”

Of the authors who alluded to inclusion being placement in general education classrooms, most described inclusion/inclusive practices through the *amount of time* an autistic student was in the general education classroom. Time in general education, however, varied. Authors of three studies described inclusion as “fully included in the setting,” (Koegel, Kuriakose et al., 2012; Koegel, Vernon et al., 2012; Robinson, 2011), whereas the participant in Rosenbloom et al. (2016) was described to be included in the general education classroom “for the majority of the day.” Other authors described (a) participating in at least one content area class per day (Knight et al., 2018), (b) at least two academic core areas (Courtade et al., 2013), (c) at least 75% of the school day (Feldman & Matos, 2013), or (d) at least 80% of the school day (Locke et al., 2019).

Participants

We examined the body of research to identify the total number of student participants and number of participants with autism, the grade levels, gender, and race/ethnic background. In some studies, teachers or paraprofessionals were also “participants”, due to a central training component in the study. However, these participants also acted as intervention agents and for the purpose of this review, their characteristics are reported *only* under “Intervention Agents,” even

if their behaviors were measured as additional dependent variables in the original study. The following characteristics refer only to student participants (See Table 1).

A total of 164 student participants were included across the 16 studies. Of those, 161 (98%) were participants educationally identified or clinically diagnosed with autism. Other participants included three students with intellectual disability. Study participants spanned Kindergarten through sixth grade and several studies included participants from multiple grade levels. Authors of two studies did not report grade levels of participants.

All 16 studies reported gender of participants, which included 137 (84%) boys and 27 (16%) girls. Authors of 12 studies representing 149 participants reported racial/ethnic background of participants. Across studies, participants included 106 (71%) White students, 16 (11%) Black, 14 (9%) Hispanic or Latino, four (3%) Asian, and nine (6%) reported as multi-racial or “other.”

Study authors varied in reporting identification of autism among participants. Authors of eight studies included participants with a clinical diagnosis, whereas authors of four studies included participants with educational identification of autism. Authors of four studies did not report the source of identification. Researchers also varied in reporting of determination or confirmation of autism among participants. Across the 16 studies, authors of five studies confirmed diagnoses of autism through record review. Authors of two studies confirmed diagnosis through professional expert confirmation, whereas authors of nine studies did not report confirmation of autism diagnosis/identification.

Quality indicators for participants include QI 2.1 (the study describes participant demographics) and QI 2.2 (the study describes disability or risk status of the participants and method for determining status) (Cook et al., 2015). Eight of 12 (67%) SCD studies met QI 2.1,

six (50%) met QI 2.2, and all four (100%) group design studies met QI 2.1 and QI 2.2 (see Tables 3 and 4).

Settings

We examined the settings by physical location of the intervention within the school (e.g., classroom, recess, etc.), geographic location, and density of the community (i.e., rural, suburban, urban). Nine studies were conducted in general education classrooms in public elementary schools, whereas seven were conducted during elementary school lunch and/or recess. Robinson (2011) reported the study took place in the “natural environment of the school,” which included the classroom and playground. Sainato et al. (2015) was conducted in model inclusive Kindergarten classrooms. Feldman and Matos (2013) did not explicitly report the physical location of the intervention but reported that “all probes taken during school activities in which social interactions among children were encouraged (e.g., recess)” (p. 171).

Authors of 10 studies reported the geographic region of the U.S., representing the Midwest ($n = 4$), southwest ($n = 1$), southeast ($n = 2$), west coast ($n = 2$) and east coast ($n = 1$). Authors of nine studies reported density of the community, representing urban ($n = 7$), suburban ($n = 2$), and rural areas ($n = 2$). Two studies included participants in both rural and urban settings (Courtade et al., 2013; Radley et al., 2014). See Table 2 for settings across studies.

There is a single QI (Cook et al., 2015) for setting: 1.1 (the study provides sufficient information regarding the critical features of the context or setting). Seven of 12 (58%) SCD and three of the four (75%) group design studies met indicator QI 1.1 (see Tables 3 and 4).

Intervention Agents

We examined types of intervention agents and reported the total by teachers, paraprofessionals, graduate or undergraduate students, instructional specialists, and peers. Across

studies, over 150 intervention agents participated. Authors of one study did not report the number of intervention agents (Radley et al., 2014). Intervention agents included general education teachers ($n = 4$ studies), special education teachers ($n = 1$ study), paraprofessionals ($n = 9$ studies), trained graduate or undergraduate students ($n = 3$ studies), instructional specialists ($n = 1$ study), and non-autistic peers ($n = 2$ studies). Authors of two studies used teachers as intervention agents but did not specify if they were general education or special education teachers (Locke et al., 2019; Reeves et al., 2013). Strain et al. (2011) had additional members on their intervention team to assist in preliminary assessment and the design of the intervention (e.g., social worker, consultant, parent, etc.), who were not responsible for implementation of the intervention. Six studies involved a combination of intervention agents, and one study did not have an intervention agent, as the participant used a technology-based self-monitoring technique. The student went through a training prior to the start of the intervention with a researcher, and the intervention stage began once the student was able to independently respond to the self-monitoring application during 80% of the intervals (Rosenbloom et al., 2016).

QIs for intervention agent (Cook et al., 2015) include 3.1 (description of the critical features of the intervention agent) and 3.2 (description of the intervention agent training). Twelve (100%) SCD studies met 3.1, eight (67%) SCD studies met 3.2, and all four (100%) group design studies met both QIs for intervention agents (see Tables 3 and 4).

Implementation Fidelity

Implementation fidelity is a critical component of any intervention study and can be measured in several ways, including checklists or observations. Authors of 13 studies reported implementation fidelity; six of which included implementation fidelity as a primary dependent

variable because the focus of study aims were staff training (Courtade et al., 2013; Feldman & Matos, 2013; Knight et al., 2018; Kretzmann et al., 2015; Locke et al., 2019; Robinson, 2011).

Implementation fidelity QIs (Cook et al., 2015) include 5.1 (use direct, reliable measures to measure adherence), 5.2 (use direct, reliable measure to measure dosage or exposure), and 5.3 (assess and report fidelity throughout the intervention, for each intervention agent, setting, and participant or other unit of analysis). All three QIs for implementation fidelity were met by eight SCD studies and one group design study, for a total of nine (56%) of the total studies. Nine (75%) SCD studies and all four (100%) group design studies met indicator 5.1, eight (67%) SCD studies and two (50%) group design studies met indicator 5.2, and eight (67%) SCD studies and three (75%) group design studies met indicator 5.3.

Research Design and Internal Validity

We examined the research designs used across studies. Fundamental aspects of design are addressed within the *Internal Validity* QIs. Authors of 12 of the 16 studies employed a SCD, with sample sizes between one and four participants. Of those, authors of seven studies implemented a multiple baseline design, whereas authors of two studies employed a multiple baseline variation, multiple probe design. Reeves et al. (2013) also included reversal conditions within their multiple baseline design. Authors of two studies used an ABAB withdrawal design, and authors of one study used an AB design across three settings. Of the four group design studies, three were experimental and one was quasi-experimental (see Table 1).

Internal validity QIs (Cook et al., 2015) include 6.1 (addresses control and systematic manipulation of the independent variable), 6.2 (addresses description of baseline and control/comparison conditions), and 6.3 (involves limited to no access to the treatment intervention by control/baseline participants). Three *Internal Validity* QIs are specific to SCD

studies: there are three demonstrations of experimental effect at three times (6.5); three data points in the baseline phase and a pattern that predicts future performance (6.6), and a design that controls for threats to internal validity (6.7; Cook et al., 2015). Three QIs are focused on group design studies: addresses description of assignment to groups by either random assignment or non-random assignment where groups are matched (6.4), requires low attrition across groups (6.8), and addresses differential attrition (6.9).

Six (50%) SCD studies and no group design studies met all of the QIs for internal validity. Of the three QIs for both SCD and group design studies, 11 (92%) SCD and all four (100%) group design studies met indicator 6.1, all 12 (100%) SCD and three (75%) group design studies met indicator 6.2, and 11 (92%) SCD and three (75%) group design studies met indicator 6.3.

Of the 12 SCD studies, authors of nine (75%) SCD studies reported three demonstrations of effect at three different times (6.5). Authors of 10 (83%) SCD studies reported at least three data points in baseline, establishing a clear pattern of performance (6.6). One study included three baseline data points, but data were variable, without establishing a clear pattern (Rosenbloom et al., 2016). One study had only two data points in baseline (Robinson, 2011). Three (25%) SCD studies *did not* use commonly accepted designs to adequately control for internal validity threats (6.7; see Table 3).

Among the four studies using group design, all four (100%) met criteria for 6.4: three (75%) involved random assignment of participants to groups, whereas one study used rankings on a waitlist to recruit and assign participants. Authors of two studies (50%) reported low attrition across groups (6.8), and authors of only one study (25%) reported no differential attrition between groups (6.9; see Table 4).

Dependent Variables

Studies in this review focused primarily on behavioral and social outcomes, with two studies also examining academic outcomes (see Table 2). Researchers of some studies included multiple dependent variables relevant to one outcome domain (e.g., social, behavioral, etc.). For example, Brock et al. (2018) investigated quality of play and verbal and non-verbal interactions.

Five studies included examinations of behavioral outcomes, including on-task behavior or engagement with an academic task ($n = 4$) and off-task or disruptive/problem behavior ($n = 4$). Authors of three studies examined *both* on-task or academic task engagement and off-task or disruptive/problem behavior. Eight studies included examinations of social outcomes, including peer/social engagement or interactions ($n = 7$), verbal initiations/responses ($n = 3$), social network salience or social network inclusion ($n = 1$), quality of play/interaction or affect ($n = 3$), and changes in target social communication goals ($n = 1$). Authors of six studies examined multiple dependent variables related to social outcomes. Lastly, two studies focused on academic outcomes, including IQ and academic achievement ($n = 1$) and independent steps completed on a task analysis for a target academic skill ($n = 1$). Sainato et al. (2016) also measured language development and adaptive behavior.

Six studies focused on staff training and, therefore, also looked at implementation fidelity as a dependent variable (Courtade et al., 2013; Feldman & Matos, 2013; Knight et al., 2018; Kretzmann et al., 2015; Locke et al., 2019; Robinson, 2011). In considering the purpose of this review, only student-related dependent variables are included in Table 2.

The dependent variable QIs (Cook et al., 2015) include 7.1 (social importance), 7.2 (definition and description of measurement), 7.3 (effects intervention on all measures), 7.4 (frequency and timing of measures), and 7.5 (adequacy of internal reliability). An additional

quality indicator, 7.6 (evidence of validity) is included for evaluating group design studies. Eight (67%) SCD studies met all five indicators for dependent variables, and four (33%) SCD studies met four of five indicators for dependent variables (see Table 3). Among group design studies, half (50%) met all six indicators and half (50%) met five of six indicators (see Table 4). Ten (63%) of the total studies (i.e., SCD and group design) met all respective QIs for dependent variables.

Independent Variables

In this review, independent variables represented a range of practices; no single practice was present across a majority of studies. Interventions included: non-contingent attention ($n = 1$), Pivotal Response Training ($n = 4$), task analysis ($n = 2$), video prompting of academic skill ($n = 1$), clubs themed around child's special interest ($n = 1$), Remaking Recess ($n = 2$), a peer support intervention ($n = 1$), Superheroes Social Skills program ($n = 1$), function-based assessment ($n = 1$), I-Connect Self-Monitoring Intervention ($n = 1$), Model Kindergarten Classroom ($n = 1$), Prevent-Teach-Reinforce ($n = 1$; see Table 2).

Although four studies used Pivotal Response Training (PRT), Brock and colleagues (2018) examined practitioner-facilitated, peer-mediated PRT; Koegel, Kuriakose and colleagues (2012) examined the use of PRT strategies with peer initiation training; Feldman and Matos (2013) and Robinson (2011) focused on PRT training for paraprofessionals. Similarly, although two studies used Remaking Recess, Locke et al. (2019) used an adaptation of Remaking Recess (i.e., looking at a school-wide Remaking Recess with coaches) and Kretzmann et al. (2015) focused on Remaking Recess training for paraprofessionals. Across studies, PRT, Remaking Recess, clubs themed around child's special interest, Peer Support, and the Superheroes Social Skills interventions were used to target social outcomes and demonstrated positive outcomes.

Task analysis interventions, I-Connect Self-Monitoring, Prevent-Teach-Reinforce, and Noncontingent Attention were used to target behavioral outcomes. Two studies used task analyses: Courtade et al. (2013) focused on teacher training for implementation of task analyses during story/group reading, and Reeves et al. (2013) used function-based assessments to inform the creation of task analyses (i.e., function-based interventions). All studies targeting behavioral outcomes demonstrated positive outcomes. Courtade et al. (2013), however, saw improvement in academic engagement time for two out of three students. Although findings may be promising, three demonstrations of effect are needed in SCD to confidently assume positive outcomes. Lastly, video prompting (Knight et al., 2018) and the Model Kindergarten Classroom (Sainato et al., 2015) were used to target academic outcomes and reported positive outcomes.

Description of Practice QIs (Cook et al., 2015) include 4.1 (provides detailed intervention procedures) and 4.2 (description of study materials). All 12 (100%) SCD studies met both indicators for description of practice; all four (100%) group design studies met 4.1, and two (50%) group design studies met indicator 4.2. In total, 14 (88%) total studies (i.e., SCD and group design) met all QIs for description of practice (see Tables 3 and 4).

Data Analysis

Data analysis QIs are individualized by design (Cook et al., 2015). Two data analysis QIs for group design studies include 8.1 (appropriateness of data analysis techniques for comparing change in performance of two or more groups) and 8.3 (reporting effect sizes for all outcomes). All four (100%) group design studies met indicators 8.1 and 8.3. There is one QI for data analysis in SCD studies: 8.2 (addresses clear graphical representation of outcome data across all phases of the study for each unit of analysis). All 12 (100%) SCD studies met indicator 8.2. All 16 (100%) of the total studies (i.e., SCD and group design) met respective QIs for data analysis.

Evidence-Based Practices

To be considered an EBP, an intervention should have positive effects by either a minimum of five rigorous SCD studies with at least 20 participants or two (random assignment) to four (nonrandom assignment) rigorous group design studies with at least 60 participants (Cook et al., 2015). No studies met all of the QIs. However, all 16 studies met between 13 and 22 QIs (i.e., $\geq 50\%$ of indicators). No intervention type was represented by at least four methodologically sound group designs or five sound SCDs.

While no interventions in this review met Cook et al. (2015) criteria to be considered an EBP for autistic students in elementary school general education settings, some studies used existing EBPs in other contexts, as identified by NAC (2015) and Steinbrenner et al. (2021). Twelve of the 16 studies involved application of an existing EBP, including: (a) Pivotal Response Training ($n = 4$), (b) function-based intervention ($n = 3$), (c) video modeling ($n = 1$), (d) social skills training package ($n = 1$), (e) self-monitoring ($n = 1$), and (f) peer-mediated intervention ($n = 2$). The remaining studies did not involve a previously determined EBP for autistic elementary school students; however, authors reported components of an EBP were included in intervention packages. For example, one study (Sainato et al., 2015) involved an intervention package combining multiple EBPs: visual supports, naturalistic intervention, prompting, direct instruction, and reinforcement. Koegel, Vernon et al. (2012) used a commonly suggested strategy to enhance intervention effectiveness, which was to include focused interests. While components may have been present, there was insufficient information to determine whether the interventions were EBPs themselves, based on NAC (2015) or Steinbrenner et al. (2021). In addition, Courtade et al. (2013) used literacy strategies shown to be evidence-based

with other populations but have not yet been established as an EBP with autistic students in elementary general education settings.

Discussion

None of the interventions in this review met Cook et al. (2015) criteria to be considered an EBP for autistic students in elementary school general education settings. Notably, twelve of the sixteen studies in this review included interventions that have been established as EBPs in other contexts (e.g., Pivotal Response Training, Prevent-Teach-Reinforce, peer-mediated interventions, task analysis, and self-monitoring). It is possible that additional research on these EBPs could support their use as "inclusive practices" with autistic students in elementary general education settings. One additional rigorous study meeting QI criteria and with positive results would be sufficient for Pivotal Response Training ($n = 4$), while two additional studies would be sufficient for function-based intervention ($n = 3$; Cook et al., 2015).

Additional research on these interventions is necessary to determine the evidence base in inclusive elementary settings. In the past decade, few studies ($n = 16$) have been conducted in the U.S. for autistic elementary students in inclusive settings. Of the reviewed studies, 44% were published in the two years of 2012 and 2013. Further, 88% were single-case research designs, greatly restricting the total sample size. The paucity of research examining the effectiveness of inclusion practices is notable given the dramatic increase in autistic students being taught in general education classrooms (Morningstar et al., 2017; Williamson et al., 2020). This underscores the need for continued research on novel interventions and existing EBPs, including those identified in this review, to determine what interventions are effective for use with autistic students in inclusive settings.

All studies in this review were conducted in naturalistic educational environments in the U.S., primarily in urban, public elementary schools. This suggests that these interventions designed specifically for autistic students might be effectively delivered in general education settings. Findings from this review also suggest that these interventions can be delivered by a range of educational staff. Intervention agents were most often general education teachers or paraprofessionals. One hallmark of inclusive settings is collaborative teaming between general and special educators, yet the findings from this review suggest that there is generally an absence of collaborating intervention agents or an absence in the reporting of teaming that might have occurred. Only one study reported using general education *and* special education teachers as intervention agents. Our findings suggest that general educators, special educators, and paraprofessionals can effectively implement interventions for autistic students with generally high fidelity and ultimately lead to positive social and behavioral outcomes.

Implementation fidelity is critical to ensure that the intervention is being implemented consistently and as it is intended to be implemented over time and across intervention agents (Cook et al., 2015; Stahmer et al., 2015). About half of the studies implemented interventions with some degree of fidelity. Six studies were focused on training educational staff and, therefore, examined implementation fidelity as a dependent variable. These results suggest educators can implement interventions with proper training. Notably, some EBPs were adapted to a degree. It is important to consider both adaptations and implementation fidelity more broadly, as they may have implications for practice-based evidence. It is unclear to what degree an EBP needs to be implemented exactly as originally studied to be effective. In addition, as EBPs are adapted or particular components are used by practitioners, it is important to understand which components are salient. Data on the maintenance of the effects of

implementing EBPs across contexts and over time is also critical, which few studies in this review examined. These longitudinal data may provide a greater understanding into both the durability and the generalizability of the effects of various EBPs.

Reporting classification information and confirmation of that classification is also critical for replicability and generalizability in education research. Across all studies in the current review, 88% of students had an educational classification or clinical diagnosis of autism. Of the included studies, five studies confirmed diagnosis via record review and two studies confirmed diagnosis via expert confirmation. The authors of nine studies did not report confirmation of autism diagnosis/identification. In the U.S., where some state education agencies have classifications of autism that do not require a medical diagnosis, confirming diagnosis enhances the validity of diagnoses and/or educational classification and enables practitioners to determine whether the intervention might be useful for their students. Furthermore, considering the heterogeneity among autistic students, detailed diagnostic information may provide greater insight into who benefits from EBPs delivered in an inclusive setting (Mottron & Bzdok, 2020).

Another potential barrier to identifying inclusive practices is the lack of a generally accepted definition of inclusion or inclusive practices. In our review, only one study (Sainato et al., 2015) included a clear definition of inclusion. The majority of studies ($n=11$) described inclusion as a placement in general education. In addition, the duration a student spent in a general education setting considered to be “inclusive” varied drastically across reviewed studies. This finding is also consistent with previous literature (e.g., Mason et al., 2022). Time spent in the general education classroom may not be the most salient indicator of inclusion or inclusive practices. Students with disabilities who spend time in general education classrooms can still be isolated or segregated from activities with their neurotypical peers. Instead, it is critical that researchers

identify and investigate salient features of inclusive settings, which may include but are not limited to collaboration among general educators, special educators, and related service providers, a culture of belonging, specific supports and services being brought to or used by the student(s), and natural ratios of students with disabilities and students without disabilities to promote appropriate inclusive educational settings for autistic youth (CCSSO, 2020; Ottley et al., 2023). Understanding how these variables support or maintain the meaningful progress of an autistic student in the general education curriculum alongside peers without disabilities will help define “inclusive practices” and “inclusive settings.” Without additional research and a common understanding of the features, segregation and isolation of autistic students within the general education setting may persist.

Inclusion involves much more than physically integrating a student in a general education setting; however, nearly all of the studies examining interventions in the classroom setting focused on behavioral outcomes centering around compliance (e.g., staying on-task, reducing “disruptive behavior”). Only two studies focused on academic interventions (e.g., increasing percentage of correct steps in a task analysis for academic skills; improving “academic achievement”) for autistic students in general education classrooms. It remains unclear how meaningful compliance-based behaviors (e.g., academic engagement, “on-task” versus “off-task” behaviors) are for the academic success of students. In other words, it is not clear if many of the interventions are intended to optimize success in general education and foster inclusion or focus solely on optimizing the child’s ability to physically integrate into the general education classroom (e.g., increasing on-task behavior, decreasing disruptive behavior).

Similarly, studies examining the social outcomes of interventions were primarily conducted during lunch or recess, with the potential exception of Feldman and Matos (2013)

who did not explicitly report setting. As a result, the impact that these interventions have on the overall inclusive classroom environment is not yet clear. No studies in this review explored the generalization of social outcomes across other settings (e.g., classroom) or looked at outcomes across multiple domains (i.e., behavioral, social, academic). Although the majority of interventions (e.g., Pivotal Response Training, Remaking Recess, Superheroes Social Skills Program) were successful in ‘improving’ social outcomes, no study examined if these interventions or outcomes were socially valid according to the autistic students. There is a need to better understand what specific social outcomes are important, and how and in what context they are necessary to foster greater inclusion.

Lastly, the studies included in this review largely represent male (84%) and White (71%) children. Although seemingly disproportionate, these statistics are consistent with both the U.S. population of White individuals (75.5%; U.S. Census Bureau, 2023) and the ratio of autistic males to females (75%; 3:1 male to female; Loomes et al., 2017). Nonetheless, there is a critical need to capture these under-researched populations, as findings related to EBP in general education are likely biased toward a specific population (i.e., White males). Notably, in this review, demographic information was not consistently reported across studies and autism diagnostic information was not always reported or confirmed.

In summary, findings from this review suggest that EBPs established *in other contexts* may be generalizable to general education classrooms with autistic students, primarily in urban, public, elementary schools. These interventions can be implemented by educators and paraprofessionals with generally high fidelity. However, findings from this review also highlight the critical need for ongoing research on this topic. No interventions in this review met Cook et al. (2015) criteria to be considered an EBP for autistic students in elementary school general

education settings, there was a lack of reporting on collaboration between special and general educators as intervention agents, and a lack of data collected on the maintenance and generalizability of outcomes. Lastly, more research is needed examining the effectiveness of EBP on under-researched populations, such as females, children from marginalized backgrounds, schools in rural settings and non-public schools.

Limitations

There are several limitations to this systematic review. First, we did not include gray literature (e.g., dissertations, conference papers, etc.), which may have omitted potentially rigorous studies. We may have missed additional studies due to our chosen search terms and the use of two databases. It is possible that studies were filtered out early in the systematic review process due to not having key terms related to autism. Additionally, we did not conduct forward or backward searches of the included studies. Further, the limited number of studies of inclusive practices for autistic students in elementary schools in the U.S., the results of the review may not be generalizable to other settings or populations. In addition, we focused on identifying practices that were student-focused interventions delivered in inclusive settings. Other researchers might consider other elements of inclusive practices outside of interventions, such as staff training or inclusive classroom climate, which may have illuminated other results related to inclusion and inclusion-related outcomes. We included two sources of EBPs specific to autistic students, which may have prevented us from identifying additional EBPs classified by other organizations (e.g., National Center for Intensive Interventions, What Works Clearinghouse). In addition, restrictions on publication year in the inclusion criteria for this review may have precluded identification of EBPs being used to foster inclusive practices. In our data extraction and analysis, we did not code for diagnostic level of autism or support need. Therefore, it remains unknown whether these

interventions are effective for students with diverse learning needs related to their autism diagnosis. Finally, we used a binary system for determining whether a study met a single QI. That is, we did not give partial credit for meetings some portion of the QI; either the components were substantially present or they were not. Other researchers may use a Likert system where study components earn partial points for meeting a portion of a single QI requirements.

Implications and Future Directions

Continued research is needed to identify the most effective and efficient methods to support inclusion of autistic students in elementary school settings. It is clear that teachers and paraprofessionals are able to effectively implement EBPs when properly trained. In considering previous reports that teachers do not feel equipped to teach and support autistic students in general education settings (Finkelstein et al., 2021; Roberts & Simpson, 2015), it is important to continue a line of research on how to effectively and proactively provide educators with proper training and resources. Although peer-mediated interventions should not necessarily be used in place of proper teacher training, they may provide additional support to educators who must divide their attention and support between many students. Further research is needed to determine if non-autistic peers can meet the autistic students' support needs.

Further, findings that suggest certain interventions are effective for autistic students in general education classrooms do not necessarily generalize to all autistic students, including those with more intensive learning needs and those placed in special education classrooms. As mentioned, a limitation of the present review is that the support needs of autistic students were not coded for, and should be addressed in future studies. In addition, a major limitation in the general literature evaluating inclusive practices is that students are not able to ethically be randomized to different education placements. Although educational placements are not intended

to be fixed, fewer than 20% of students in a more restrictive placement transition to a less restrictive environment (White et al., 2007). There is a clear need for future research to examine what EBPs are effective in preparing students to effectively transition into less-restrictive environments, such as from a special education to general education classroom, and what EBPs are effective in preparing educators to support these students in the transition. Although outside the scope of this review, Radley et al. (2014) may provide a future model for supporting autistic students in the transition to a less restrictive environment. The intervention used in this study, the Superheroes Social Skills Program, was conducted in a vacant classroom with autistic and nominated non-autistic peers, but the outcomes related to this intervention were then examined during recess with non-autistic peers demonstrating that outcomes of an EBP used outside of the general education classroom may generalize to general education settings with proper support and training.

Lastly, it is essential that future research examines EBPs for inclusion in more diverse samples. As mentioned, the effectiveness of EBPs have been studied primarily in White males, and limited information is provided on setting details related to SES, geographic region/density, and the school/district. It is unclear if these EBP are effective for other populations, and consequently, if these populations are receiving adequate educational support.

Conclusion

Despite increased access to the general education environment by autistic students in the last decade, there continues to be a dearth of research on effective interventions for these settings. Furthermore, educators often claim their schools are “inclusive,” yet students with disabilities, including autistic students, are taught in one designated “inclusion” class. The field needs more research and guidance on what inclusion is, how to implement inclusive practices,

and how to effectively teach and support autistic students in these settings. This review revealed the potential for practitioners and peers to successfully deliver interventions to support behavioral and social outcomes. It is imperative that the focus turns to clearly defining inclusion and its features, exploring academic interventions, and replicating interventions found to be effective in the general education setting, to ensure that including autistic students goes beyond access to belonging.

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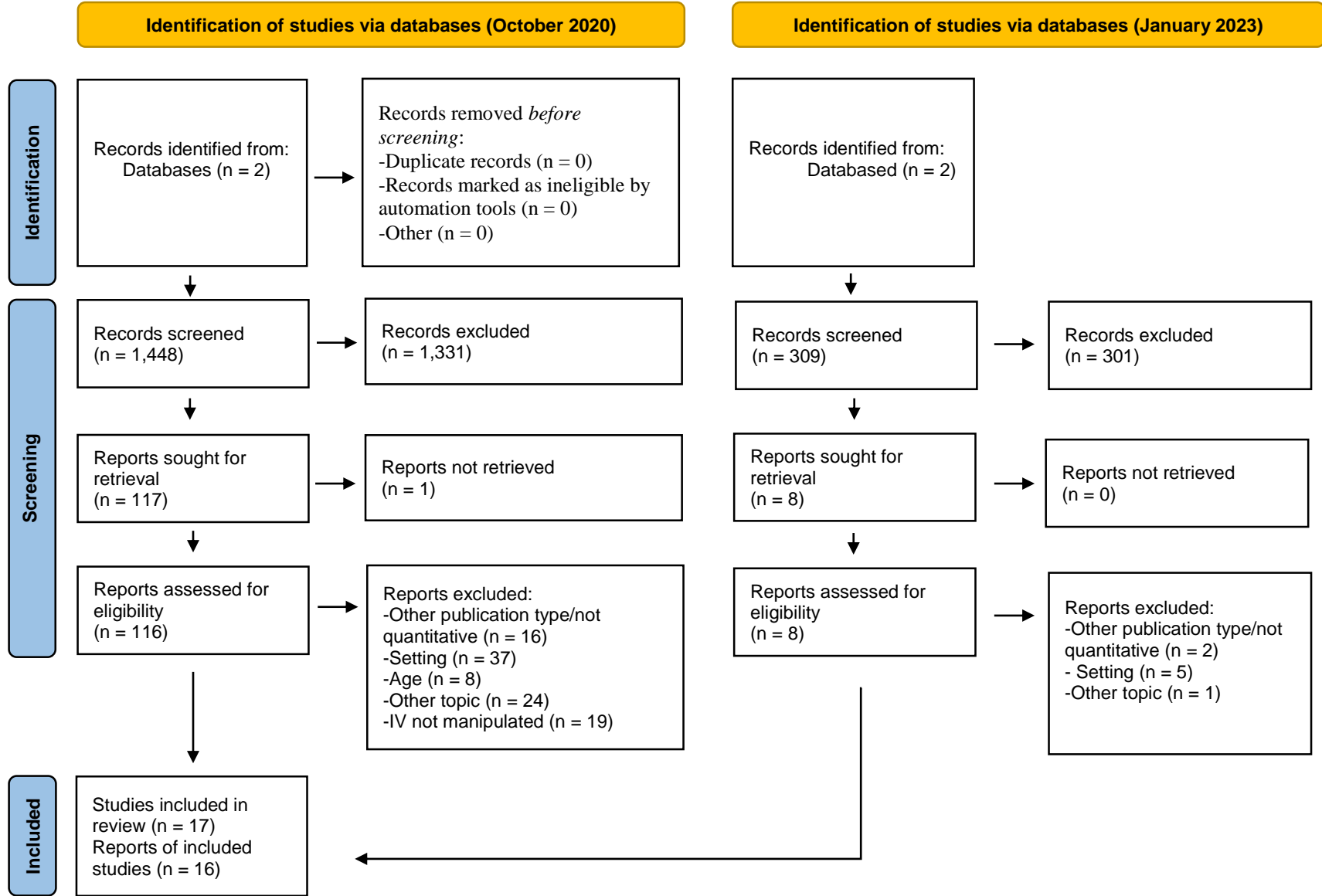
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Figure 1

PRISMA Flow Diagram: Systematic Review of Inclusion Practices



Student Participant Characteristics

Reference	Study Design	Autistic (N) Other Disability (N) No Disability (N)	Age	Grade	Gender (N)
Banda et al., 2012	AB	1 0 0	NR	3	M = 1 F = 0
Brock et al., 2018	Group Experimental	11 0 0	8-12	2-6	M = 10 F = 1
Courtade et al., 2013	Multiple Probe across Participants	2 1 0	6-8	K-3	M = 2 F = 1
Feldman & Matos, 2013	Multiple Baseline across Participants	3 0 0	5-8	K-2	M = 3 F = 0
Knight et al., 2018	Multiple Probe across Participants and Skills	2 1 0	7-10	NR	M = 2 F = 1
Koegel, Kuriakose et al., 2012	Multiple Baseline across Participants	3 0 0	5-6	K	M = 2 F = 1

Koegel, Vernon et al., 2012	Multiple Baseline across Participants with one Reversal	3 0 0	9-12	3-6	M = 2 F = 1
Kretzmann et al., 2015 ^a	Group Experimental	24 0 0	6-11	1-5	M = 16 F = 8
Locke et al., 2019	Group Experimental	31 0 0	<i>M</i> = 8.78	K-5	M = 27 F = 4
McCurdy & Cole, 2014	Multiple Baseline across Participants	3 0 0	8-11	2-5	M = 3 F = 0
Radley et al., 2014	Multiple Baseline across Participants	4 0 0	8 - 10	NR	M = 4 F = 0
Reeves et al., 2013	Withdrawal Across Participants with Staggered Reversal Conditions	3 0 0	7	1	M = 3 F = 0
Robinson, 2011	Multiple Baseline across Participants	7 1 0	3-10	PreK - 5	M = 7 F = 1
Rosenbloom et al., 2016	Withdrawal	1 0 0	9	3	M = 1 F = 0

Sainato et al., 2015	Group Quasi-experimental	60 0 0	$M = 6.23$	K	M = 52 F = 8
Strain et al., 2011	Multiple Baseline across Participants	3 0 0	5-9	K-4	M = 2 F = 1

Notes.

^aThere was a discrepancy in the text and demographics table for the participant male:female ratio; The above reported ratio is based on the text

Table 2*Study Characteristics*

Reference	Purpose	Intervention Agents	Student-focused Dependent Variable(s)	Independent Variable (Intervention)	Reported Study Outcomes
Banda et al., 2012	To determine the function of, and subsequently target, an autistic student's disruptive vocalizations using a function-based assessment and intervention	General education teachers (N=3) Age (NR) Gender (NR)	Disruptive vocalizations	Noncontingent Attention	Disruptive vocalizations decreased in the intervention compared to baseline condition for the participant across all three classrooms
Brock et al., 2018	To evaluate the effectiveness of practitioner facilitated peer-implemented Pivotal Response Treatment on the social communication of autistic students during recess	Peers (M=19) Age (8-12) Gender (F=11; M=8)	Quality of play (defined through 4 variables); Verbal/nonverbal interactions	Practitioner-facilitated Peer-Mediated Pivotal Response Training	Significant effect of the intervention on the number of communicative behaviors of autistic student directed toward a peer and vice-versa; Nonsignificant effect of the intervention on the quality of play with peers
Courtade et al., 2013	To evaluate the ability for special education teachers to follow a 12-step task analysis to develop an adapted story and the ability for general education teachers to implement a story-based lesson; to examine the	General education teachers (N=3); Special education teachers (N=3) Age (NR) Gender (NR)	Academic engagement time	Teacher training for implementation of task analyses during story/group reading time	Special and general education teachers successfully completed task analysis to adapt book and implement story-based lesson; Percentage of academic engaged time increased from baseline to

	effectiveness of the story-based lesson on increasing the academic engagement time of autistic students				intervention conditions for 2/3 autistic students
Feldman & Matos, 2013	To evaluate if paraprofessionals can be trained to use procedure-based Pivotal Response Treatment to increase social engagement among autistic children	Paraprofessionals (N=3) Age (23-50) Gender (F=3; M=0)	Reciprocal social engagement	Pivotal Response Treatment training for paraprofessionals	Implementation fidelity was high; Percentage of intervals the children were engaged in reciprocal social engagement immediately increased in the intervention conditions compared to baseline and was maintained at the follow-up
Knight et al., 2018	To evaluate the effectiveness of training paraprofessionals to implement video modeling on teaching academic skills to autistic children/children with intellectual disability	Paraprofessionals (N=3) Age (NR) Gender (F=3; M=0)	Independent steps completed in a task analysis for target academic skill	Paraprofessional training of video prompting for an academic skill	Implementation fidelity was good; Percent of independent, correct steps completed in the task analysis for academic skills increased in intervention conditions compared to baseline across all students and was maintained at the follow-up

Koegel, Kurikose, et al., 2012	To evaluate autistic children's social communication when interventionists were no longer present	Undergraduate/Graduate Students (N=3) Age (NR) Gender (NR)	Social engagement; quality of interaction/affect; unprompted peer-directed initiations	Clinician-facilitated social play using PRT strategies with and without peer initiations training	The percentage of intervals with social engagement and affect ratings all improved in intervention conditions compared to baseline condition for all students; When no interventionist was present, only the children who received social-initiations training showed continued high levels of social engagement, an increase in the number of unprompted initiations, and had the highest affect ratings
Koegel, Vernon et al., 2012	To evaluate whether socialization improves when autistic children's interests are incorporated into activities	Undergraduate Students (N=3) Age (NR) Gender (NR)	Engagement with peers; unprompted verbal initiations	Clubs themed around child's focused interest	The percentage of intervals the children were engaged with peers increased in the intervention compared to baseline condition; All children increased the number of unprompted verbal initiations upon the introduction of the intervention

Kretzmann et al., 2015	To evaluate the effectiveness of training paraprofessionals to implement a brief intervention on the social engagement of autistic children with peers	Paraprofessionals (N=35) Age (21-61) Gender (F=31; M=4)	Peer engagement	Remaking Recess training for paraprofessionals	The intervention led to an increase in the responsiveness and implementation of paraprofessionals, and an increased duration of peer engagement compared to the waitlist control group
Locke et al., 2019	To compare the effectiveness of a school-wide Remaking Recess relative to a traditional Remaking Recess intervention on the socialization of autistic students	Teachers (N=11); Paraprofessionals (N=17) Age (M=39.5) Gender (F=24; M=4)	Peer engagement; social network inclusion	Remaking Recess with Coaches	There were high levels of implementation fidelity across both conditions; Children in both the intervention with implementation support and the intervention only conditions spent significantly more time in joint engagement with peers and less time in solitary play from baseline to end of treatment and this effect was maintained through follow-up; Children in the intervention with implementation support improved in social network inclusion significantly more than children in the intervention only condition

McCurdy & Cole, 2014	To examine the effect of a simple peer-support intervention on the off-task behavior of autistic students	Peer supporters (N=3) Age (8-11) Gender (F=2; M=1)	Off-task behavior	Peer Support Intervention	Lower levels of off-task behavior during the intervention compared to baseline for all three students
Radley et al., 2014	To examine the effect of the Superheros Social Skills program on the social engagement and interactions of autistic students	Graduate students (NR) Age (NR) Gender (NR)	Social engagement; positive and negative social initiations/responses	Superheroes Social Skills program	Social engagement and the frequency per minute of social initiations and responses during recess periods increased in the intervention compared to baseline condition for all students
Reeves et al., 2013	To evaluate function-based assessments and function-based interventions to improve on-task behavior for autistic students in the classroom	Teacher (N=1); Paraprofessionals (N=3) Age (NR) Gender (NR)	On-task behavior	Function-based assessment and Task Analysis	On-task behavior increased during the intervention compared to the baseline for all three students and these effects were maintained at follow-up
Robinson, 2011	To examine the outcome of a paraprofessional Pivotal Response Treatment training on the social communication of autistic students	Paraprofessionals (N=4) Age (18-60) Gender (F=4; M=0)	Affect; Student's target social communication behavior	Pivotal Response Treatment training for paraprofessionals	Paraprofessionals implementation and involvement improved; Higher level of the social communication targets of the respective students during intervention compared to baseline; Two of the students increased in affect ratings from baseline to intervention and the other two students had similar levels of affect ratings across phases

Rosenbloom et al., 2016	To evaluate the effectiveness of an app, I-Connect, on increasing the on-task behavior of an autistic student in the classroom	N/A	On-task behavior; disruptive behavior	I-Connect Self-Monitoring Intervention	On-task behavior increased, and disruptive behavior decreased during intervention phases compared to baseline phases
Sainato et al., 2015	To compare the overall impact of a model-inclusive classroom relative to an eclectic classroom intervention in general education on autistic student outcomes	General education teacher (N=24); Paraprofessionals (N=16); Instructional assistants (N=2) Age (NR) Gender (NR)	IQ; academic achievement; language development; adaptive behavior	Model Kindergarten Classroom	Children in model classrooms showed significant improvements in IQ, academic achievement, and language scores compared to children in the comparison classrooms. Nonsignificant differences observed in adaptive behavior
Strain et al., 2011	To evaluate the feasibility of Prevent-Teach-Reinforce (PTR) in an inclusive setting, and examine the influence of PTR on the academic engagement and problem behavior of autistic students	General education teachers (N=3); Paraprofessionals (N=2); Age (NR) Gender (NR)	Problem behavior; academic task engagement	Prevent-Teach-Reinforce	Percentage of intervals with behavioral problems decreased in the intervention compared to baseline phase; Percentage of intervals with task engagement increased in the intervention compared to the baseline phase; All effects were maintained throughout follow-up period

Table 3*Quality Indicator Evaluation of Single Case Design Studies*

Reference	Quality indicator																					Total (22)	
Author, year	1.1	2.1	2.2	3.1	3.2	4.1	4.2	5.1	5.2	5.3	6.1	6.2	6.3	6.5	6.6	6.7	7.1	7.2	7.3	7.4	7.5	8.2	
Banda et al., 2012	0	0	0	1	1	1	1	0	0	0	0	1	0	0	1	0	1	1	1	0	1	1	13
Courtade et al., 2013	0	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	1	1	1	1	1	1	18
Feldman & Matos, 2013	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	20
Knight et al., 2018	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
Koegel, Kuriakose et al., 2012	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	18
Koegel, Vernon et al., 2012	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
McCurdy & Cole, 2014	1	0	0	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	18
Radley et al., 2014	1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	19
Reeves et al., 2013	1	0	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	0	1	1	19
Robinson, 2011	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	1	1	20
Rosenbloom et al., 2016	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	20
Strain et al., 2011	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
Total studies	7	8	6	12	9	12	12	9	8	8	11	12	11	9	10	9	12	12	12	8	12	12	

Table 4

Quality Indicator Evaluation of Group Studies

Reference		Quality indicator																								Total (24)
Author, year	1.1	2.1	2.2	3.1	3.2	4.1	4.2	5.1	5.2	5.3	6.1	6.2	6.3	6.4	6.8	6.9	7.1	7.2	7.3	7.4	7.5	7.6	8.1	8.3		
Brock et al, 2018	0	1	1	1	1	1	1	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	20
Kretzmann et al., 2015	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	1	1	22
Locke et al, 2019	1	1	1	1	1	1		1	1	0	1	1	0	1	1	0	1	1	1	1	1	0	1	1	1	21
Sainato et al., 2015	1	1	1	1	1	1		1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	21
Total studies	3	4	4	4	4	4	2	4	2	3	4	3	3	4	2	1	4	4	4	4	4	2	4	4		

Note. Grayed-out boxes indicate that the QI for those studies was not applicable.