

**SOCIAL SKILLS INTERVENTIONS FOR STUDENTS WITH CHALLENGING
BEHAVIOR: QUALITY OF THE EVIDENCE BASE AND A SINGLE-CASE
RESEARCH META-ANALYSIS**

A Dissertation

by

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ABSTRACT

The purpose of this dissertation was to: (1) conduct a systematic literature review to evaluate the quality of the evidence base on social skills interventions (SSIs) for students with or at-risk of emotional behavioral disorder (EBD) and students with autism spectrum disorder (ASD) who display challenging behavior and (2) conduct a single-case research (SCR) meta-analysis to determine the overall effect and the effect of potential moderators of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. For study one, a rubric based on the What Works Clearinghouse (WWC) design standards was developed to assess the overall quality of SCR design methodology employed by each of the 24 included studies. One study met all design standards, 10 studies met one or more design standards with reservations, and 13 studies did not meet one or more of the design standards. For study two, the Tau-U effect size was used to synthesize SCR design data and estimate the overall effect size of SSIs on school-related challenging behavior. A total of 301 phase contrasts were analyzed from the 75 participants. The aggregated Tau-U effect size across the 24 included studies was .67 ($SE = .02$) with a confidence interval of $CI_{95} = .63$ to .71. The effect size for SSIs on the maintenance of social skills was .79 ($SE = .04$, $CI_{95} = .71$ to .87) and included 77 phase contrasts. The effect size for the generalization of social skills was .56 ($SE = .08$, $CI_{95} = .41$ to .71) and included 21 phase contrasts. Four moderator variables were identified: target behavior, intervention implementation, intervention development, and methodological quality. Implications for practice, areas of future research, and limitations were addressed.

DEDICATION

I would like to dedicate this accomplishment to my family - past, present, and future. Especially to my grandparents, who sacrificed all they had in hopes that their children and their children's children would achieve the American dream. I am honored to be part of such a rich history.

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CHAPTER I

INTRODUCTION

The ability to interact successfully through prosocial behaviors is one of the most important skills of childhood development. Social skills are necessary for students to develop and maintain positive social relationships with peers and adults in school settings. Positive patterns of social responses also assist students in avoiding negative school consequences such as peer rejection and isolation (Mathur, Kavale, Quinn, Forness & Rutherford, 1998). Students with poor social skills, particularly students with disabilities, require social skills interventions (SSIs) to increase their rates of positive social interaction and enhance their social acceptance.

Poor social skills is a common characteristic for students with or at-risk for emotional and behavioral disorder (EBD) and students with autism spectrum disorder (ASD; Denning, 2007; Kauffman, Mock, & Simpson, 2007). Individuals who exhibit early signs of challenging behavior due to the lack of social skills may experience developmental consequences that place them at-risk for negative life outcomes (Bradshaw, Schaeffer, Petras, & Ialongo, 2010; Caldarella & Merrel, 1997; Mathur & Rutherford, 1996; Walker et al., 1996). One protective factor guarding against these risks is the development of prosocial behaviors through SSIs (Duran, Zhou, Frew, Kwok, & Benz, 2011; Gresham, 1985; Walker et al., 1996).

Research Goals and Objectives

Continued research is needed to support SSIs as an effective practice for students with school-related behavioral difficulties, especially students with or at-risk of EBD

and students with ASD. This dissertation focused on two main research goals: (1) to evaluate the quality of single-case research (SCR) on SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior, and (2) to update the overall effect size and identify moderator variables of SSIs for students with or at-risk of EBD and students with ASD who display challenging behaviors.

Research Objectives for Study 1

The first goal of this dissertation was to evaluate the quality of the evidence base of SCR from 1998 to 2014 on SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. This study accomplished the following research objectives:

- a) Identified SCR studies conducted after 1998 implementing SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior.
- b) Evaluated the methodological quality of the evidence base on SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior.
- c) Determined the methodological strengths and areas of improvement for single-case social skills research conducted after 1998 for students with or at-risk of EBD and students with ASD who display challenging behavior.
- d) Identified areas of future research related to SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior.

Research Objectives for Study 2

The second goal of this dissertation was to synthesize the effects of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. A SCR meta-analysis of SSI research from 1998 to the present was needed to provide support for SSIs as an Evidence-Based Practice (EBP) for students with or at-risk of EBD and students with ASD who display challenging behavior. To address this gap in the literature, the present meta-analysis investigated the following research objectives:

- a) Determined the overall effect size of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior through an SCR meta-analysis.
- b) Identified variables that moderate the effects of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior.
- c) Identified the effect of SSIs on the maintenance and generalization of social skill.
- d) Identified if SSIs can be considered an EBP for students with or at-risk of EBD and students with ASD who display challenging behavior.

CHAPTER II

SOCIAL SKILLS INTERVENTIONS FOR STUDENTS WITH CHALLENGING BEHAVIOR: EVALUATING THE QUALITY OF THE EVIDENCE BASE

Statement of the Problem

Challenging classroom behaviors, exhibited by students with or at-risk of Emotional Behavioral Disorder (EBD) and individuals with Autism Spectrum Disorder (ASD), are a common problem in schools (Forness, Freeman, Paparella, Kauffman, & Walker, 2012; Walker, Colvin, & Ramsey, 1995). School displays of challenging behavior can disrupt the learning environment, detract instructional time, and contribute to teacher burnout (Osher, Bear, Sprague, & Doyle, 2010). Consequently, public school systems are concerned with the number of students displaying challenging behavior (Walker et al., 1996).

Challenging behaviors can be defined as “any repeated pattern of behavior or perception of behavior that interferes with or is at-risk of interfering with optimal learning or engagement in prosocial interactions with peers and adults” (Dunlap et al., 2006; Smith & Fox, 2003). Students who exhibit persistent challenging behaviors can establish developmental trajectories that place them at-risk for a host of negative life outcomes (Bradshaw et al., 2010; Calderella & Merrel, 1997; Mathur & Rutherford, 1996; Walker et al., 1996). Furthermore, chronic displays of disruptive classroom behavior can adversely affect the development of interpersonal relationships and academic achievement (Dunlap et al., 2006).

The most common responses to displays of disruptive classroom behavior result in the removal of the student from the general learning environment and/or segregation with other deviant peers. However, removing students from the learning environment negatively affects academic outcomes, and separation with deviant peers can actually increase behavioral challenges (Conoley & Goldstein, 2004). Thus, emphasis should be placed on classroom interventions that strengthen protective factors for challenging behaviors. Teaching prosocial behavior through SSIs can counter the development of challenging behavior.

Social Skills Deficits

Challenging behaviors can be conceptualized as social skills deficits (Gresham, Van, & Cook, 2006). Overcoming social skills deficits and acquiring prosocial behaviors leads to positive social interactions and interpersonal relationships, which can increase school success (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Positive patterns of social responses and increases in social competence also assist students in avoiding negative school consequences such as peer rejection and isolation (Mathur & Rutherford, 1996). Social skills are necessary for students to develop and maintain positive social relationships with peers and adults in school settings. However, for students with or at-risk of EBD and students with ASD social skills may need to be explicitly taught, learned, and practiced in order for the development of social competence to occur (Gresham, Sugai, & Horner, 2001).

Social competence “represents an evaluative term based upon judgments, given certain criteria, that a person has performed a task adequately” (Gresham, 1986).

Although related, social skills and social competence are not synonymous. Social skills are defined as “socially acceptable learned behaviors enabling individuals to interact effectively with others and avoid or escape socially unacceptable behaviors exhibited by others” (Gresham, 1998). As a behavioral construct, previous research has identified five broad social skill domains: *peer relationship skills, self-management skills, academic-related skills, compliance, and assertion skills* (Caldarella & Merrell, 1997). The concept of social skills as a behavioral construct directly ties social skills to observable behaviors (Gresham, 1986).

Within the context of school settings, Walker, Irvin, Noell, and Singer (1992) conceptualized observable social skill behavior as consisting of both adaptive and maladaptive teacher and peer social behaviors. Teacher preferred social skills include compliance, listening, and following directions (Walker et al., 1992). Peer preferred social skills are behaviors related to forming friendships and gaining acceptance from peer groups (Walker et al. 1992). Because students with or at-risk of EBD and students with ASD are often characterized by school personnel as having poor social skills (Denning, 2007; Kauffman et al., 2007), the present research focused on challenging classroom behavior associated with social skills deficits common to both populations of students.

Social skills deficits for students with or at-risk of EBD. Students with or at-risk of EBD have externalizing and/or internalizing behavioral patterns that are often linked to social skills deficits (Lane, Parks, Kalberg & Carter, 2007; Walker, Gresham, & Ramsey, 2004). Problem behaviors characteristic of students with or at-risk of EBD

include a failure to abide by rules, defiance of authority, peer conflicts and an avoidance of responsibility (Sprague, Sugai, & Walker, 1998). Social skill deficits of students with or at-risk of EBD have been described as either skill or performance deficits. According to this model, students with or at-risk of EBD have either not learned the targeted social skill (skill deficit) or the student has learned the skill, but chooses not to perform the social skill (performance deficit; Mathur & Rutherford, 1996).

Students with or at-risk of EBD who display challenging behavior due to either skill deficits or performance deficits are placed at-risk for juvenile delinquency, academic failure, school disengagement, and peer rejection (Bradshaw et al. , 2010). Additionally, students with or at-risk of EBD are shown to have poor school attendance, impaired personal relationships, negative peer and teacher interactions, and a greater need for mental health services (Lane et al., 2007; Wagner & Davis, 2006; Walker et al., 2004). For example, Dishion, Loeber, Stouthamer-Lober, and Patterson (1984) investigated the relationship between official and self-reported juvenile delinquency and academic, interpersonal, and work skills. Poor interpersonal skills were found to be associated with both official and self-reported juvenile delinquency. Thus, remediating interpersonal skill deficits and improving social interaction skills can potentially enhance quality of life for students with or at-risk of EBD who constantly display challenging classroom behavior.

Social skill deficits for students with ASD. Social skill deficits similar to those found in students with or at-risk of EBD are also characteristic among students with ASD, particularly those who are higher functioning (Wang, Cui, & Parrila, 2011).

Children with high function autism (HFA), pervasive developmental disorders not otherwise specified (PDDNOS), or Asperger syndrome show fewer cognitive and language deficits compared to students with more severe forms of ASD (Rao, Beidel, & Murray, 2008). However, the development of social skills continues to be a major problem for students with ASD (Rao et al., 2008).

Social interaction skill deficits related to initiating interactions, maintaining reciprocity, understanding perspectives, and inferring meanings have been identified in students with ASD (Bellini, Peters, Benner, & Hopf, 2007). Because of these social skill deficits, students with ASD have difficulty communicating with peers and adults, processing social situations, and establishing social relationships. Social interaction skill deficits can negatively affect social, emotional, and cognitive development and are linked to lifelong implications of depression, limited job success, and poor relationships (Denning, 2007). For example, Bauminger and Kasari (2000) investigated loneliness and friendship in children with HFA. Their study found that children with HFA reported feeling lonely and expressed a desire to form relationships with others. However, students lacked the understanding of others' thoughts, feelings, and desires which prevented them from forming meaningful relationships. Schools expect students to successfully interact with peers and adults on a daily basis. Given that the development of positive relationships is essential in school settings, findings from the Bauminger and Kasari (2000) study are disparaging.

In addition to difficulties with social interaction, students with ASD are likely to exhibit behavioral challenges in school settings when faced with social situations

perceived as difficult. Because challenging behaviors can impede social, behavioral, and/or academic progress at school, previous research has focused on interventions to help students with ASD transition between classroom activities, pick up on social cues, and adjust to new situations (Dettmer, Simpson, Myles, & Ganz, 2000). For example, Dooley, Wilczenski, and Torem (2001) implemented a social communication intervention to decrease the challenging behavior of a student with pervasive developmental disorder. During transitions their participant exhibited disruptive behaviors such as hitting, kicking, biting, crying, and screaming. They reported a dramatic increase in cooperative classroom behavior following the social skill intervention.

Further examples of effective SSIs for students with ASD displaying challenging classroom behavior include explicitly teaching specific behaviors and expectations, prompting, and reinforcement (Scattone, 2007). Differing models of social skill practices include peer-mediated training, social stories, and video modeling (Wang, Parrila, & Cui, 2013). Because it is difficult for student with ASD to develop social skills through observation alone, additional SSI practices that are evidence-based are needed to teach students with ASD appropriate school-related social behaviors and interactions.

Evidence-based Practices

Recent legislative changes in the Individuals with Disabilities Education Improvement Act (IDEA, 2004) and No Child Left Behind Act (NCLB, 2001) have influenced the field of special education to place greater emphasis on identifying

interventions that are evidence-based (Shavelson & Towne, 2002). Following these changes, an impetus to determine the most effective means for serving students with disabilities was seen. This resulted in an "evidence-based practice movement".

Evidence-based Practices (EBPs) are defined as "practices and programs shown by high-quality research to have meaningful effect on student outcomes" (Cook & Odom, 2013).

As an important component of IDEA and NCLB, the use of EBPs is pertinent to SCR on interventions for students with disabilities. However, the development of scientific research design standards are still emerging for determining an EBP within SCR (Kratochwill et al, 2010).

In response to the EBP movement, researchers have put forward several indicators of EBPs for SCR (Horner et al., 2005; Horner & Kratochwill, 2012; Kratochwill et al., 2010). One of the key indicators is evidence of a functional relationship. A functional relationship is said to exist when the relationship between the intervention or practice and the expected behavioral change has been repeatedly documented (Horner & Kratochwill, 2012). Additional indicators of an EBP for SCR are when the practice is: (a) operationally defined, (b) defined within a context, (c) implemented with fidelity, (d) documented to show a functional relationship between the practice and dependent measures, and (e) replicated sufficiently across studies (Horner et al, 2005).

Horner et al. (2005) also states that sufficient replication of effectiveness must: (a) include a minimum of five studies meeting basic design standards, (b) be conducted by at least three different researchers in three different geographic locations, and (c)

include at least a total of 20 participants (5-3-20 criteria). Additionally, Horner and Kratochwill (2012) re-emphasized the need for detailed and specific operational definitions for a practice to be documented as evidenced-based. Practices that are vaguely described cannot be documented as evidence-based (Horner & Kratochwill, 2012). SCR indicators are integral for establishing EBPs. Likewise, the following methodological features and the recently published What Works Clearinghouse (WWC) single-case design standards play key roles in determining EBPs for SCR (Kratochwill et al., 2010).

Methodological Features of SCR

Methodological quality pertains to the methods of a research study as well as the safe guards implemented to prevent the likelihood of alternative explanations for observed outcomes (Shadish, Cook, & Campbell, 2002). Historically, SCR has been evaluated based upon several methodological features including: (a) operational definitions and descriptions of variables, (b) replication of effects, (c) fidelity of implementation, (d) reliability, and (e) social validity (Horner et al., 2005; Logan, Hickman, Harris, & Heriza, 2008; Tate et al. , 2008).

Operational definitions. Specific information is needed to translate research into practice (Lane, Wolery, Reichow, & Rogers, 2007). Detailed reporting of study features is particularly important to: (1) identify commonalities and disparities across studies and (2) increase the ability for other researchers to replicate study effects (Wolery & Ezell, 1993). Clear descriptions and operationalized definitions should be

provided for all aspects of a study including: (a) student populations, (b) independent variables, (c) procedures, (d) dependent variables, and (e) settings.

Replication of effects. Replication is determined by the extent to which treatment effects are consistently observed across phases, participants, settings, and behaviors. Treatment effects are established when a desired change in the dependent variable coincides with the systematic manipulation of the independent variable or intervention.

Fidelity. Fidelity of implementation is an important element of SCR methods and refers to the consistency of intervention delivery. Data on intervention implementation should be collected to ensure the treatment or intervention was carried out as planned. Measures of fidelity can also help validate treatment effects.

Reliability. Measures of each dependent variable should be assessed by more than one observer. Acceptable reliability of measurement, or inter-observer agreement (IOA), must be collected for each case and each dependent variable. Although many indices for IOA are available, percent agreement and Cohen's Kappa are often used. Minimum acceptable values for percent agreement and Cohen's Kappa are .80 and .60 respectively (Hartmann, 1977).

Social validity. Social validity provides helpful information on the acceptability and appropriateness of an intervention. Data on the social validity of an intervention is useful for determining the feasibility of an intervention (Spear, Strickland-Cohen, Romer, & Albin, 2013).

Design standards. Recently, the WWC developed standards for evaluating single-case design methodology which classifies studies into three categories: *Meets Design Standards*, *Meets Design Standards with Reservations*, or *Does Not Meet Design Standards*. The design standards are intended as a guide for evaluating empirical support and determining EBP (Kratochwill et al., 2013). To meet basic design standards studies must (a) systematically manipulating an independent variable, (b) systematically measure each dependent variable over time by more than one observer, (c) include at least three demonstrations of intervention effect, and (d) must include a minimum of five data points per phase. If a study meets the previously mentioned criteria, but phases include a minimum of three data points per phase, then the study *Meets Design Standards with Reservations*. As previously stated, Horner et al. (2005) put forward the 5-3-20 criteria for what can be considered an EBP where a body of research on a specific practice that: (a) includes five studies meeting basic design standards, (b) has been conducted by at least three different researchers in three different geographic locations, and (c) includes a total of at least 20 participants is deemed an EBP. Therefore, by definition, a body of research on a specific intervention or practice must be evaluated before it can be considered evidence-based. Previous literature has attempted to review research on SSIs in an effort to draw conclusions on SSIs as an EBP.

Previous Reviews of the Literature

SSIs focus on increasing prosocial behaviors using nonaversive methods (Elliott & Gresham, 1993). There is a robust research literature on SSIs as evidenced by the number of narrative, quantitative, and meta-analytic reviews dating back to 1981 that

have been conducted on SSIs (Cappadocia & Weiss, 2010; Flynn & Healy, 2011; Gillis & Butler, 2007; Gresham, 1981; Gresham, 1985; Gresham & MacMillan, 1997; Maag, 2006; Reichow & Volkmar, 2010; White, Keonig, & Scahill, 2007). Literature reviews conclude that SSI can be effective in promoting the acquisition and performance of prosocial behaviors (Gresham, 1981; Gresham 1985; McIntosh, Vaughn, & Zaragoza, 1991). However, meta-analyses on SSIs have reported mixed findings. Previous reviews and meta-analyses are summarized in the following sections.

Descriptive literature reviews. Early reviews by Gresham (1981, 1985) examined the literature on SSIs for students with and without disabilities. He concluded that children with disabilities who received social skills training were better accepted by their peers, and that sociodramatic activities were effective in increasing appropriate social interactions (Gresham, 1981). In another review by Gresham (1985) the utility of cognitive-behavioral procedures for social skills training was reviewed. Social skills interventions using cognitive-behavioral techniques, including modeling and coaching, were found to be effective.

To summarize the overwhelming amount of literature reviews on social skills, Maag (2006) conducted a “review of reviews” on SSIs for students with EBD. The review included nine narrative (Ager & Cole, 1991; Coleman, Wheeler, & Webber, 1993; Holinger, 1987; Landrum & Lloyd, 1992; Mathur & Rutherford, 1991; Olmeda & Kauffman, 2003; Schloss, Schloss, Wood, & Kiehl, 1986; Templeton, 1990; Zaragoza et. al., 1991), three meta-analytic (Beelmann, Pfungsten, & Losel, 1994; Mathur et. al., 1998; Quinn, Kavale, Mathur, Rutherford, & Forness, 1999), and one quantitative

(Singh, Deitz, Epstein, & Singh, 1991). SSIs were reported by Maag (2006) as being weak to moderately effective. Findings from the included reviews identified as concerns: inadequate treatment specification, lack of generalization and maintenance of skill, and failure to produce consistent effects as major issues surrounding the social skills literature base. For example, one of the studies (Coleman, Wheeler, & Webber, 1993) included in the Maag (2006) review summarized research on interpersonal problem-solving training for students with EBD and found little impact on observed behaviors, a lack of generalization, and the need to individualize training to student deficits.

Conversely, many of the included studies reviewed in White et al., (2007) found improvements for targeted social skill in children with ASD. For example, one of the included studies by Yang, Schaller, Huang, Wang, and Tsai (2003) found improvements in the frequency of positive social behavior for students receiving social skills training. In a more recent review, Reichow and Volkmar (2010) examined the empirical evidence of SSIs within the framework of a “best evidence synthesis” (i. e., only studies with strong methodological rigor were included). Their findings report video-modeling SSIs as meeting criteria for an EBP. Criteria used to determine an EBP for students with ASD were previously established by Reichow, Volkmar, and Cicchetti (2008). However, consistent with the previous review (White et al., 2007); Reichow and Volkmar (2010) found inconsistent results for social skills group interventions.

Meta-analyses. Several group meta-analyses on SSIs have also been conducted including student with or at-risk for EBD (Ang & Hughes, 2001; Beelmann, Pflingsten, & Losel, 1994; Cook, Gresham, Kern, Barreras, Thornton, & Crews, 2008; Quinn,

Kavale, Mathur, Rutherford, & Forness, 1999; Schneider, 1992). Low to moderate effect sizes were reported. For example, Schneider (1992) reported an overall average effect size of $r = .40$ across 79 reviewed studies. In the meta-analysis by Beelman et al. (1994), stronger effect sizes were reported for problem solving measures ($g = .78$) while weaker effect sizes were reported for behavior ratings ($g = .26$).

Later meta-analyses continued to report conflicting results. In the meta-analysis conducted by Quinn et al. (1999) an overall effect size of only $d = .20$ across 35 group studies was found. Then, Ang and Hughes (2002) analyzed 38 studies on SSIs for antisocial youth and reported an overall effect size of $\Delta = .62$. Following, Cook et al. (2008) synthesized the meta-analytic literature on SSIs for secondary students with or at-risk for EBD. Their study included five meta-analyses and reported an overall weighted mean effect size of $r = .32$. Meaning two thirds of students with or at-risk for EBD, compared to one third of students in control groups, showed improvements following intervention.

SCR has typically been excluded from meta-analysis on SSIs for students with challenging behavior (e. g., Ang & Hughes, 2001; Beelmann et al., 1994; Quinn et al., 1999; Schneider, 1992). However, five meta-analyses on social skills instruction for students with ASD that included single-case studies were found (Bellini et al., 2007; Mathur et al., 1998; Schneider, Goldstein, & Parker, 2008; Wang et al., 2011; Wang et al., 2013; Wang & Spillane, 2009). Similar to group meta-analyses results, meta-analyses on SSIs including SCR have reported a wide range of effect sizes.

Bellini et al. (2007) used the percent of non-overlapping data (PND) effect size to analyze 55 studies researching social skill interventions for children with ASD. Their meta-analysis resulted in a mean PND effect size of 70%. The meta-analysis by Wang and Spillane (2009) included 36 single-case and two group studies. The following mean PND effect sizes were reported: social stories (67.21%), peer mediated (60.69%), video modeling (84.25%), and cognitive behavioral training (100%). Schneider et al. (2008) used the percentage of all non-overlapping data points (PAND) and the Phi statistic to calculate an overall effect size. An average weighted Phi of .71 was found for peer-mediated interventions on social skills of students with autism.

Two recent single-case meta-analyses on social skills have used hierarchical linear modeling (HLM) to examine outcomes across multiple social skills studies (Wang et al., 2011; Wang et al., 2013). Both studies indicated that SSIs were effective in improving the social behavior of children with ASD, reporting $\gamma = 1.27$ ($SD = 0.43$, $CL_{95} = 1.05 - 1.50$, Wang et al., 2011) and $\gamma = 1.40$ ($SD = 0.43$, $CL_{95} = 1.32 - 1.48$, Wang et al., 2013).

Only one single-case meta-analysis focusing on SSIs for students with or at-risk of EBD and students with ASD was found (Mathur et al., 1998). In the Mathur et al. (1998) meta-analysis, a total of 64 single-case studies were analyzed. The mean PND across all 64 studies was 62% ($SD = 33\%$). The study included 283 participants identified as having behavioral problems, including those with EBD and ASD. Participants at the elementary and secondary levels were found to benefit more from social skills instruction than participants at the preschool level. Additionally, greater

social skills intervention effects were reported for promoting social interaction skills than fostering communication skills. The mean PND for studies that assessed maintenance and generalization of social skill was 64%. Comparing results from the Mathur et al. (1998) meta-analysis to the meta-analyses on students with ASD, greater effects were reported for studies that only included students with ASD.

Based on the previous literature, research has concluded that social skills training can be effective in promoting the acquisition and performance of prosocial behaviors (Beelmann et al., 1994; Gresham, 1981; Gresham 1985; McIntosh, Vaughn, & Zaragoza, 1991). Although the Mather et al. (1998) meta-analytic review did include students with or at-risk of EBD and students with ASD, quality of research design was not evaluated. Because a quality of evidence evaluation on SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior has not been done, the present study aimed to fill this gap in the literature.

Purpose and Research Questions

There is a need to evaluate the quality of evidence on SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior in school settings. Because students with or at-risk of EBD and students with ASD are often characterized by school personnel as having similar social skills deficits (Kauffman et al., 2007; Denning, 2007), the present research included both populations of students. Rigorous analysis of single-case design methodology is needed to determine the strength of this evidence base. To accomplish this task, a current review from 1998 to the present on the methodological quality of SCR on SSIs for students with or at-risk of EBD and

students with ASD who exhibit challenging classroom behavior was conducted.

Therefore, the purpose of this systematic literature review was to evaluate the evidence base of social skills instruction based upon SCR design standards and answer the following research questions:

- 1) What is the methodological quality of SCR studies using social skills instruction to remediate challenging classroom behaviors for students with or at-risk of EBD and students with ASD?
- 2) What are the most common behaviors targeted for improvement through SSIs?
- 3) What percentages of studies: (a) were conducted in early elementary, intermediate/middle, and secondary settings; (b) focused on the effects of SSIs on social interaction skills, (c) focused on the effects of SSIs on social classroom behaviors, (d) individualized treatment to social skill deficits; and (e) implemented SSIs alone versus combining SSIs with other behavioral strategies?

Methods

Article Identification

Search approach. A systematic method was used to identify studies to be included in the literature review. This process began with an electronic search of the following psychology and educational databases: PsycINFO, Educational Resources Information Center, Academic Search Complete, and Education Full Text. The goal was to identify studies using single-case designs to research the efficacy of SSIs on anti-

social or challenging classroom behaviors. Search terms related to problem behavior and SSIs were combined using the Boolean phrase AND. The first set of terms included: *behavioral disorders, emotional disorders, seriously emotionally disturbed, disruptive behavior, social behavior problems, antisocial behavior, autism, social behavior problems* OR *conduct disorders*. The second set of terms included: *social skills training, social skills instruction* OR *social skills interventions*. The initial search yielded 1,067 articles. After 373 duplicate articles were removed, 694 titles and abstracts were evaluated to determine if the article should be read in its entirety to assess inclusion in the review.

Extended search. References of identified studies were reviewed to find other articles that met inclusion criteria. Additionally, searches in the following journals were conducted to find articles published between 2013 and 2014 meeting inclusion criteria: *Exceptional Children, Behavioral Disorders, Journal of Emotional and Behavioral Disorders, Journal of Autism and Developmental Disorders, Journal of Applied Behavior Analysis, Journal of Autism and Developmental Disorders, Journal of Positive Behavior Interventions, and Remedial and Special Education*. A total of 22 articles were identified through the electronic search and one article was identified through the extended search resulting in 23 articles included in the present literature review (see Figure 1). However, a total of 24 studies were analyzed because Blake, Wang, Cartledge, & Gardner, (2000) included two studies.

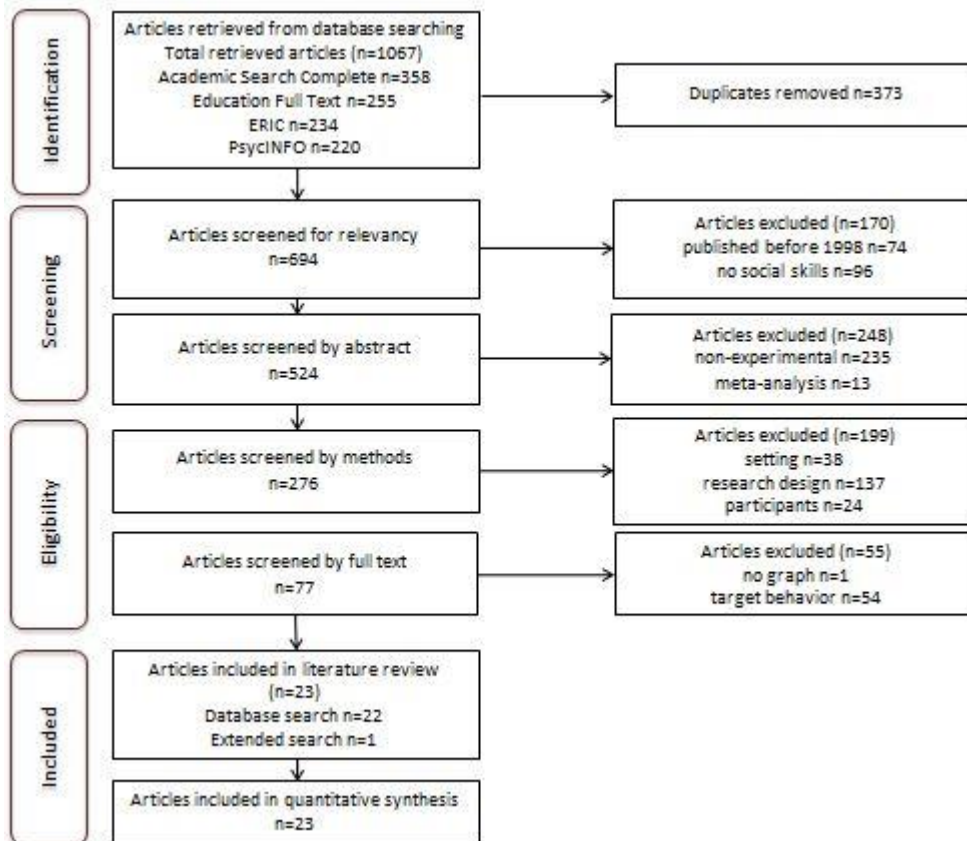


Figure 1. Article Selection Flowchart. This figure illustrates the article selection process.

Inclusion and Exclusion Criteria

The intent of this literature review was to evaluate the quality of the evidence of SSIs for students with or at-risk of EBD and ASD with challenging classroom behavior. Studies were included in this literature review if (a) the participants were educated in a school setting, (b) the participants were described as with or at-risk of EBD or students with ASD exhibiting challenging school-based behavior, (c) the intervention implemented was based on teaching social skills related to school-based prosocial behaviors or positive social interactions (d) outcome measures in the study assessed school related social skills behavior as a primary predictor, (e) the study used a single-case design methodology, and (f) was written in English, conducted in the United States, and was published in a peer-reviewed journal after 1998. Dissertations and book chapters were excluded because the goal of this review was to draw conclusions based on information that has been evaluated through a peer-review process. Specific areas coded for included: (a) participants and settings characteristics and (b) methodology and intervention design.

Participants and setting. This review focused on school age participants, preschool through 12th grade, being educated in school settings. Public, private, and state approved private schools for individuals with disabilities were included. Clinical and out-patient facility settings were excluded, as well as studies conducted in home environments. All participants included in the review were identified as students with or at-risk for EBD or students with ASD exhibiting challenging classroom behavior or

negative social interactions. Studies in which adults were the primary participants were excluded.

Methodology and intervention. Studies that implemented SSIs such as social skills training, social stories, and group implemented or individualized social skills instruction using single-case design methodology were included in the review (e. g., Chan & O'Reilly, 2008; Hagiwara & Myles, 1999; Kelly & Shogren, 2014). Interventions using technology based social skills instruction were also included (e. g., Blood, Johnson, Ridenour, Simmons, & Crouch, 2011; Simpson, Langone, & Ayres, 2004). Studies utilizing group experimental designs, systematic literature reviews, editorials, commentaries, practitioner guides, or descriptive studies were excluded (e. g., Antshel, 2005; Blacher & Howell, 2008; Grimmatt & Devender, 2008). For example, Bellini, Benner, and Perers-Myszak (2009) published a guide for practitioners on a systematic approach to teaching social skills to children with ASD. Because the article did not report experimental findings, it was excluded from the review.

Dependent variables. Social skill outcomes were defined as any behavior that a student used to perform competently and successfully on social tasks (Gresham et al., 2001). This study focused specifically on remediation of school-related classroom behaviors and social interactions as outcome variables. Outcome behaviors related to compliance, on-task behavior, and adherence to classroom rules and procedures were categorized as Social Classroom Behaviors. Behaviors involving the student and other peers or adults were categorized as Social Interaction Skills. A complete list of social skills included can be seen in Table 1.

Table 1. Classification of Social Skills

Social Interaction	Classroom Behavior
Interfering in the business of classmates	Off task
Being overbearing	Losing homework and school supplies
Pushing to be in charge of any interaction	Shouting out answers
Yelling or crying when challenged by peers or corrected by a teacher	Becoming over excited and rowdy
Hypersensitivity to redirection	Making inappropriate noises
Physical threats to peers	Talking during lessons
Excessive talkbacks to adults	Daydreaming
Refusal to play cooperatively with peers	Class disruptions
Interruptions	Excessive use of inappropriate language
Physical aggression	Temper tantrums
Verbal aggression	noncompliance
Being oppositional	impulsive
General difficulties with peers	Property destruction
Invading the personal space of peers	Off topic comments
Self-injury	Complaining/whining
Negative verbal interactions	Inappropriate tone of voice
Name calling	Cheating
Inappropriate gestures towards peers	Failure to complete tasks
Difficulties sharing	Failure to appropriately request for help
Difficulties taking turns	Poor adaption to changes in activity

Studies with target behaviors related to improving rates of initiation such as social communication, recreational or play skills, and joint attention were not included because the focus of this study was to evaluate the effect of SSIs on the remediation of challenging behaviors. These studies must include students characterized as exhibiting behavior disruptive to the classroom environment. For example, Chung, Reavis, Mosconi, Drewry, Todd and Tasse (2007) used a peer-mediated social skills training program to teach children with high-functioning autism social communication skills. Target behaviors included securing peer attention and initiating on-topic comments. Since the purpose of this study was for participants to acquire a new social interaction skill versus to remediate inappropriate social interaction with peers, this study was not included in the review.

Coding

Included articles were reviewed, and descriptive information was extracted for coding. Each article was coded on participant, setting, and study characteristics. Features of methodological design were also extracted, coded and used to determine the overall quality of the study.

Participant and setting characteristics. Participants were coded on: (a) age, (b) gender, (c) school level (d) ethnicity, (e) disability and (f) educational setting. The age of each participant was recorded in years rounding down in instances where studies reported age in years and months. Gender was dichotomous including male and female. School level of participants included three levels: early elementary (pre-kindergarten-4th grade), intermediate/middle (5th-8th grade), and secondary (9th-12th grade). Ethnicity

included five levels: Caucasian, African American, Hispanic, Asian, and mixed/other. ability was coded as (a) identified with or at-risk of EBD or (b) identified with ASD. Educational setting included three levels: general education, special education, or both.

Study and intervention characteristics. Study characteristics including experimental design, intervention development, intervention implementation, and dependent measures were coded. Operational definitions for each are described below.

Experimental design and intervention. The SCR design used in each study was recorded. Social skill interventions were categorized as teaching: (a) positive social interactions; (b) prosocial classroom behaviors; or (c) mixed.

Intervention development. Two levels were included in intervention development: *individualized* or *general*. Instances where the social skill intervention was created or developed specifically for the target student matching social skills instruction to student deficits were coded as *individualized*. All other interventions in which packaged or scripted social skills curriculums were implemented were categorized as *general*.

Intervention implementation. Intervention implementation was coded as *alone* or *combined*. Studies in which social skills training was the only intervention implemented were considered stand-alone SSIs. Studies in which SSIs were combined with other strategies such as self-monitoring, cueing, group contingency or other forms of reinforcement were considered *combined* SSIs.

Dependent measures. Dependent measures included three levels: *social interaction skills*, *social classroom behavior*, or *mixed*. Behaviors involving only the

student and focusing on classroom rules and procedures were categorized as *social classroom behaviors*. Behaviors involving the student and other peers or adults were categorized as *social interaction skills*. The code book containing operational definitions for all coded variables can be found in Appendix A.

Quality of Evidence Evaluation

Quality of evidence evaluations and the application of the WWC SCR Standards were modeled after Maggin, Chafouleas, Goddard, and Johnson (2011). Each of the design standards in Appendix B was applied to each study. In addition, to help ensure design quality, standards 3 and 4 (experimental control and demonstration of an effect) were applied to each graph in studies that included more than one graph. Therefore studies with more than one graph received a two part rating for each graph reported as (S, G). *S* signifies the overall quality rating and *G* represents the additional ratings for standards 3 and 4. For example, a study with a multiple baseline across behaviors design, and graphs for three participants, would receive three ratings: (S, G₁), (S, G₂), (S, G₃); where *S* represents the overall quality rating and G_x represents the rating for standards 3 and 4 for each participant's graph. The purpose of the two part rating was to identify inconsistencies in experimental control and demonstration of an effect between the study as a whole and individual graphs within a study. Instances where studies only included one graph received only one rating.

Coding for design standards. The methodological quality rubric focused on research design and methods. The following standards were assessed: (a) systematic manipulation of the independent variable, (b) inter-observer agreement, (c) fidelity of

implementation, (d) experimental control, and (e) demonstration of effect. Each standard assessed was coded as *Meets this Standard*, *Meets this Standard with Reservations*, or *Does Not Meet this Standard*.

Systematic manipulation of the independent variable. The independent variable must be systematically manipulated. For the present study, the researcher must determine when and how the social skills intervention was implemented. If this was not done intentionally, this standard was not met, and the study was coded *Does Not Meet Evidence Standards*.

Inter-observer agreement. Each of the dependent variables must be measured repeatedly over time by more than one observer. Data on agreement between the two assessors should be collected on at least 20% of data points overall, and indicate that data were collected on 20% of the data points in each condition, setting, or phase. Additionally, agreement reported must meet the minimum thresholds of agreement indices: .80 for percentage of agreement and .60 for measures of Cohen's Kappa.

Therefore, the standard on inter-observer agreement (IOA) was sectioned into three parts: (a) collection of inter-observer agreement, (b) for 20% of data overall and on 20% of data across all conditions, and (c) meeting minimum thresholds of agreement indices. If a study reported reliability data above .80 for percent agreement and/or .60 for Cohen's Kappa, on 20% of data overall and across all conditions, it received a rating of *Meets Standard*. If the study reported reliability for 20% of the data overall but did not indicate if the 20% represented data for each condition it received a rating of *Meets Standard with Reservations*. If a study reported reliability data that was below the

minimum thresholds for percent agreement or Cohen's Kappa, it received a rating of *Does not Meet Standard*.

Fidelity of implementation. The adapted quality rubric was modified to include a standard on fidelity. Fidelity of implementation criteria mirrored design standards for IOA requiring studies to collect data on fidelity of implementation for at least 20% of all intervention conditions, with percentages of accurate implementation at or above 80%. To receive a rating of *Meets Standard*, a study must collect and report measures on the fidelity of implementation for 20% of data that is at or above 80% agreement. If a study collected informal measure of fidelity, it received a rating of *Meets Standard with Reservations*. If no measures of fidelity were reported, the study *Did not Meet Design Standards*.

Experimental control. Experimental control was assessed by the number of attempts to demonstrate an effect. To receive a rating of *Meets Design Standards* the study must include at least three attempts to demonstrate an intervention effect at three different points in time. Furthermore, attempts to demonstrate a treatment effect must occur between phase contrasts that are adjacent to one another. If this standard was not met, the study *Does Not Meet Evidence Standards*. Examples of designs meeting this standard include ABAB designs, multiple baseline designs with at least three baseline conditions, alternating treatment designs with at least three alternating treatments compared with a baseline condition or two alternating treatments compared with each other, changing criterion designs with at least three different criteria, and more complex

variants of these designs. Examples of designs not meeting this standard include AB, ABA, and BAB designs.

Demonstration of an effect. Demonstration of an effect was determined by the number of data points within a phase, or the phase length. For a phase to qualify as an attempt to demonstrate an effect, the phase must have a minimum of three data points to *Meet This Standard With Reservations*, and five or more data points is required to *Meet this Standard*.

Overall quality ratings. Overall quality ratings were coded as *Meets Design Standards*, *Meets Design Standards with Reservations*, or *Does Not Meet Design Standards*. To receive an overall quality rating of *Meets Design Standards*, all items assessed in the quality rubric must be coded as *Meets this Standard*. If any of the items assessed in the quality rubric are coded *Meets this Standard with Reservations*, then the overall quality is coded as *Meets Design Standards with Reservations*. Similarly, if any item within the quality rubric is coded *Does Not Meet this Standard* then the overall quality rating is coded *Does Not Meet Design Standards*.

The same logic was applied to studies receiving two part ratings. For a study with multiple graphs to receive an overall quality rating of *Meets Design Standards*, all ratings for that study must be coded as *Meets Design Standards*. If one of the graphs within a study receives a rating of *Meets Design Standards with Reservations*, the overall quality rating for that study will receive a rating of *Meets Design Standards with Reservations*. If one of the graphs within a study receives a rating of *Does Not Meet*

Design Standards, the overall quality rating for that study will receive a rating of *Does Not Meet Design Standards*.

Reliability

Reliability estimates were collected for (a) article selection, (b) descriptive coding of studies, and (c) the application of the methodological quality rubric. If the reliability coder's results matched the researcher's results, this was coded as an agreement. Simple percent agreement and Cohen's Kappa, a more conservative measure of reliability adjusting for chance agreement (Ary & Suen, 1989), were calculated for each area of reliability. Simple percent agreement was calculated by dividing the sum of agreements by the total number of agreements plus disagreements multiplied by 100. Cohen's Kappa was calculated using the Vassar stats website (Lowry, 2001). Percent agreement above 80% and Cohen's Kappa values above .60 are considered acceptable (Kratochwill, et al., 2013).

Article selection. To check for the reliability of article selection an additional reviewer, with expertise in the systematic literature review process, assessed 20% (n=55) of eligible articles (n=267) for the application of inclusion and exclusion criteria. Each of the 55 articles were categorized as *include* or *exclude*. Initial percent agreement and Cohen's Kappa results for article selection was 90% and .81, respectively. All disagreements were discussed until 100% agreement was reached.

Descriptive coding. Articles included in the review were also checked for coding reliability. Over 20% (n=6) of the included studies across the five randomly selected articles were checked for descriptive coding reliability. Each study was coded

by an additional coder trained in single-case design methodology and unaware of initial coding results. Reliability on 15 different descriptive items was assessed across the number of participants in a study. For example, a study with three participants allowed for 45 opportunities of agreement. Initial reliability using percent agreement was 87%. Cohen's Kappa was assessed for the coding of dependent measures because the majority of disagreements occurred in this area. Kappa for coding of dependent measures was .70. All disagreements were discussed until 100% agreement was reached.

Methodological quality coding. The same five articles randomly selected for descriptive coding were checked for reliability on the application of the quality design rubric. Each graph within a study was assessed for standards 3 and 4. Initial percent agreement for graphs was 95%. Reliability on overall ratings of methodological quality at the study level was 100% for percent agreement and Cohen's Kappa.

Results

Participant and Study Characteristics

Participants and setting. A total of 75 participants were included across the 24 studies examined in this systematic literature review (see Table 2). Studies were published between 1998 and 2014. The majority of the participants were male (89%, $n = 68$). Although ethnicity was not reported for 23 participants (31%), African American (33%, $n = 25$) and Caucasian (31%, $n = 23$) were the two ethnic groups with the greatest representation. All studies involved students with behavioral difficulties with 15 participants (20%) at-risk for EBD, 29 participants (39%) with EBD, and 31 participants (41%) with ASD. The majority of students were educated in special education settings

including specialized schools for students with disabilities (47%, n = 35), followed by general educational settings (35%, n = 26). Only 18% (n = 14) of participants were educated in both special education and general education settings (see Table 2).

Experimental design and intervention. Because one article included two studies, a total of 24 studies were evaluated. Multiple baseline designs were the most commonly used experimental design (67%, n = 16) followed by AB or Reversal/Variation designs (16.5%, n = 4), and mixed designs (16.5%, n = 4). The four mixed designs included MBD across subjects with randomization of intervention implementation (Bardon, Dona, & Symons, 2008), MBD across behaviors with two treatments (Blake, Wang, Cartledge, & Gardner, 2000, Study 1), a combined ABAB and MBD across behaviors (Hagopian, Kuhn, & Strother, 2009), and an MBD across setting and behaviors with reversals (Herring & Northup, 1998).

The majority of studies used classroom behavior (46%, n = 11) as the dependent measure. Social interaction was the dependent measure for 29% (n = 7) of studies and 25% (n = 6) of the studies measured classroom behavior and social interaction skills. In 62.5% (n = 15) of studies the intervention implemented was individualized to the student. The majority of studies implemented SSIs alone (62.5%, n = 15) as opposed to combining the intervention with other behavioral strategies (see Table 3). Table 4 contains a list of the social skills interventions implemented.

Table 2. Participant and Study Characteristics

	n	%
Gender		
Male	66	88
Female	9	12
School Level		
Early Elementary	46	61
Intermediate/Middle	15	20
Secondary	11	15
not provided	3	4
Race/Ethnicity		
African American	25	33
Caucasian	23	31
Hispanic	1	1
Asian	1	1
not provided	24	32
mixed/other	1	1
Disability		
At-risk for EBD	15	20
EBD	29	39
ASD	31	41
Educational Setting		
Special Education	35	47
General Education	26	35
Both	14	18
Target Behavior		
Social Interaction	26	35
Classroom Behavior	30	40
Both	19	25
Intervention		
Individualized	37	49
General	38	51
Experimental Design		
AB or Reversal	4*	16.5
Multiple Baseline	16*	67
Mixed	4*	16.5

Note. n = number of participants

* refers to the number of studies

Table 3. Study Characteristics

Study	N	Male	School Level	Educational Setting	Disability	Target Behavior	Intervention Implementation	Intervention Development	Experimental Design
Bardon et al. (2008)	3	1	pK-4	General	At-Risk	Social Interaction	Alone	General	Mixed
Blake et al. (2000, Study 1)	3	3	5-8	Special	EBD	Mixed	Alone	General	Mixed
Blake et al. (2000, Study 2)	6	6	5-8 (3) pK-4 (3)	Special	EBD	Social Interaction Classroom Behavior	Combined	General	MBD-Participant
Blood et al. (2011)	1	1	5-8	Special	EBD	Classroom Behavior	Combined	Individualized	AB(B+C)
Bock (2007, Article 1)	1	1	5-8	General	ASD	Classroom Behavior	Alone	Individualized	MBD-Setting
Bock (2007, Article 2)	4	4	pK-4	Special	ASD	Classroom Behavior	Alone	Individualized	MBD-Setting
Campbell & Tincani (2011)	3	2	pK=4	Special	ASD	Classroom Behavior	Combined	Individualized	MBD-Participant
Chan & O'Reilly (2008)	2	2	pK-4	General	ASD	Mixed Classroom Behavior	Alone	Individualized	MBD-Behavior
Hagiwara & Myles (1999)	3	3	pK-4	Both	ASD	Classroom Behavior	Alone	Individualized	MBD-Setting
Hagopian et al. (2009)	1	1	NP	General	ASD	Social Interaction	Combined	Individualized	Mixed
Hansen & Lignugaris-Kraft (2005)	9	9	5-8	Special	EBD	Social Interaction Classroom Behavior	Combined	General	ABAB
Herring & Northup (1998)	1	1	pK-4	General	EBD	Classroom Behavior	Combined	Individualized	Mixed

Note. NP = not provided

Table 3. Study Characteristics (continued)

Study	N	Male	School Level	Educational Setting	Disability	Target Behavior	Intervention Implementation	Intervention Development	Experimental Design
Hune & Nelson (2002)	4	3	pK-4	General	At-Risk	Social Interaction Classroom Behavior	Combined	General	AB
Keeling et al. (2003)	1	0	pK-4	Both	ASD	Classroom Behavior	Alone	Individualized	MBD-Setting
Kelly & Shogren (2014)	4	4	9-12	Both	EBD	Classroom Behavior	Combined	General	MBD-Participant
Kuoch & Mirenda (2003)	3	3	pK-4	Special	ASD	Class Beh. (2) Soc Int (1)	Alone (2) Combined (1)	Individualized	ABA/Mixed MBD-Participant
Lo et al. (2002)	5	4	pK-4	General	At-Risk	Mixed Social Interaction Classroom Behavior	Combined	General	Participant MBD-Participant
Miller & Cole (1998)	1	1	NP	Special	EBD	Classroom Behavior	Alone	Individualized	Behavior MBD-Participant
Miller et al. (2011)	3	3	pK-4	General	At-Risk	Classroom Behavior	Alone	Individualized	Participant MBD-Participant
Ozdemir (2008)	3	3	pK-4	General	ASD	Behavior	Alone	Individualized	Participant MBD-Participant
Presley & Hughes (2000)	4	3	9-12	General	EBD	Mixed Social Interaction Classroom Behavior	Alone	General	Participant MBD-Participant
Scattone et al. (2006)	3	3	pK-4	General	ASD	Classroom Behavior	Alone	General	Participant MBD-Participant
Schneider & Goldstein (2010)	3	3	pK-4 (2) 5-8 (1)	Special (1) Both (2)	ASD	Classroom Behavior	Combined	Individualized	Participant MBD-Participant
Simpson et al. (2004)	4	2	pK-4	Both	ASD	Mixed	Alone	Individualized	Participant

Note. NP = not provided

Table 4. Social Skills Interventions

Study	Social Skill Intervention
Bardon et al. (2008)	PATHS curriculum
Blake et al. (2000, Study 1)	Working Together curriculum
Blake et al. (2000, Study 2)	Working Together curriculum
Blood et al. (2011)	Video-modeling with an iPod Touch
Bock (2007, Article 1)	Stop-Observe-Deliberate-Act (SODA)
Bock (2007, Article 2)	Stop-Observe-Deliberate-Act (SODA)
Campbell & Tincani (2011)	Power Card strategy
Chan & O'Reilly (2008)	Social Stories
Hagiwara & Myles (1999)	Multimedia Social Story
Hagopian et al. (2009)	Social Skills Training
Hansen & Lignugaris-Kraft (2005)	Social Skills Strategies program
Herring & Northup (1998)	Social Skills instruction
Hune & Nelson (2002)	Problem solving strategy
Keeling et al. (2003)	Power Card Strategy
Kelly & Shogren (2014)	Self-Determined Learning Model of Instruction (SDLMI)
Kuoch & Mirenda (2003)	Social Story
Lo et al. (2002)	Working Together curriculum
Miller & Cole (1998)	Social skills training package (Frame, 1982)
Miller et al. (2011)	Skillstreaming in Elementary School Child Skill Cards
Ozdemir (2008)	Social Stories
Presley & Hughes (2000)	Triple A Strategy (ASSESS, AMEND, and ACT)
Scattono et al. (2006)	Social Stories
Schneider & Goldstein (2010)	Social Stories
Simpson et al. (2004)	Video/computer based social skills instruction

Methodological Quality

Overall ratings. Each study as well as each graph within each study was assessed with the quality rubric and given an overall rating of methodological quality. This resulted in 24 studies and 43 graphs evaluated.

Study ratings. Twenty-four studies across 23 articles were assessed for methodological quality. Only one study received a rating of *Meets Design Standards* (Campbell & Tincani, 2011). About 42% (n = 10) of the studies evaluated received a rating of *Meets Design Standards with Reservations*. The remaining 54% (n = 13) of studies *Did Not Meet Design Standards*.

Individual graph ratings. Standards 3 and 4 from the methodological quality rubric were also applied to individual graphs within a study for a total of 43 graphs evaluated. Almost half of the designs (n = 19) *Did Not Meet Design Standards*. About 45% of the designs (n = 22) *Met Design Standards With Reservations*. Only two designs *Met Design Standards* (Campbell & Tincani, 2011; Kuoch & Mirenda, 2003).

Individual design standard ratings. The quality rubric assessed five standards: systematic manipulation of the independent variable, inter-observer agreement, fidelity of implementation, experimental control, and demonstration of effect. Failing to meet all design standards for IOA was the primary reason studies received *Meets Design Standards with Reservations* ratings (70%, n = 17), followed by demonstration of effect (58%, n = 14). Although the majority of studies met standards for experimental control (62.5%, n = 15), nine studies did not include at least three attempts to demonstrate intervention effects at three different points in time (see Table 4 and Table 5).

Systematic manipulation of the independent variable. All of the 24 included studies systematically introduced the SSIs. One study (Bardon et al., 2008) used a randomization technique to determine when the intervention would be implemented with each participant.

Inter-observer agreement. The majority of studies (96%, n = 23) reported IOA on 20% of data overall, at or above 80% for percent agreement or 60% for Cohen's Kappa, with only one study (Keeling, Smith, Myles, Gagnon, & Simpson, 2003) failing to provide any information on reliability. However, over 70% (n=17) of studies did not specify if IOA was collected for 20% of data in each condition.

Fidelity of implementation. Formal and informal fidelity of implementation data was reported for 66% (n=16) and 8% (n=2) of studies, respectively. Six studies (25%) did not report any data on fidelity of implementation.

Experimental control and demonstration of effect. Of the 24 studies evaluated 62.5% (n = 15) of studies demonstrated intervention effects for at least three different points in time, and 42% (n = 10) of studies utilized designs that included at least five data points per phase.

Table 5. Design Standards Ratings

Article	Rating (Study, Graph)	Article	Rating (Study, Graph)
Bardon et al. (2008)	0	Herring & Northup (1998)	0
Blake et al. (2000)		Hune & Nelson (2002)	
Graph 1	(0,0)	Graph 1	(0,0)
Graph 2	(0,0)	Graph 2	(0,0)
Graph 3	(0,0)	Graph 3	(0,0)
Blood et al. (2011)	1	Graph 4	(0,0)
Bock (2007, Article 1)	1	Keeling et al. (2003)	0
Bock (2007, Article 2)		Kelly & Shogren (2014)	
Graph 1	(1,1)	Graph 1	(0,0)
Graph 2	(1,1)	Graph 2	
Graph 3	(1,1)	Kuoch & Mirenda (2003)	
Campbell & Tincani (2011)	2	Graph 1	(0,0)
Chan & O'Reilly (2008)		Graph 2	(0,0)
Graph 1	(1,1)	Graph 3	(0,2)
Graph 2	(1,1)	Lo et al. (2002)	1
Hagiwara & Myles (1999)		Miller & Cole (1998)	1
Graph 1	(0,0)	Miller et al. (2011)	0
Graph 2	(0,0)	Ozdemir (2008)	1
Hagopian et al. (2009)	0	Presley & Hughes (2000)	1
Hansen & Lignugaris-Kraft (2005)		Scattone et al. (2006)	1
Graph 1	(0,1)	Schneider & Goldstein (2010)	
Graph 2	(0,0)	Graph 1	(0,1)
Graph 3	(0,1)	Graph 2	(0,0)
Graph 4	(0,1)	Simpson et al. (2004)	1
Graph 5	(0,1)		
Graph 6	(0,1)		
Graph 7	(0,1)		
Graph 8	(0,1)		
Graph 9	(0,1)		

Note. 0 = Does not meet design standards; 1 = Meets design standards with reservations;

2 = Meets design standards

Table 6. Methodological Quality Results

Study	IV	IOA-A	IOA-B	IOA-C	Fidelity-A	Fidelity-B	Fidelity-C	Experimental Control	Data Points	Overall Quality Rating
Bardon et al. (2008)	Y	Y	N	Y	I	N	N	N	≥ 5	Does not meet
Blake et al. (2000, Study 1)	Y	Y	N	Y	F	Y	Y	N	< 3	Does not meet
Blake et al. (2000, Study 2)	Y	Y	N	Y	F	Y	Y	Y	≥ 5	Reservations
Blood et al. (2011)	Y	Y	Y	Y	N	N	N	N	≥ 3	Does not meet
Bock (2007, Article 1)	Y	Y	N	Y	F	Y	Y	Y	≥ 3	Reservations
Bock (2007, Article 2)	Y	Y	Y	Y	F	Y	Y	Y	≥ 3	Reservations
Campbell & Tincani (2011)	Y	Y	Y	Y	F	Y	Y	Y	≥ 5	Meets
Chan & O'Reilly (2008)	Y	Y	N	Y	F	Y	Y	Y	≥ 3	Reservations
Hagiwara & Myles (1999)	Y	Y	N	Y	N	N	N	Y	≥ 5	Does not meet
Hagopian et al. (2009)	Y	Y	N	Y	N	N	N	Y	≥ 3	Does not meet
Hansen & Lignugaris-Kraft (2005)	Y	Y	N	Y	F	Y	Y	N	≥ 3	Does not meet
Herring & Northup (1998)	Y	Y	N	Y	N	N	N	N	< 3	Does not meet
Hune & Nelson (2002)	Y	Y	N	Y	F	Y	Y	N	≥ 3	Does not meet
Keeling et al. (2003)	Y	N	N	N	N	N	N	Y	≥ 5	Does not meet
Kelly & Shogren (2014)	Y	Y	Y	Y	F	Y	Y	N	≥ 5	Does not meet
Kuoch & Mirenda (2003)	Y	Y	N	Y	F	Y	Y	N	≥ 3	Does not meet
Lo et al. (2002)	Y	Y	N	Y	I	Y	N	Y	≥ 5	Reservations
Miller & Cole (1998)	Y	Y	N	Y	F	Y	Y	Y	≥ 5	Reservations
Miller et al. (2011)	Y	Y	N	Y	N	N	N	Y	≥ 5	Does not meet
Ozdemir (2008)	Y	Y	N	Y	F	Y	Y	Y	≥ 3	Reservations
Presley & Hughes (2000)	Y	Y	Y	Y	F	Y	Y	Y	≥ 3	Reservations
Scattono et al. (2006)	Y	Y	Y	Y	F	Y	Y	Y	≥ 3	Reservations
Schneider & Goldstein (2010)	Y	Y	N	Y	F	Y	Y	N	≥ 5	Does not meet
Simpson et al. (2004)	Y	Y	Y	Y	F	Y	Y	Y	≥ 3	Reservations

Note. Y = yes, N = no, F = formal, I = informal

Discussion

The purpose of this systematic literature review was to evaluate the evidence base of SSIs for students with or at-risk of EBD and students with ASD. This quality evaluation provided vital information on the methodological rigor within the existing social skills literature. Currently in the field of special education, there is a move to evaluate the methodological quality of the studies being conducted due to standards now available for helping to determine quality single-case experimental studies (e.g., Kratochwill et al., 2010). The methodological quality assessed in this study informs practitioners on whether the SSI research base is trustworthy as a viable intervention for the remediation of school-related social interactions and classroom behaviors. Three research questions were posed for this study. Findings for each research question are discussed below.

Major Findings

Research question one. *What is the methodological quality of single-case studies researching the effects of social skills instruction on school-related behavioral outcomes for students with challenging behavior?*

After applying the quality rubric to each of the 24 included studies, results indicated that the evidence-base on SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior is not ideal, but holds some potential. Over half of studies identified failed to meet minimum design standards with or without reservations (54%, n = 13). However, the fact that 60% of the remaining 10 studies met eight out of nine design standards is promising. From this evaluation, four areas of

methodological weakness were identified: *reliability*, *fidelity of implementation*, *experimental control*, and *demonstration of effect*.

Reliability. Although 96% (n = 23) of the studies evaluated included acceptable data on reliability, only 29% (n = 7) of studies specified conducting IOA consistently across all participants and phases. Adequate collection and reporting of IOA increases confidence in the reliability of effects reported in research literature. This finding is particularly important given that 15 of the included articles reported positive intervention effects but did not include adequate IOA measures. Insufficient IOA decreases the overall quality of data collection and, in the present study, decreases confidence in the results for these 15 articles (e. g., Bardon et. al., 2008; Blake et. al., 2000; Chan & O'Reilly, 2008; Schneider & Goldstein, 2010).

Fidelity. Six studies did not include information on fidelity of implementation (Blood et al, 2011; Hagiwara & Miles, 1999; Hagopian et al, 2009; Herring & Northup, 1998; Keeling et al., 2003; Miller et al., 2011). The quality rubric developed was based on the WWC design standards but was modified to include fidelity of implementation criteria. The addition of these criteria weakened the overall quality of the evidence for SSIs. While fidelity of implementation is not included in the WWC standards, reporting fidelity data ensures that interventions are provided as intended. Fidelity of implementation data is a key element in the description of intervention procedures. Lack of fidelity measures not only limit confidence in treatment efficacy, but hinder the ability for future researchers to replicate effects. Given that replication is essential to determining EBPs, the absence of fidelity measures is a real problem. Furthermore,

without the measure of treatment fidelity, it is unknown if a social skills intervention was ineffective due to an ineffective strategy or because it was poorly implemented.

Experimental control. The third area of concern, demonstrating experimental control, is foundational in SCR. It is generally known that appropriate experimental control validates the functional relationship between the independent and dependent variable. However, only 63% (n = 15) of the studies evaluated included three or more demonstrations of intervention effect at three different points in time. Therefore, the nine studies reporting positive effects lack the internal validity to support their findings (Bardon et al., 2008; Blake et al., 2000; Blood et al., 2011; Hansen & Lignugaris-Kraft, 2005; Herring & Northup, 1998; Hune & Nelson, 2002; Kelly & Shogren, 2014; Kuoch & Mirenda, 2003; Schneider & Goldstein, 2010). Based on these results, additional single-case studies with proper methodological rigor related to the internal validity of study design are needed to strengthen the evidence of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior.

Unfortunately, weaknesses in the areas of IOA, fidelity of implementation, and experimental control have also been documented in other SCR quality evaluations. For example, Maggin et al. (2011) evaluated the strength of evidence supporting the use of school-based token economies to increase appropriate student behaviors in the classroom. Results from their evaluation also found a lack of support for token economies due to poor methodological quality in the areas of IOA, fidelity of implementation, and experimental control. If researchers desire their study's findings to be included in the literature supporting a practice as evidence-based, they must design

and implement studies adhering, at minimum, to the basic design standards outlined by the WWC.

Research question two. *What are the most common school-related behaviors targeted for improvement through SSIs?*

Results focused on question two were organized into two categories. The first category, *social interaction*, describes behaviors in which the participant engaged in physical or verbal interactions with peers or adults in school settings. The second category, *classroom behavior*, was used to describe all other behaviors which did not involve social interactions with peers or adults. Instead, target behaviors categorized as *classroom behavior* included behaviors such as noncompliance, temper tantrums, and property destruction. The three most common behaviors across all studies in both categories were noncompliance, negative verbal interactions, and class disruptions.

Specific to the category of *classroom behavior*, off-task behavior, class disruptions, and noncompliance were the three most common targeted behaviors. Specific to the category of *social interaction*, physical or verbal aggression and negative verbal interactions were the most common targeted behaviors. The majority of participants with target behaviors in the *social interaction* category were students with or at-risk for EBD. Conversely, the majority of participants with target behaviors in the *classroom behavior* category were students with ASD. Social stories and video modeling were often used to teach students with ASD social skills related to appropriate classroom behavior and routines but not social interaction skills. Perhaps one reason that studies including students with or at-risk of EBD primarily focused on social interaction skills is

that verbal and physical aggression, which are more characteristic for this population, are more visible than the social interaction deficits of students with ASD such as negative verbal interactions or off topic comments during conversations.

Research question three. *What percentages of included studies (a) were conducted in preschool, elementary, and secondary settings; (b) researched the effects of SSIs for students with or at-risk of EBD versus students with ASD; (c) individualized treatment to the social skill deficits of the student; and (d) implemented SSIs alone versus combining social skills instruction with other behavioral strategies?*

Results focused on question three showed that the majority of studies were conducted in early elementary grades prekindergarten through 4th grade. Consistent with previous research, findings indicate a lack of research on SSIs for students with or at-risk of EBD and students with ASD at the intermediate/middle and secondary settings (Maag, 2006). An equal number of studies included participants with ASD compared to participants with or at-risk for EBD. However, at the participant level, more participants with or at-risk of EBD (n = 44) were found than students with ASD (n = 31). Similarly, 15 studies individualized the social skills intervention to the student, but at the participant level the numbers were almost even (individualized, n = 37; general, n = 38). Interventions that were individualized were primarily in studies including students with ASD. In contrast, the general SSIs were implemented for groups of students with or at-risk for EBD. This is most likely due to the fact that students with or at-risk of EBD are often separated from the general learning environment and grouped with other students displaying similar behaviors.

The majority of studies implemented SSIs alone (62.5 %, n = 15) as opposed to combining the intervention with other behavioral strategies. For nine studies SSIs were combined with one of the following strategies: Visual reminders, peer training, self-management, reinforcement, corrective feedback, and group contingency. The unique design employed by Kuoch & Mirenda (2003) allowed for an instant comparison between a social story intervention implemented alone versus combined with a behavioral reminder strategy. Surprisingly, the social story implemented in isolation was found to be more effective. Combining SSIs with other behavioral strategies provides insight into which combinations of interventions are effective or ineffective for students with or at-risk of EBD and students with ASD.

Limitations and Implications for Future Research

Results of this systematic literature review on the quality of SCR for SSIs suggest that future research be conducted with greater methodological rigor, particularly in the areas of IOA, fidelity of implementation, and experimental control. If SCR studies are to be used to identify EBPs, then their results are directly linked to the methodological quality of the study design. Future research should adhere, at minimum, to guidelines set by WWC and may need to assess methodological quality at the study, design, or participant level in order to accurately capture features of research design.

Although the WWC design standards provide a solid framework for assessing methodological rigor in SCR, there is still room for growth. Improvements to the WWC design standards should be made to further advance the methodological quality of SCR. The quality rubric used in the present study included criteria for the fidelity of

implementation and future research should continue to focus on the importance of fidelity measures. Because replication is essential to the identification of an EBP (Horner et al., 2005), and fidelity of implementation data aids future researcher in replicating intervention effects, this area should be included as a basic standard for SCR design.

Measures of social validity should also be included as part of SCR design standards. Two major barriers to the implementation of EBPs in school settings are the lack of time and inadequate support from administrators (Kratochwill & Shernoff, 2004). Feedback from participants and school personnel on the feasibility of an intervention guide practitioners toward interventions that can be easily translated into the classroom. Therefore, measures of social validity are vital if the ultimate goal is to transfer EBPs into practice. Finally, future studies are needed to extend the research on social skills intervention to other populations of individuals with disabilities (e. g. students with ADHD or adults with disabilities), in a variety of settings (e. g., naturalistic, home, or employment settings), and other behaviors of interest (e. g., problem solving, safety skills, or social competence).

Three limitations should be considered when interpreting the findings of the present literature review. First, although efforts were made to identify all studies meeting inclusion criteria, all suitable studies may not have been identified. It is possible that studies not identified could have impacted results. Second, the majority of included studies were conducted in pre-kindergarten through 4th grade settings. Therefore, care should be taken when interpreting results for students in intermediate and secondary settings. Third, the specific focus of this study was on (a) students with or at-risk of EBD

and students with ASD and (b) outcome measures for the remediation of social interaction or classroom behaviors only. These conditions limit the generalization of findings to similar participant and study characteristics.

Conclusion

In this study, a systematic literature review process was used to evaluate the methodological quality of the evidence base for SSIs as an intervention for students with challenging classroom behavior, including students with or at-risk of EBD and students with ASD. Results from the quality evaluation provided information on the methodological rigor and the strength of support for social skills as a viable intervention for the remediation of school-related social interactions and classroom behaviors. Areas of methodological design relating to *reliability*, *fidelity of implementation*, *experimental control*, and *demonstration of effect* were identified as weakness in the literature base. Systematic manipulation of the independent variable was identified as a strength.

CHAPTER III

**SOCIAL SKILLS INTERVENTIONS FOR STUDENTS WITH CHALLENGING
BEHAVIOR: A SINGLE-CASE RESEARCH META-ANALYSIS**

Statement of the Problem

Challenging classroom behaviors, exhibited by students with or at-risk of Emotional Behavioral Disorder (EBD) and individuals with Autism Spectrum Disorder (ASD), are a common problem in schools (Forness, Freeman, Paparella, Kauffman, & Walker, 2012; Walker, Colvin, & Ramsey, 1995). School displays of challenging behavior can disrupt the learning environment, detract instructional time, and contribute to teacher burnout (Osher, Bear, Sprague, & Doyle, 2010). Consequently, public school systems are concerned with the number of students displaying challenging behavior (Walker et al., 1996).

Challenging behaviors can be defined as “any repeated pattern of behavior or perception of behavior that interferes with or is at-risk of interfering with optimal learning or engagement in prosocial interactions with peers and adults” (Dunlap et al., 2006; Smith & Fox, 2003). Students who exhibit persistent challenging behaviors can establish developmental trajectories that place them at-risk for a host of negative life outcomes (Bradshaw et al., 2010; Calderella & Merrel, 1997; Mathur & Rutherford, 1996; Walker et al., 1996). Furthermore, chronic displays of disruptive classroom behavior can adversely affect the development of interpersonal relationships and academic achievement (Dunlap et al., 2006).

The most common responses to displays of disruptive classroom behavior result in the removal of the student from the general learning environment and/or segregation with other deviant peers. However, removing students from the learning environment negatively affects academic outcomes, and separation with deviant peers can actually increase behavioral challenges (Conoley & Goldstein, 2004). Thus, emphasis should be placed on classroom interventions that strengthen protective factors for challenging behaviors. Teaching prosocial behavior through SSIs can counter the development of challenging behavior.

Social Skills Deficits

Challenging behaviors can be conceptualized as social skills deficits (Gresham, Van, & Cook, 2006). Overcoming social skills deficits and acquiring prosocial behaviors leads to positive social interactions and interpersonal relationships, which can increase school success (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). Positive patterns of social responses and increases in social competence also assist students in avoiding negative school consequences such as peer rejection and isolation (Mathur & Rutherford, 1996). Social skills are necessary for students to develop and maintain positive social relationships with peers and adults in school settings. However, for students with or at-risk of EBD and students with ASD social skills may need to be explicitly taught, learned, and practiced in order for the development of social competence to occur (Gresham, Sugai, & Horner, 2001).

Social competence “represents an evaluative term based upon judgments, given certain criteria, that a person has performed a task adequately” (Gresham, 1986).

Although related, social skills and social competence are not synonymous. Social skills are defined as “socially acceptable learned behaviors enabling individuals to interact effectively with others and avoid or escape socially unacceptable behaviors exhibited by others” (Gresham, 1998). As a behavioral construct, previous research has identified five broad social skill domains: *peer relationship skills, self-management skills, academic-related skills, compliance, and assertion skills* (Caldarella & Merrell, 1997). The concept of social skills as a behavioral construct directly ties social skills to observable behaviors (Gresham, 1986).

Within the context of school settings, Walker, Irvin, Noell, and Singer (1992) conceptualized observable social skill behavior as consisting of both adaptive and maladaptive teacher and peer social behaviors. Teacher preferred social skills include compliance, listening, and following directions (Walker et al., 1992). Peer preferred social skills are behaviors related to forming friendships and gaining acceptance from peer groups (Walker et al. 1992). Because students with or at-risk of EBD and students with ASD are often characterized by school personnel as having poor social skills (Denning, 2007; Kauffman et al., 2007), the present research focused on challenging classroom behavior associated with social skills deficits common to both populations of students.

Social skills deficits for students with or at-risk of EBD. Students with or at-risk of EBD have externalizing and/or internalizing behavioral patterns that are often linked to social skills deficits (Lane, Parks, Kalberg & Carter, 2007; Walker, Gresham, & Ramsey, 2004). Problem behaviors characteristic of students with or at-risk of EBD

include a failure to abide by rules, defiance of authority, peer conflicts and an avoidance of responsibility (Sprague, Sugai, & Walker, 1998). Social skill deficits of students with or at-risk of EBD have been described as either skill or performance deficits. According to this model, students with or at-risk of EBD have either not learned the targeted social skill (skill deficit) or the student has learned the skill, but chooses not to perform the social skill (performance deficit; Mathur & Rutherford, 1996).

Students with or at-risk of EBD who display challenging behavior due to either skill deficits or performance deficits are placed at-risk for juvenile delinquency, academic failure, school disengagement, and peer rejection (Bradshaw et al. , 2010). Additionally, students with or at-risk of EBD are shown to have poor school attendance, impaired personal relationships, negative peer and teacher interactions, and a greater need for mental health services (Lane et al., 2007; Wagner & Davis, 2006; Walker et al., 2004). For example, Dishion, Loeber, Stouthamer-Lober, and Patterson (1984) investigated the relationship between official and self-reported juvenile delinquency and academic, interpersonal, and work skills. Poor interpersonal skills were found to be associated with both official and self-reported juvenile delinquency. Thus, remediating interpersonal skill deficits and improving social interaction skills can potentially enhance quality of life for students with or at-risk of EBD who constantly display challenging classroom behavior.

Social skill deficits for students with ASD. Social skill deficits similar to those found in students with or at-risk of EBD are also characteristic among students with ASD, particularly those who are higher functioning (Wang, Cui, & Parrila, 2011).

Children with high function autism (HFA), pervasive developmental disorders not otherwise specified (PDDNOS), or Asperger syndrome show fewer cognitive and language deficits compared to students with more severe forms of ASD (Rao, Beidel, & Murray, 2008). However, the development of social skills continues to be a major problem for students with ASD (Rao et al., 2008).

Social interaction skill deficits related to initiating interactions, maintaining reciprocity, understanding perspectives, and inferring meanings have been identified in students with ASD (Bellini, Peters, Benner, & Hopf, 2007). Because of these social skill deficits, students with ASD have difficulty communicating with peers and adults, processing social situations, and establishing social relationships. Social interaction skill deficits can negatively affect social, emotional, and cognitive development and are linked to lifelong implications of depression, limited job success, and poor relationships (Denning, 2007). For example, Bauminger and Kasari (2000) investigated loneliness and friendship in children with HFA. Their study found that children with HFA reported feeling lonely and expressed a desire to form relationships with others. However, students lacked the understanding of others' thoughts, feelings, and desires which prevented them from forming meaningful relationships. Schools expect students to successfully interact with peers and adults on a daily basis. Given that the development of positive relationships is essential in school settings, findings from the Bauminger and Kasari (2000) study are disparaging.

In addition to difficulties with social interaction, students with ASD are likely to exhibit behavioral challenges in school settings when faced with social situations

perceived as difficult. Because challenging behaviors can impede social, behavioral, and/or academic progress at school, previous research has focused on interventions to help students with ASD transition between classroom activities, pick up on social cues, and adjust to new situations (Dettmer, Simpson, Myles, & Ganz, 2000). For example, Dooley, Wilczenski, and Torem (2001) implemented a social communication intervention to decrease the challenging behavior of a student with pervasive developmental disorder. During transitions their participant exhibited disruptive behaviors such as hitting, kicking, biting, crying, and screaming. They reported a dramatic increase in cooperative classroom behavior following the social skill intervention.

Further examples of effective SSIs for students with ASD displaying challenging classroom behavior include explicitly teaching specific behaviors and expectations, prompting, and reinforcement (Scattone, 2007). Differing models of social skill practices include peer-mediated training, social stories, and video modeling (Wang, Parrila, & Cui, 2013). Because it is difficult for student with ASD to develop social skills through observation alone, additional SSI practices that are evidence-based are needed to teach students with ASD appropriate school-related social behaviors and interactions.

Single-Case Meta-analyses to Identify Evidence-based Practices

Although there is ongoing disagreement concerning methods of single-case meta-analysis, synthesis of intervention studies using single-case designs contribute meaningful knowledge to research literature and to the identification of evidence based

practices (EBPs) for students with disabilities. EBPs are defined as "practices and programs shown by high-quality research to have meaningful effect on student outcomes" (Cook & Odom, 2013). Recent legislative changes in the Individuals with Disabilities Education Improvement Act (IDEA, 2004) and No Child Left Behind Act (NCLB, 2001) have influenced the field of special education to place greater emphasis on identifying EBPs (Shavelson & Towne, 2002).

Horner et al. (2005) put forward the 5-3-20 criteria for what can be considered an EBP where a body of research on a specific practice that: (a) includes five studies meeting basic design standards, (b) has been conducted by at least three different researchers in three different geographic locations, and (c) includes a total of at least 20 participants is deemed an EBP. Therefore, by definition, a body of research on a specific intervention or practice must be evaluated on methodological design and assessed for overall effect before it can be considered evidence-based. Thus far previous literature on SSIs has been inconsistent.

Previous Meta-Analysis on SSIs

SSIs for individuals with challenging behavior (i. e., EBD and ASD) have a long history in research literature. This is evidenced by the number of narrative, quantitative, and meta-analytic reviews dating back to 1981 that have been conducted on SSIs (Cappadocia & Weiss, 2010; Flynn & Healy, 2011; Gillis & Butler, 2007; Gresham, 1981; Gresham, 1985; Gresham & MacMillan, 1997; Maag, 2006; Reichow & Volkmar, 2010; White, Keonig, & Scahill, 2007). Literature reviews conclude that SSIs can be effective in promoting the acquisition and performance of prosocial behaviors (Gresham,

1981; Gresham 1985; McIntosh et al., 1991). However, meta-analyses on SSIs have reported mixed findings.

Group design meta-analyses. Several group meta-analyses on SSIs have also been conducted including student with or at-risk for EBD (Ang & Hughes, 2001; Beelmann, Pflingsten, & Losel, 1994; Cook, Gresham, Kern, Barreras, Thornton, & Crews, 2008; Quinn, Kavale, Mathur, Rutherford, & Forness, 1999; Schneider, 1992). Low to moderate effect sizes were reported. For example, Schneider (1992) reported an overall average effect size of $r = .40$ across 79 reviewed studies. In the meta-analysis by Beelman et al. (1994), stronger effect sizes were reported for problem solving measures ($g = .78$) while weaker effect sizes were reported for behavior ratings ($g = .26$).

Later meta-analyses continued to report conflicting results. In the meta-analysis conducted by Quinn et al. (1999) an overall effect size of only $d = .20$ across 35 group studies was found. Then, Ang and Hughes (2002) analyzed 38 studies on SSIs for antisocial youth and reported an overall effect size of $\Delta = .62$. Following, Cook et al. (2008) synthesized the meta-analytic literature on SSIs for secondary students with or at-risk for EBD. Their study included five meta-analyses and reported an overall weighted mean effect size of $r = .32$. Meaning two thirds of students with or at-risk for EBD, compared to one third of students in control groups, showed improvements following intervention.

Single-case design meta-analyses. SCR has typically been excluded from meta-analysis on SSIs for students with challenging behavior (e. g., Ang & Hughes, 2001; Beelmann et al., 1994; Quinn et al., 1999; Schneider, 1992). However, meta-analysis of

SCR is being conducted more now because of the standards now available for helping to determine quality single-case experimental design (Kratochwill et al., 2013).

Five meta-analyses on social skills instruction for students with ASD that included single-case studies were found (Bellini et al., 2007; Mathur et al., 1998; Schneider, Goldstein, & Parker, 2008; Wang et al., 2011; Wang et al., 2013; Wang & Spillane, 2009). Similar to group meta-analyses results, meta-analyses on SSIs including SCR have reported a wide range of effect sizes.

Bellini et al. (2007) used the percent of non-overlapping data (PND) effect size to analyze 55 studies researching social skill interventions for children with ASD. Their meta-analysis resulted in a mean PND effect size of 70%. The meta-analysis by Wang and Spillane (2009) included 36 single-case and two group studies. The following mean PND effect sizes were reported: social stories (67.21%), peer mediated (60.69%), video modeling (84.25%), and cognitive behavioral training (100%). Schneider et al. (2008) used the percentage of all non-overlapping data points (PAND) and the Phi statistic to calculate an overall effect size. An average weighted Phi of .71 was found for peer-mediated interventions on social skills of students with autism.

Two recent single-case meta-analyses on social skills have used hierarchical linear modeling (HLM) to examine outcomes across multiple social skills studies (Wang et al., 2011; Wang et al., 2013). Both studies indicated that SSIs were effective in improving the social behavior of children with ASD, reporting $\gamma = 1.27$ ($SD = 0.43$, $CL_{95} = 1.05 - 1.50$, Wang et al., 2011) and $\gamma = 1.40$ ($SD = 0.43$, $CL_{95} = 1.32 - 1.48$, Wang et al., 2013).

Only one single-case meta-analysis focusing on SSIs for students with or at-risk of EBD and students with ASD was found (Mathur et al., 1998). In the Mathur et al. (1998) meta-analysis, a total of 64 single-case studies were analyzed. The mean PND across all 64 studies was 62% ($SD = 33\%$). The study included 283 participants identified as having behavioral problems, including those with EBD and ASD. Participants at the elementary and secondary levels were found to benefit more from social skills instruction than participants at the preschool level. Additionally, greater social skills intervention effects were reported for promoting social interaction skills than fostering communication skills. The mean PND for studies that assessed maintenance and generalization of social skill was 64%. Comparing results from the Mathur et al. (1998) meta-analysis to the meta-analyses on students with ASD, greater effects were reported for studies that only included students with ASD.

Differential Effects, Maintenance, and Generalization

Previous meta-analyses have identified differential effects for SSIs based on theoretical approach, intervention type, group composition, intervention strategy, implementation format, disability, and school level (Ang & Hughes, 2001; Bellini et al., 2007; Cook et al., 2008; Mathur et al., 1998; Schneider et al., 1992; Wang & Spillane, 2009). Additionally, smaller effect sizes have been reported for generalization of social skill with a PND range of 74% (Mathur et al., 1998) to 80% (Bellini et al., 2007). Greater effects have been reported for the maintenance of social skill with PND ranging from 53% (Bellini et al., 2007; Mathur et al., 1998) to 80% (Wang & Spillane, 2009). Continued research synthesizing the literature on SSIs is needed to: (a) provide further

support for SSIs as an effective practice for students with or at-risk of EBD and students with ASD who display challenging behavior, (b) confirm previously identified moderator variable and identify any additional moderator variables, (c) determine the effect of social skills instruction on the maintenance and generalization of social skill.

Purpose and Research Questions

Researchers have been investigating the effects of social skills training for over 30 years (Maag, 2006). Literature reviews conclude that social skills training can be effective in promoting the acquisition and performance of prosocial behaviors (Beelmann et al., 1994; Gresham, 1981; Gresham 1985; McIntosh, Vaughn, & Zaragoza, 1991). However, meta-analysis on social skills training have reported low to moderate effect sizes (Ang & Hughes, 2001; Beelmann, Pfingsten, & Losel, 1994; Cook et al., 2008; Mathur et al. , 1998; Quinn et al., 1999; Schneider, 1992). To date there has only been one single-case meta-analysis focusing on SSIs for students with emotional and behavioral difficulties and students with autism (Mathur et al., 1998).

The purpose of this SCR meta-analysis was to update the research from Mathur et al., 1998) and determine for whom and under what circumstances SSI's are effective.

This meta-analytic study answered the following research questions:

- 1) What is the overall effect of SSIs for students with or at-risk of EBD and students with ASD?
- 2) Are there differential effects for SSIs based on: (a) disability, (b) target behavior, (c) intervention implementation, (d) intervention development, or (e) methodological quality?

- 3) What is the overall effect of SSIs on maintenance and generalization?
- 4) Do SSIs meet criteria to be considered an EBP for students with or at-risk of EBD and students with ASD?

Methods

Article Identification

Systematic methods for article identification were identical to the study conducted in Chapter II. This process began with an electronic search of psychology and educational databases (PsycINFO, Educational Resources Information Center, Academic Search Complete, and Education Full Text) to identify studies using single-case designs to research the efficacy of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. The following search terms were used:

behavioral disorders, emotional disorders, seriously emotionally disturbed, disruptive behavior, social behavior problems, antisocial behavior, autism, social behavior problems or conduct disorders AND social skills training or SSIs.

Additionally, an ancestral search was conducted using references of identified articles. Because the most recent research may not have been added to the electronic databases, hand searches in the following journals were conducted to find additional articles published between 2013 and 2014 meeting inclusion criteria: *Exceptional Children, Behavioral Disorders, Journal of Emotional and Behavioral Disorders, Journal of Autism and Developmental Disorders, Journal of Applied Behavior Analysis, Journal of Autism and Developmental Disorders, Journal of Positive Behavior Interventions, and Remedial and Special Education*. A total of 22 articles were identified through the electronic search and one article was identified through the extended search

resulting in 23 articles with 24 studies included in the present meta-analysis (see Chapter II, Figure 1). Articles identified in Chapter II were identical to the articles included in this meta-analysis.

Inclusion and Exclusion Criteria

The intent of this meta-analysis was to evaluate the overall effectiveness of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. Studies were included in this literature review if: (a) the participants were educated in a school setting, (b) the participants were described as with or at-risk of EBD or students with ASD exhibiting challenging classroom behavior, (c) the intervention implemented was based on teaching social skills related to prosocial classroom behaviors or positive social classroom interactions (d) outcome measures in the study assessed school related social skills behaviors as a primary predictor, (e) the study used a single-case design methodology, and (f) was written in English, conducted in the United States, and was published in a peer-reviewed journal after 1998.

Dissertations were excluded because the goal of this meta-analysis was to summarize the effectiveness of SSIs based on studies that have been evaluated through a peer-review process. Studies were also excluded if they were conducted in clinical facilities or in the home environment, if the dependent measures did not include school-related social skill behaviors, or if the study utilized a group design or did not report on experimental findings (e. g., systematic literature reviews, editorials, commentaries, or practitioner guides).

Coding of Descriptive Information

As outlined in Chapter II, included articles were reviewed and descriptive information was extracted for coding. Each article was coded for: (a) study design, (b) participant and setting characteristics, (c) intervention characteristics, (d) methodological quality, and (e) potential moderators. The code book with operational definitions for coded variables can be seen in Appendix A.

Participant and setting characteristics. Participants were coded on: (a) age, (b) gender, (c) school level (d) ethnicity, (e) disability and (f) educational setting. The age of each participant was recorded in whole years rounding down when necessary. School level of participants included three levels: early elementary (preK-4), intermediate/middle (5-8), and secondary (9-12). Gender was dichotomous including male and female. Ethnicity included: Caucasian, African American, Hispanic, Asian, and Other/Not Provided. Disability included three levels and was coded as identified with EBD, identified with Autism Spectrum Disorder (ASD), or At-Risk. Educational setting of participants was coded as special education, general education, or both.

Intervention characteristics. Techniques of SSIs can vary based upon student needs, desired outcomes, or implementation. Intervention characteristics including the type of social skill intervention, individualization, implementation, and dependent measures were coded.

Potential moderators. An independent variable that affects the primary relationship between the intervention and the dependent variable is a moderator variable (Baron & Kenny, 1986). The studies identified were coded for potential moderators to

determine for whom and under what circumstances are SSIs effective. Previous research on SSIs for students with behavioral difficulties have identified differential effects for preschool aged students, students identified with disabilities, individualized treatment for specific social skills deficits, and length of intervention implementation. Moderator variables evaluated in the present study included: (a) disability (b) target behaviors, (c) intervention implementation, (d) intervention development, and (e) methodological quality.

Disability status. The current study primarily focuses on two disability categories: Emotional Behavioral Disorders (EBD) and Autism Spectrum Disorders (ASD). The *Disability Status* variable consisted of two levels: *with or at-risk of EBD* and *students with ASD*. Students who were not identified as having a disability, but exhibited significant and consistent problematic classroom behaviors were considered at –risk of EBD.

Target behaviors. Social skill behaviors were defined as any behavior that a student uses to perform competently and successfully on social tasks (Gresham et al., 2001). This study focused specifically on school-related classroom behaviors and social interactions as outcome variables. Target behaviors were coded as: *classroom behaviors*, *social interaction*, or *mixed*. Behaviors related to compliance, on-task behavior, and adherence to classroom rules and procedures were categorized as *classroom behaviors*. Behaviors involving interactions with the participant and other peers or adults were categorized as *social interaction* (see Chapter II, Table 1).

Intervention implementation. Intervention implementation was coded as *alone* or *combined*. Studies in which social skills training was the only intervention implemented were considered stand-alone SSIs and were coded *alone*. Studies in which SSIs were combined with other strategies such as self-monitoring, cueing, group contingency or other forms of reinforcement were considered *combined* SSIs.

Intervention development. Intervention development refers to the individualization of the social skills intervention to the student. Interventions were considered *individualized* if they were created specifically for the student and matched social skills taught to the student's social skill deficits (i. e., problem behavior). Studies implementing established social skills curricula which taught a variety of social skills were coded as *general* SSIs.

Methodological quality. Results from the study conducted in Chapter II on methodological quality of research design were included as a potential moderator. Studies meeting design standards with or without reservations overall were compared against studies not meeting design standards.

Quantitative Synthesis

Effect size estimation. Percentage of non-overlapping data (PND; Scruggs, Mastropieri, & Casto, 1987), percentage of all non-overlapping data (PAND; Parker, Hagan-Burke, & Vannest, 2007), non-overlap of all pairs (NAP; Parker & Vannest, 2009), and improvement rate difference (IRD; Parker, Vannest, & Brown, 2009) are some commonly found non-overlap effect size indices used in SCR. PND is a widely used non-overlap index for synthesizing single-case design studies (Campbell, 2013).

However, this popular statistic is heavily influenced by outliers along with baseline trend. PND is also inaccurate in measuring the magnitude of treatment effects when data do not overlap but show large differences between baseline and intervention phases (Campbell, 2013). Recently, an additional non-parametric statistic, Tau-U was introduced (Parker, Vannest, Davis, & Sauber, 2011).

Tau-U. Tau-U, an index for analyzing single-case data, combines non-overlap between phases with trend from within the intervention phase (Parker et al., 2011). Using derivations from the Kendall's Rank Correlation coefficient and Mann-Whitney U test of non-overlap between groups, Tau-U measures level and trend of data (Parker et al., 2011). Including level and trend in an analysis provides a complete measure of treatment effect, overcoming limitations of traditional non-overlap methods (e. g. PND; Parker et al., 2011). Furthermore, Tau-U is distribution free and more suitably controls for positive baseline trend supporting its use to synthesize single-case design data to estimate intervention effects (Parker et al, 2011).

Data extraction. Numerical values for each graphed data point were extracted in order to calculate effect sizes between phase contrasts. GetData, a computer software program, was used to extract graphed data from the included articles (GetData, 2012). For each study, the figures containing graphed data for measures of outcome variables were cropped and uploaded into the GetData computer software. Once uploaded, and the scale of the X and Y axes were set, values for each data point were extracted and exported into an Excel spreadsheet for analysis. Values were rounded to the nearest

whole number when necessary. Excel spreadsheets containing extracted data were then labeled to identify data for each phase, and phase contrasts were determined.

Phase contrasts. Phase contrasts are required in order to synthesize SCR (Faith, Allison, & Gorman, 1996). Determination of phase contrasts mirrored traditional comparisons of phases used for visual analysis of effects. Effect sizes between phase contrasts were calculated to measure the magnitude of change between two phases. For the present meta-analysis, all AB phases were contrasted and analyzed. For ABAB reversal designs, separate Tau -U effect sizes were computed between A_1B_1 and A_2B_2 and then aggregated.

For multiple baseline designs (MBD) adjacent phases were contrasted for each tier and then aggregated. Studies with more than one intervention phase using ABAC designs were contrasted between adjacent baseline and intervention phases (A_1B and A_2C). In studies where the intervention was conducted across more than one phase, an AB phase contrast where B included data across all intervention phases was used. Maintenance and generalization phases were contrasted against the A_1 (first baseline) phase. Data from phases including fading procedures were included as maintenance phase data. Individual effect sizes were aggregated separately at the participant and study level when appropriate.

Effect size calculation. Once all data were labeled and phase contrasts were determined, data for each contrast were entered into the online Tau-U calculator (Vannest, Parker, & Gonon, 2011). Using the contrast function and correcting for baseline trend, the online calculator produced results in which Tau-U values, standard

error of Tau-U (SE_{Tau}), and 95% CIs were recorded. Calculation of the Tau-U effect size involves a point by point comparison of all data in a time forward motion. Each pair of data from within and between each phase being contrasted was determined to be a positive pair, a negative pair, or a tie. The number of positive pairs and the number of negative pairs were used in the calculation of Tau-U using the formula: number of positive pairs - number of negative pairs, divided by the total number of pairs (Parker et al, 2011).

Effect size aggregation. Output results for Tau-U and SE_{Tau} were entered into WinPepi resulting in an effect size and confidence interval for each study. The following procedures were used: (a) *Compare 2*, (b) *META-ANALYSIS; analysis of stratified data*, (c) *Others, or proportions or rates with effect sizes/CIs*, and (d) *Also enter standard error*. Unique effect sizes and SE_{Tau} values for each phase contrast were entered and aggregated to find a single effect size for each participant. Resulting effect sizes for each participant within a study were then aggregated using the same procedures to arrive at a single effect size at the study level. For example, Hune and Nelson (2002) conducted a study with four participants and collected data on positive and negative social skills for each participant. Effects from both dependent measures were calculated separately and aggregated to obtain a single effect size for each participant. Then, effect sizes for each participant were aggregated resulting in a single overall effect size for the study.

Aggregated effect sizes at the participant and study level allowed for comparison of intervention effects among the 24 studies as well as between participant

characteristics. Instances where the expected behavioral change was negative, signs for negative Tau-U values were reversed prior to effect size aggregation.

Statistical significance and differential effects. Statistical significance for Tau-U values was determined using 95% CIs indicating a reasonable change of 5-10% likelihood of error (Nunnally & Bernstein, 1994). Statistically significant differences between Tau-U values were obtained through the use of 83.4% CIs. A test of non-overlapping 83.4% CIs shows statistical significance ($p = .05$) has occurred. This test of non-overlap is equivalent to the student t test of statistical significant differences between multiple effect sizes (Payton, Miller, William & Raun, 2000). Visual analysis indicates statistically significant differences between effect sizes in which the 83.4% CIs do not overlap. Forrest plots with confidence intervals at the 83.4% level were created to allow for visual analysis of statistical significant differences and outliers (Parker, 2006).

Reliability

Reliability for article selection, descriptive coding, and methodological quality coding were assessed in Chapter II. Simple percent agreement and Cohen's Kappa, a more conservative measure of reliability adjusting for chance agreement (Ary & Suen, 1989), were calculated for each area of reliability. Simple percent agreement was calculated by dividing the sum of agreements by the total number of agreements plus disagreements multiplied by 100. Cohen's Kappa was calculated using the Vassar stats website (2001). Percent agreement above 80% and Cohen's Kappa values above .60 are considered acceptable (Kratochwill, et al., 2013). Percent agreement and Cohen's Kappa

for article selection, descriptive coding, and methodological quality were 90% and .81, 87% and .70, and 100% and 1.0, respectively. Additionally, all calculations for six studies (21.7%) were checked for reliability. Reliability for data calculation was 100%.

Results

Participant and Study Characteristics

Twenty-four studies across 23 articles published between 1998 and 2014 were analyzed. Studies included 75 participants with the majority of participants identified as male (89%, n=67). Although ethnicity was not reported for 24 participants (32%), African American (33%, n=25) and Caucasian (31%, n=23) were the two ethnic groups with the greatest representation. All studies involved students with behavioral difficulties with 15 participants (20%) at-risk of EBD, 29 participants (39%) identified with EBD, and 31 participants (41%) identified with ASD. The majority of students were educated in special education settings including specialized schools for students with disabilities (47%, n=35), followed by general education settings (35%, n=26). Fourteen of the participants (18%) were educated in both special education and general education settings.

Multiple baseline designs were the most commonly used experimental design (67%, n=16) followed by AB or reversal/variation designs (16.5%, n=4), and mixed designs (16.5%, n=4). About half (49%, n=37) of the interventions implemented were individualized for each participant.

Overall Effect

A total of 301 phase contrast were conducted and aggregated, resulting in 75 Tau-U values at the participant level and 24 Tau-U values at the study level. The overall Tau-U effect size across the 24 included studies was .66 ($SE = .02$) with a confidence interval of $CI_{95} = .62$ to $.70$. The range of effect sizes and corresponding 95% CIs are illustrated in Figure 2. Therefore, we can be 95% certain that the true value for each study's effect size falls between the upper and lower limits of the calculated 95% CI. The overall effect size of SSIs on the maintenance ($n = 93$) of social skills was .79 ($SE = .04$, $CI_{95} = .72$ to $.87$). The overall effect size of SSIs on the generalization ($n = 5$) of social skills was .57 ($SE = .09$, $CI_{95} = .40$ to $.75$). Tau-U values were converted to Cohen's d for comparison between previous meta-analyses results using the formula $d = 3.464 * (1 - \sqrt{1 - x})$. Cohen's d values for overall effect, maintenance, and generalization were 1.44, 1.87, and 1.19 respectively.

Moderators

Potential moderators of SSIs were tested by calculating statistically significant differences between effects through the use of 83.4% CIs. Visual analysis of the forest plot illustrated in Figure 3 indicates statistically significant differences between effect sizes in which the 83.4% CIs do not overlap. Four moderator variables were identified: target behavior, intervention implementation, intervention development, and methodological quality.

Disability. Students with or at-risk of EBD ($n=44$) were compared to students with ASD ($n=31$). Differences in treatment effects were not found between students with

ASD ($ES = .71$, $SE = .04$, $CI_{95} = .64$ to $.79$) and students with or at-risk of EBD ($ES = .63$, $SE = .03$, $CI_{95} = .58$ to $.68$).

Target behaviors. A statistically significant difference in effect was found between students whose target behaviors focused on social interactions with peer and adults ($ES = .61$, $SE = .03$, $CI_{95} = .57$ to $.65$) compared to students whose target behaviors focused only on classroom behaviors ($ES = .73$, $SE = .04$, $CI_{95} = .67$ to $.79$). However, difference in effects for students with target behaviors including both *social interaction* and *classroom behavior* were not statistically significant ($ES = .73$, $SE = .05$, $CI_{95} = .67$ to $.79$) when compared to classroom behaviors or social interaction alone.

Intervention implementation. A larger effect was found for studies in which social skills training was implemented as a stand-alone intervention ($ES = .73$, $SE = .03$, $CI_{95} = .69$ to $.77$) versus studies in which social skills training was combined with other strategies such as group contingency or self-management ($ES = .59$, $SE = .03$, $CI_{95} = .55$ to $.63$).

Intervention development. SSIs that were individualized to students' social skill deficits were more effective ($ES = .71$, $SE = .03$, $CI_{95} = .67$ to $.75$) than social skill intervention packages teaching general social skills ($ES = .62$, $SE = .03$, $CI_{95} = .58$ to $.66$).

Methodological quality. Studies identified as meeting design standards with or without reservation resulted in greater effects ($ES = .57$, $SE = .03$, $CI_{95} = .52$ to $.62$) than studies that were classified as not meeting design standards ($ES = .81$, $SE = .03$, $CI_{95} = .75$ to $.88$).

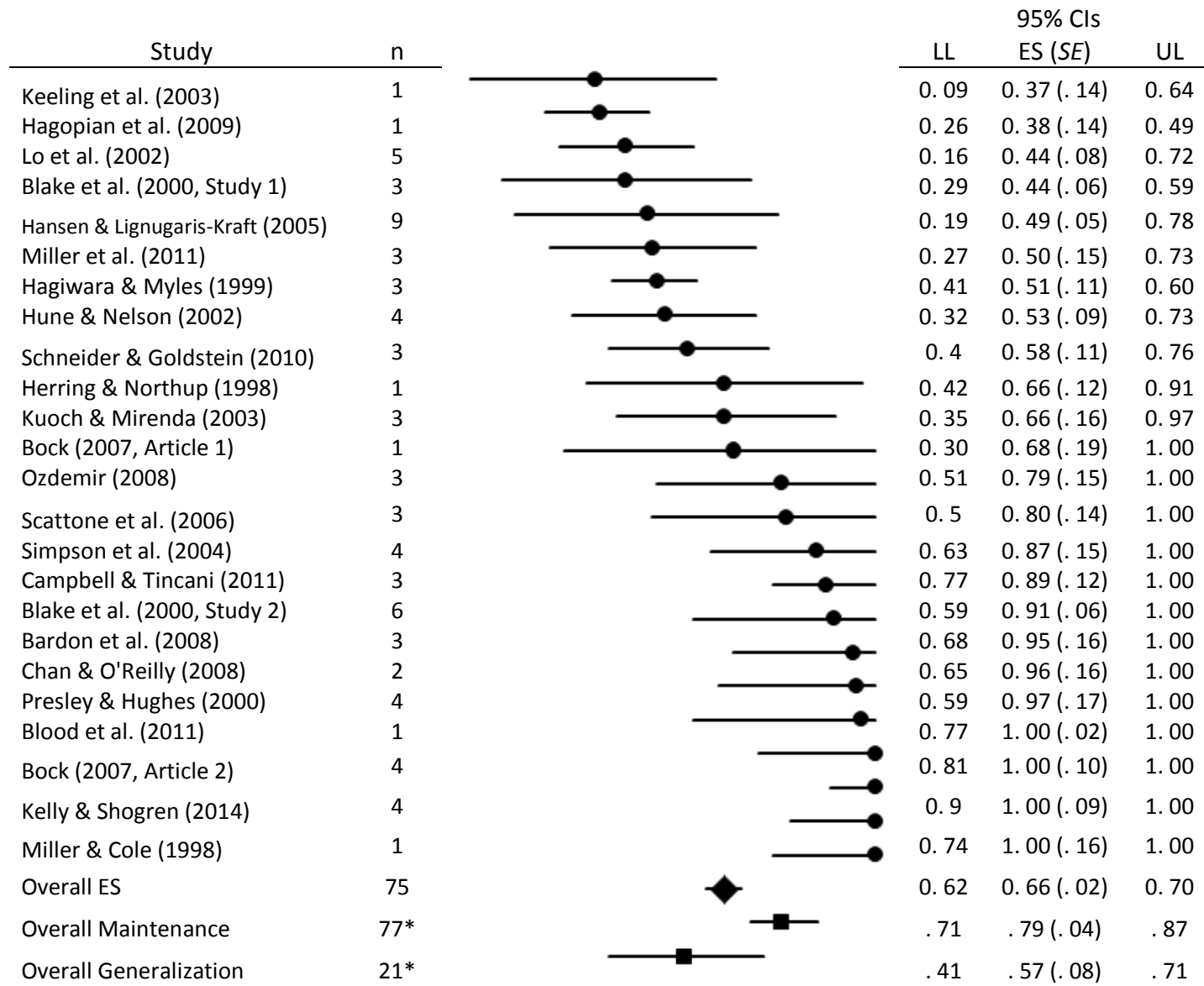


Figure 2. Study Effect Sizes. This figure illustrates the forest plot of effect sizes. The circles represent the study's effect size. The diamond represents the overall effect size. The squares represent the overall effect size for maintenance and generalization. The * indicates the number of contrasts. n = participants, LL = lower level, ES = effect size, SE = standard error, UL = upper limit

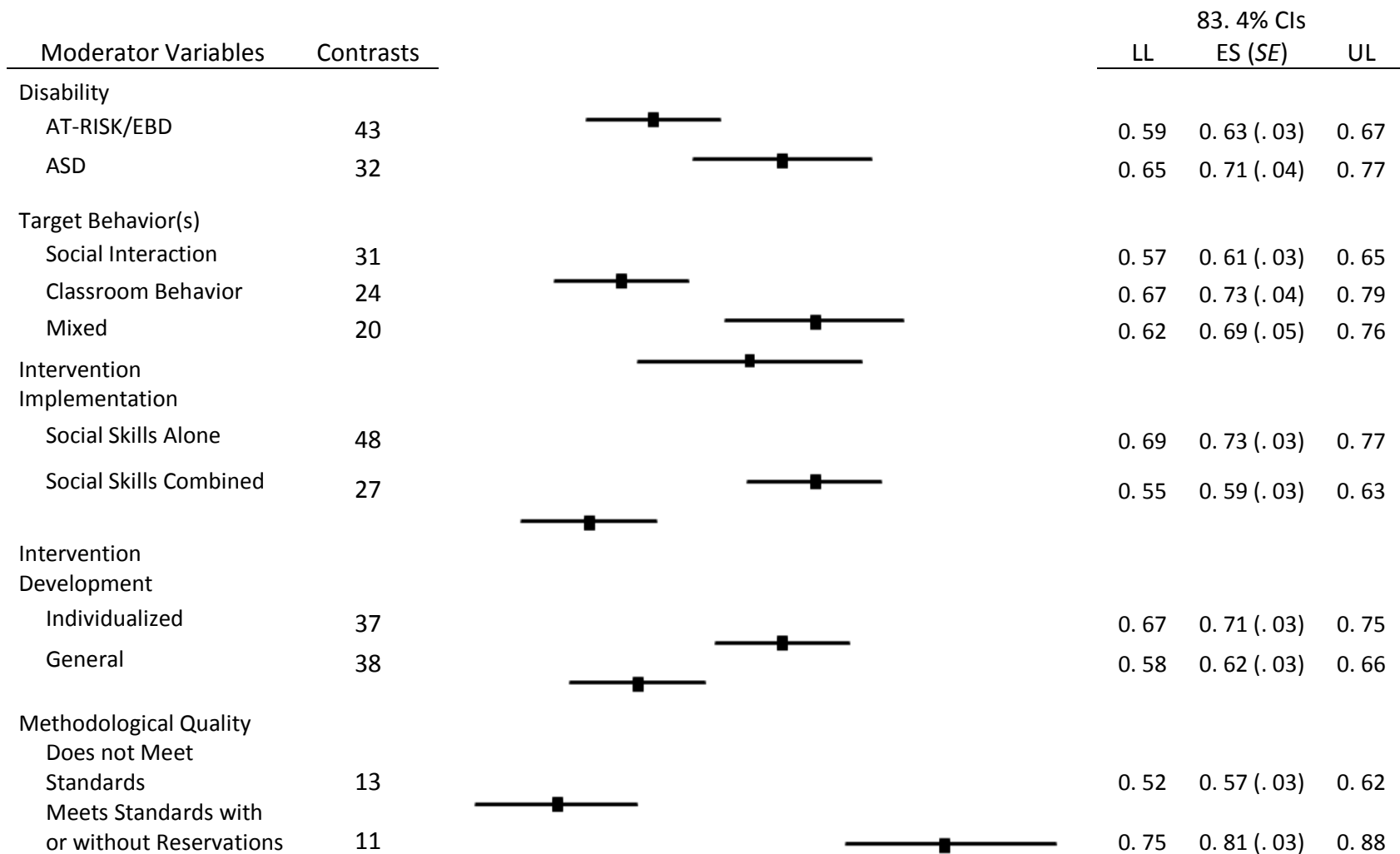


Figure 3. Moderator Variable Effects. This figure illustrates differences in moderator effects. Confidence bars within a moderator that do not overlap are statistically significant at a $p = .05$ level. LL = lower level, ES = effect size, SE = standard error, UL = upper limit

Discussion

This meta-analysis updated the overall effect size of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. The overall effect size found was moderate, as indicated by the Tau-U value of .66 ($SE = .03$, $CI_{95} = .62$ to $.70$). Results of the present single-case meta-analysis are consistent with the 62% PND effect size found in Mather et al. (1998); the only other single-case meta-analysis on SSIs including students with or at-risk of EBD and students with ASD who display challenging behavior. Findings from this meta-analysis provide further support for social skills training as an effective intervention for increasing appropriate social interactions and classroom behaviors for students with behavioral difficulties including students with or at-risk of EBD and students with ASD. Four moderator variables were identified: target behavior, intervention implementation, intervention development, and methodological quality. Disability was not found to moderate intervention effects. Four research questions were presented for this study. Findings for each question are discussed below.

Findings

Research question one. *What is the overall effect of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior?*

The overall Tau-U effect size found was .66 ($SE = .03$, $CI_{95} = .62$ to $.70$) across the 24 included studies. Although this effect size is not as large as the effects reported in the group meta-analysis results from Schneider (1992) and Beelman et al. (1994), it is greater than the effects reported by Quinn et al. (1999) and Cook et al. (2008). Previous

single-case meta-analyses on SSIs for students with ASD have reported greater effect sizes up to PND 84%. However, the Mathur et al. (1998) single-case meta-analysis which included both students with or at-risk for EBD and students with ASD, found very similar results with an overall PND of 62%.

Research question two. *Are there differential effects for SSIs based on: (a) disability, (b) target behavior, (c) intervention implementation, (d) intervention development, or (e) methodological quality?*

Previous meta-analyses have identified differential effects for SSIs based on theoretical approach, intervention type, group composition, intervention strategy, implementation format, disability, and school level. Four moderator variables were identified: target behavior, intervention implementation, intervention development, and methodological quality.

Disability. Contrary to previous meta-analyses, moderator analyses did not reveal statistically significant differences in effect for students with ASD compared to students with or at-risk for EBD. Mathur et al. (1998) reported greater effects for students who were at-risk of EBD. However, the present meta-analysis only included students with ASD who had similar challenging behaviors as students with or-at risk for EBD. This is most likely the reason why differential effects for SSIs were not found based on the participant's disability status.

Target behavior. A statistically significant difference in effect was not found between participants whose target behaviors included both social interaction and classroom behavior skills compared to social interaction or classroom behavior skills

alone. However, when comparing students whose target behaviors focused on either social interaction skills or classroom behavior skills, students with classroom behavior skills as outcome measures were found to be more effective than social interaction skills. This finding is consistent with previous research (Mathur et al., 1998; Quinn et al., 1999) identifying outcome measures as producing differential effects for social skills.

Intervention implementation. Differential effects were found for social skills training implemented as a single intervention versus interventions that included social skills combined with other behavioral strategies. This variable had not been previously investigated as a moderator. Results in this category were unexpected given that other behavioral strategies such as peer mediated interventions and reinforcement have been identified as effective. However, combining SSIs with additional behavioral strategies did not produce greater effects than implementing SSIs alone.

Individualization of treatment. SSIs that were designed specifically for the student and individualized to student social skill deficits were slightly more effective than SSIs that included general social skill sets. This finding is consistent with the previous meta-analysis by Bellini et al. (2007). They reported child specific SSIs as producing greater effects than peer mediated social skills. Based on the current findings, practitioners wanting to implement SSIs should first determine the student's areas of social skill deficit. Efforts should be made to individualize the social skill intervention to student matching skills taught to the skill deficit of the student. Individualization of intervention also applied to personalizing interventions via student interests, names, and pictures.

Methodological quality. Although methodological quality is not directly related to whether or not social skills are effective, identifying quality of design as a moderator further supports the need for methodological rigor in SCR. A large statistically significant difference was found when considering methodological quality of studies. Studies meeting What Works Clearinghouse (WWC) design standards with or without reservations resulted in higher effect sizes than studies that did not meet basic design standards. Issues of reliability, experimental control, and fidelity of implementation weaken confidence in study results and in the current study produced weaker overall effects.

Research question three. *What is the overall effect of SSIs on the maintenance and generalization of social skills?*

A total of 77 phase contrasts resulted in an overall effect size of .79 ($SE = .04$, $CI_{95} = .71$ to $.87$) for the maintenance of social skills. Overall effect size for generalization was .56 ($SE = .08$, $CI_{95} = .41$ to $.71$) and included 21 phase contrasts. Previous meta-analyses have reported a range of effects on maintenance and generalization of social skills. Greater effect sizes have been reported for maintenance of social skill with a PND range of 74% (Mathur et al., 1998) to 80% (Bellini et al., 2007). Smaller effects have been previously reported for the generalization of social skill with PND ranging from 53% (Bellini et al., 2007; Mathur et al., 1998) to 80% (Wang et al., 2009). The same difference in effects between maintenance and generalization were also seen in the current meta-analysis. Only three of the studies included collected data on generalization of social skills and 12 studies collected data on maintenance of skill.

These findings are also consistent with previous reviews of social skills training including students with or at-risk of EBD (Maag, 2006) that concluded studies lacked measures for maintenance and generalization of social skills. Coleman, Wheeler and Webber (1993) reviewed nine group design studies on the effects of interpersonal problem-solving training for students with EBD and also found a lack of generalization, and the need to individualize training to student deficits.

Research question four. *Do SSIs meet criteria to be considered an EBP for students with or at-risk of EBD and students with ASD who display challenging behavior?*

Based on the Horner et al. (2005) 5-3-20 criteria for what can be considered an EBP, social skills intervention research must: (a) include five studies meeting basic design standards, (b) be conducted by at least three different researchers in three different geographic locations, and (c) include a total of at least 20 participants to be considered an EBP. According to these criteria SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior cannot be considered an EBP because only one of the included studies met basic design standards. Although the Reinchow and Volkmar (2010) synthesis did not use an effect size metric, the researchers did identify video modeling social skill interventions as an EBP using a “success estimate” and criteria developed by Reinchow et al. (2008).

Limitations and Implications for Future Research

There are three limitations and corresponding implications for future research. First, Mathur et al. (1998) reported greater effects for students who were at-risk of EBD.

The current meta-analysis did not separate students identified with EBD from students at-risk of EBD. Further disaggregating participants may have identified disability as a moderator. Additionally, target behaviors were only separated into categories for: *social interaction, classroom behavior skills, or both*. Differences in effects of SSIs based on social skill deficits versus social performance deficits were not assessed. Future research should investigate if skill deficits or performance deficits are more common among students with or at-risk of EBD or students with ASD.

Second, Tau-U is a fairly new index used to quantify effects of SCR. Further research on the use of this effect size is needed. Extending this research to other methods of synthesizing outcomes would allow for comparison across indices. Examples of this have already been conducted, but a larger body of research is need for adequate comparison and confirmation of findings (Wang et al., 2011, Wang et al., 2013).

Third, social skills encompass a wide range of behaviors. This meta-analysis focused only on remediating school-related social behaviors. The specific focus of this study was on (a) students with or at-risk of EBD and students with ASD and (b) outcome measures for the remediation of social interaction or classroom behaviors only. These conditions limit the generalization of findings to similar participant and study characteristics. Future research on the acquisition of social skills is needed. Additionally, the majority of included studies were conducted in pre-kindergarten through 4th grade settings. Therefore, care should be taken when interpreting results for students in intermediate and secondary settings. Other areas of future research should focus on exploring different domains of social skills such as social competence, problem solving,

or survival skills. Additionally, investigating the impact on students without disabilities would provide added support to the social skills literature base extending the external validity of results.

Conclusion

This meta-analysis updated the overall effect size of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. The overall ES found was moderate, with an overall Tau-U effect size of .66 ($SE = .03$, $CI_{95} = .62$ to $.70$). Results were consistent with the overall PND effect size of 62% found in Mather et al. (1998); the only other single-case meta-analysis on SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. Additionally, four moderator variables were identified: target behavior, intervention implementation, intervention development, and methodological quality. However, when assessed against the Horner et al. (2005) 5-3-20 criteria for what can be considered an EBP; SSIs could not be considered an EBP because only one of the included studies met basic design standards established by the WWC.

CHAPTER IV

CONCLUSION

Social skills are necessary for students to develop and maintain positive social relationships with peers and adults in school settings. Acquiring prosocial behavior leads to positive social interactions and interpersonal relationships, which can increase school success (Durlak et al., 2011). Because students with or at-risk of EBD and students with ASD are often characterized by school personnel as having poor social skills (Denning, 2007; Kauffman et al., 2007), the present research focused on challenging classroom behavior associated with social skills deficits common to both populations of students.

Two studies were conducted within this dissertation to: (1) evaluate the quality of the evidence base of single-case studies investigating the effectiveness of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior and (2) conduct a meta-analysis on single-case studies investigating the effectiveness of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior.

In the first study a systematic literature review process was used to evaluate the evidence base of social skills instruction as an intervention for students with challenging classroom behavior, including students with or at-risk of EBD and students with ASD. The evaluation of the quality of research provided information on the methodological rigor and the strength of support for social skills as a viable intervention for the remediation of school-related social interactions and classroom behaviors. Unfortunately, only one study met all design standards. Nine studies met one or more

design standards with reservations, and 14 studies did not meet one or more of the design standards.

In study two, a meta-analysis was conducted to update the overall effect size of SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior. The overall ES found was moderate, with an overall Tau-U effect size of .66 ($SE = .03$, $CI_{95} = .62$ to $.70$). Results were consistent with the overall PND effect size of 62% found in Mather et al. (1998); the only other single-case meta-analysis on SSIs for students with or at-risk of EBD and students with ASD who display challenging behavior.

Findings from the meta-analysis provided further support for social skills training as an effective intervention for increasing appropriate social interactions and classroom behaviors for students with behavioral difficulties including students with or at-risk of EBD and students with ASD. However, when assessed against the Horner et al. (2005) 5-3-20 criteria for what can be considered an EBP; SSIs could not be considered an EBP because only one of the included studies met basic design standards.

With the legislative push (e. g., IDEA and NCLB) to identify and implement interventions that are evidence-based, future SCR should adhere to the WWC standards when creating experimental designs. Particular attention should be given to adequate experimental control, demonstration of effect, reliability and fidelity measures. Future research should focus on exploring different domains of social skills (e. g., social competence, problem solving, or survival skills) as well as other populations of individuals with disabilities (e. g. students with ADHD or adults with disabilities), across

a variety of settings (e. g., naturalistic, home, or employment settings), and with other behaviors of interest (e. g., problem solving, safety skills, or social competence). Finally, investigating the impact on students without disabilities would provide added support to the social skills literature base extending the external validity of results.

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APPENDIX A

Code Book		
Study Characteristics		
Variable	Definition	Codes
Study Design	Single-case research design used to conduct the study	1= AB 2= ABA 3= ABAB Reversal or ABAC Variation 4= AB(BC) Changing conditions or changing criterion 5= MBD – Participant 6= MBD – Setting 7= MBD – Behavior 8= Alternating Treatment 9= Mixed design

Participant and Setting Characteristics		
Variable	Definition	Codes
Age	Chronological age for each participant, if provided. Enter whole years only rounding down when necessary	Enter exact age in whole years
Gender	Gender for each participant	M = Male F=Female
School level groupings	Identifies school level of each participant	1= PreK-4 (early Elem) 2= 5-8 (Intermediate/Middle) 3= 9-12 (Secondary) 0=not provided
Ethnicity	Ethnicity for each participant, if provided	1= Black/African-American 2= Caucasian/Euro-American 3= Hispanic/Latino(a) 4= Asian 5=mixed 0= Not provided
Disability	EBD disability label for each participant, if provided.	1= At-Risk for EBD 2= EBD 3=ASD 4=other 0= Not provided
Educational Setting	Identifies the educational setting of each participant State approved private schools for students with disabilities, specialized schools attached to facilities for students with disabilities both categorized as special education setting	1= Special Education Setting 2= General Education 3=mixed 0= Not provided

Intervention Characteristics		
Variable	Definition	Codes
Social Skill Intervention	Type of social skill intervention provided during the study. Positive social interaction: any aspect of social interaction with peers or adults, including cooperative play Prosocial classroom behavior: on task behavior, compliance, following directives, assignment completion. Typically only involves participant.	1=positive social interaction 2=prosocial classroom behavior 3=mixed
Individualization	Identify if the intervention was a preset program/ curriculum or if the intervention was matched with the student's social skill deficit	1 = individualized 2 = general
Implementation	Delivery of intervention	1= small group 2= individual/one-on-one 3= classwide 4=mixed 0=not provided
Dependent Variable	Identify if the dependent variable is related to classroom behavior or social interaction. Same definitions as Intervention.	1=classroom behavior 2= social interaction 3=mixed
Methodological Quality	Results of quality rubric	1=Meets Design Standards 2=Meets Design Standards with Reservations 3=Does Not Meet Design Standards
Implementation Fidelity	Identifies if the study included a measure of implementation fidelity	1=formal 2=informal 3=none
Maintenance	Identifies if the study included a maintenance phase	1=Yes 2=No
Generalization	Identifies if the study included a generalization phase	1=Yes 2=No
Social Validity	Identifies if the study conducted a social validity assessment	1=Yes 2=No

APPENDIX B

Meeting Basic Design Standards: Quality Rubric

Step 1: Evaluate the independent variable.

Design Standard #1

Definition:

The independent variable (i. e. , the intervention) must be systematically manipulated, with the researcher determining when and how the independent variable conditions change. If this standard is not met, the study *Does Not Meet Evidence Standards*.

Code:

1= independent variable was systematically manipulated. *Meets This Standard*

0= independent variable was not systematically manipulated. *Does Not Meet This Standard*

Step 2: Evaluate inter-observer agreement and Fidelity of implementation (2A-2F)

Design Standard #2A

Definition:

Each outcome variable must be measured systematically (i. e., repeatedly) over time by more than one assessor.

Code:

1= inter-observer agreement was reported. *Meets Standard*

0= inter-observer agreement was not reported. *Does Not Meet Standard*

Design Standard #2B

Definition:

The study needs to collect IOA on (a) at least twenty percent of the data points overall, and (b) indicates that IOA was collected on 20% of the data points within each condition (e. g. , baseline, intervention).

Code:

2= IOA was collected on at least 20% of sessions **overall** and IOA was collected on 20% of the data points within each condition. *Meets This Standard*

1= IOA was collected or reported collected for 20% overall but it was not reported 20% of the data points within each condition. *Meets This Standard with Reservations*

0= IOA was collected or reported collected for less than 20% overall. *Does Not Meet This Standard*

Design Standard #2C

Definition:

The inter-assessor agreement must meet minimal thresholds. Minimum thresholds include .80 for percentage agreement indices and .60 for kappa measures. Please refer to a senior member of the research team if an alternative measure of inter-assessor agreement was used.

Code:

1= inter-assessor agreement did meet the minimum thresholds listed above. *Meets This Standard*

0 = inter-assessor agreement did not meet the minimum thresholds listed above. *Does Not Meet This Standard*

Added Design Standard #3A

Definition:

Implementation procedures must be assessed for accuracy and consistency by a second observer to ensure the intervention was provided as intended.

Code:

2= Formal fidelity of implementation procedures were reported. *Meets This Standard.*
1=Informal fidelity procedures were reported. *Meets This Standards With Reservations.*
0= Fidelity of implementation was not reported. *Does Not Meet This Standard*

Added Design Standard #3B

Definition:

The study needs to collect fidelity on (a) at least twenty percent of the intervention data points.

Code:

1= Fidelity was collected on at least 20% of intervention sessions. *Meets This Standard*
0= Fidelity was collected or reported collected for less than 20% of treatment conditions.
Does Not Meet This Standard

Added Design Standard #3C

Definition:

Fidelity of implementation percentages should be at or above 80%

Code:

1= **Implementation** fidelity was at least 80%. *Meets This Standard*
0= **Implementation** fidelity was not at least 80%. *Does not meet this standard.*

Step 3. Evaluate whether design could demonstrate experimental control.

Design Standard #4

Definition:

The study must include at least three attempts to demonstrate an intervention effect at three different points in time or with three different phase repetitions. An attempt to demonstrate a treatment effect refers explicitly to phase contrasts that are adjacent (e. g., AB). A minimum of three such contrasts must be present in the study to meet this standard. If this standard is not met, the study Does Not Meet Evidence

Standards. Examples of designs meeting this standard include ABAB designs, multiple baseline designs with at least three baseline conditions, alternating/simultaneous treatment designs with either at least three alternating treatments compared with a baseline condition or two alternating treatments compared with each other, changing criterion designs with at least three different criteria, and more complex variants of these designs. Examples of designs not meeting this standard include AB, ABA, and BAB designs.

Code:

1 = the study included at least three attempts to demonstrate an intervention effect at three different points in time. *Meets This Standard*
0 = the study did not include at least three attempts to demonstrate an intervention effect at three different points in time. *Does Not Meet This Standard*

Step 4. Evaluate the number of data points per phase.

Design Standard #5

Definition:

For a phase to qualify as an attempt to demonstrate an effect, the phase must have a minimum of three data points.

Reversal/Withdrawal

• To Meet Standards a reversal/withdrawal (e. g., ABAB) design must have a minimum of four phases

per case with at **least 5 data points** per phase.

- To Meet Standards with Reservations a reversal/withdrawal (e. g., ABAB) design must have a **minimum of four phases** per case with at **least 3 data points** per phase.

- Any phases based on **fewer than three data points** cannot be used to demonstrate existence or lack of an effect.

Multiple Baseline

- To Meet Standards a multiple baseline design must have a **minimum of six phases** with at **least 5 data points** per phase.

- To Meet Standards with Reservations a multiple baseline design must have a **minimum of six phases** with at **least 3 data points** per phase.

- Any phases based on **fewer than three data points** cannot be used to demonstrate existence or lack of an effect.

Code:

2 = the case (individual participant) meets the standards for reversal or multiple baseline designs described above. *Meets This Standard*

1 = the case (individual participant) meets the standards with reservations for reversal or multiple baseline designs described above. *Meets This Standard with Reservations*

0 = the case (individual participant) does not meet the standards with reservations for reversal or multiple baseline designs described above. *Does Not Meet This Standard*

Step 5. Determine whether the design overall meets basic standards.

Overall Evaluation: Basic Design Standards

Definition:

Review your responses on the following items to determine whether the study has met design standards, met design standards with reservations, or has not met design standards.

Code:

2 = the case meets all five design standards (Must meet standards on **all** scoring criteria). ***Meets Basic Standards***

1 = the case meets design standards with reservations. (Must meet standards **or** must meet standards with reservations according to all scoring criteria) ***Meets Basic Standards with Reservations***

0 = the case does not meet design standards. The designation of not meeting standards **in any one area**, then the design is scored overall as not meeting basic design standards. ***Does Not Meet Basic Standard***