

SOCIAL SKILLS INTERVENTIONS FOR PRESCHOOLERS WITH OR AT RISK  
FOR EMOTIONAL AND BEHAVIORAL DISORDERS: A QUALITATIVE  
REVIEW, META-ANALYSIS, AND SINGLE CASE RESEARCH EVALUATION

A Dissertation

By

XIN DONG

Submitted to the Office of Graduate and Professional Studies of  
Texas A&M University  
In partial fulfillment of the requirements for the degree of  
DOCTOR OF PHILOSOPHY

Chair of Committee, Mack D. Burke  
Committee Members, Julie Thompson  
Lisa Bowman-Perrott  
Wen Luo  
Robert W, Heffer  
Head of Department, Shannon Hagan-Burke

October 2019

Major subject: Educational Psychology

Copyright 2019 Xin Dong

## ABSTRACT

The development of social competence is pivotal in young children. As children enter early childhood education settings, they need more social skills to deal with new relationships with teachers and peers. However, research suggests 10-20% of preschoolers are diagnosed with emotional and behavioral disorders. Early onset of problem behaviors can place children at high risks of developing chronic disorders later on. Children with or at risk of emotional and behavioral problems are characterized as lacking social skills. Social skills interventions are commonly used to remedy children's social skills deficits. A quality indicator review and a meta-analysis were conducted on 33 single case studies on social skills interventions for preschoolers to examine the design quality and evidence in the literature. Furthermore, a single case study was conducted to examine the effect of peer-mediated social skills intervention for preschoolers with social withdrawal. The review found social skills interventions had enough evidence to support social skills interventions as effective for preschoolers with or at risk of emotional and behavioral problems and overall the social skills interventions had a large effect on preschoolers' social behaviors. The single case study also suggested the intervention was effective in improving children's social interactions for preschoolers with social withdrawal. These findings implicated social skills interventions can be implemented in classroom settings to improve preschoolers' social behaviors at a very young age and prevent them from developing further problems.

## ACKNOWLEDGEMENTS

I would like to thank my committee chair Dr. Burke for his guidance and support in my academic study. I would also like to thank my committee members, Dr. Thompson, Dr. Bowman-Perrott, Dr. Luo, and Dr. Heffer for their time and effort in my study. Thank you to all my colleagues and friends in the Department of Educational Psychology for helping me work through reliability, data collection and data calculations.

Praise to the Lord for sustaining and strengthening me throughout all the difficulties! I am thankful for my parents for raising me as a self-disciplined person and providing financial support for my study. Thank you to my husband Joseph for supporting and encouraging me throughout the high and low points in the process. I'm also thankful for my children as they bring so much joy in my life.

## CONTRIBUTORS AND FUNDING SOURCES

### *Contributors section*

This work was supervised by a dissertation committee consisting of Professors Mack Burke, Lisa Bowman-Perrott, Julie Thompson, and Wen Luo of the Department of Educational Psychology and Professor Robert Heffer of the Department of Psychology.

All work of the dissertation was completed by the student, in collaboration with Claudia Dunn, Sandy Smith, Lisa Sanchez, and Sanikan Wattanawongwan of the Department of Educational Psychology.

### *Funding sources section*

There are no outside funding contributions to acknowledge related to the research and compilation of this document.

## TABLE OF CONTENTS

	Page
ABSTRACT.....	ii
ACKNOWLEDGEMENTS.....	iii
CONTRIBUTORS AND FUNDING SOURCES .....	iv
TABLE OF CONTENTS.....	iv
LIST OF TABLES .....	vii
LIST OF FIGURES .....	viii
CHAPTER I INTRODUCTION.....	1
Research Goals and Objectives.....	2
CHAPTER II MAPPING THE LITERATURE BASE AND QUALITY INDICATOR REVIEW ON SOCIAL SKILLS INTERVENTIONS FOR PRESCHOOLERS WITH OR AT RISK OF EMOTIONAL AND BEHAVIORAL PROBLEMS .....	4
Introduction.....	4
Method .....	14
Results.....	22
Discussion.....	27
CHAPTER III A META-ANALYSIS OF SINGLE CASE STUDIES ON SOCIAL SKILLS INTERVENTIONS FOR PRESCHOOLERS WITH OR AT RISK OF EMOTIONAL AND BEHAVIORAL PROBLEMS .....	31
Introduction.....	31
Method .....	38
Results.....	46
Discussion .....	50
CHAPTER IV THE EFFECT OF PEER-MEDIATED SOCIAL SKILLS INTERVENTION ON PEER INTERACTIONS FOR PRESCHOOLERS WITH SOCIAL WITHDRAWAL .....	56
Introduction.....	56
Method .....	61
Results.....	71
Discussion.....	78
CHAPTER V CONCLUSIONS .....	84

REFERENCES .....	87
APPENDIX A.....	107
APPENDIX B.....	133
APPENDIX C.....	139

## LIST OF TABLES

	Page
Table 1 Participants and Intervention Features.....	107
Table 2 Study Characteristics .....	108
Table 3 Social Skills Interventions .....	112
Table 4 Evaluation Using What Works Clearinghouse Design Standards for Single-Case Design .....	114
Table 5 Evidence Evaluation for the Studies that Meet WWC Design Standards .....	121
Table 6 Summary of Evidence Evaluation .....	125
Table 7 Within-Study Random-Effects Means and Confidence Intervals.....	126
Table 8 Fixed-effects Moderator Analyses.....	127
Table 9 Common Components of Social Skills Interventions.....	128
Table 10 Participants Characteristics.....	130
Table 11 Mean Percentage, Standard Deviations and Effect Sizes of Social Interactions .....	131
Table 12 Social Validity Survey Results .....	132

## LIST OF FIGURES

	Page
Figure 1 Results of the Literature Search and Inclusion Screening for the Systematic Review .....	133
Figure 2 Results of the Literature Search and Inclusion Screening for the Meta-analysis .....	134
Figure 3 Forrest Plot of the Included Studies .....	135
Figure 4 Funnel Plot of the Included Studies.....	136
Figure 5 Percentages of Intervals with Social Initiations .....	137
Figure 6 Percentage of Intervals with Social Responses .....	138



# CHAPTER I

## INTRODUCTION AND LITERATURE REVIEW

The development of social competence is pivotal in young children. As children enter early childhood education settings, they need more social skills to deal with new relationships with teachers and peers. Specifically, they need to follow teachers' directions, engage in large group and small group activities and interact with other children. However, the prevalence of emotional and behavioral problems among preschoolers is alarming. Research suggests 10-20% of preschoolers are diagnosed with emotional and behavioral disorders (EBD) (Forness, Freeman, Paparella, Kauffman, and Walker, 2011; Qi & Kaiser, 2003; Webster-Stratton & Hammond, 1997). Early onset of problem behaviors can place children at higher risks of developing chronic disorders that are more severe and less responsive to interventions than those of children who had problem behaviors later in life (Dunlap et al., 2006). Without effective early intervention, these emotional and behavioral problems can lead to a trajectory of antisocial behavior and conduct problems in adolescence and adulthood which is harmful to the society (Heckman, 2006).

Preschoolers with or at risk of EBD are characterized as lacking social skills. When children lack adequate social skills, they exhibit problem behaviors in an attempt to achieve their social goals. Researchers and professionals have made a lot of efforts to develop and evaluate different intervention programs to teach children social skills to

remedy their deficits since the 1970s (Gresham, 2015; Maag, 2006). As an effort to examine whether social skills intervention (SSI) for preschoolers with or at risk for EBD is evidence-based practice (EBP), the author performed a quality review and meta-analysis for the single case studies in the literature. The dissertation is divided into three sections.

## **Research Goals and Objectives**

### **Study 1**

The first goal of this dissertation is to evaluate the quality of the single case studies on early interventions targeting social skills for preschoolers with or at-risk of EBD. This study has the following research objectives:

- a) What are the features of the participants and interventions for the SCR studies on SSIs for preschoolers with or at risk of EBD?
- b) What is the quality of the evidence base for SCR studies on SSIs for preschoolers with or at-risk of EBD?
- c) What are the methodological strengths and areas of improvement for the included SCR studies?

### **Study 2**

The second goal of the dissertation is to synthesize the effects of SSIs for preschoolers with or at-risk of EBD. A meta-analysis of SSI research using SCR is

needed to provide support for SSIs as an evidence-based practice for preschoolers with or at risk of EBD, but no previous review has focused on this population. To address this gap in the literature, the present meta-analysis investigated the following research objectives:

- a) What is the overall effect size of SSIs for preschoolers with or at-risk of EBD across all the included SCR studies?
- b) Which variables moderate the effects of SSIs for preschoolers with or at-risk of EBD?

### **Study 3**

The third goal is to evaluate the effect of a peer-mediated social skills intervention for preschoolers with social withdrawal using a single case study. The purpose of the third section is to evaluate the effects of teaching peer-related social skills combined with peer-mediated reinforcements for the preschoolers with social withdrawal problems. The research questions focus on:

- a) Will the peer-mediated social skills intervention increase the frequency of the social initiations and social responses for preschoolers with social withdrawal?
- b) Can the effect of peer-mediated social skills intervention lead to generalization and maintenance of improved social interactions in naturalistic play settings?

## CHAPTER II

# MAPPING THE LITERATURE BASE AND QUALITY INDICATOR REVIEW OF SINGLE CASE STUDIES ON SOCIAL SKILLS INTERVENTION FOR PRESCHOOLERS AT RISK FOR EMOTIONAL AND BEHAVIORAL PROBLEMS

### **Introduction**

#### **Statement of problem**

The prevalence of emotional and behavioral problems among preschoolers is alarming. Research suggests 10-20% of preschoolers are diagnosed with emotional and behavioral disorders (EBD) (Forness, Freeman, Paparella, Kauffman, and Walker, 2011; Qi & Kaiser, 2003; Webster-Stratton & Hammond, 1997). Even more children in preschool settings are at risk for EBD than are actually diagnosed (Brown, Odom, & McConnell, 2008; Bulotsky-Shearer, Domínguez, Bell, Rouse, & Fantuzzo, 2010). The problem behaviors exhibited in preschool classrooms place great challenges to teachers and staff working in early childhood education settings. Early onset of problem behaviors can place children at higher risk of developing chronic disorders that are more severe and less responsive to interventions than those of children exhibit problem behaviors later in their lives (Dunlap et al., 2006). Persistent problem behaviors in early childhood are associated with subsequent socialization problems, school adjustment issues, and poor educational and vocational outcomes in adolescence and adulthood (Bulotsky-Shearer et al., 2010; Odgers et al., 2008; Parker & Asher, 1987). Without effective early intervention, these emotional and behavioral problems can lead to a trajectory of

antisocial behavior and conduct problems in adolescence and adulthood which is harmful to the society (Heckman, 2006).

Problem behaviors are defined as “competing behaviors that interfere with, or otherwise block, either the acquisition or performance of socially skilled behaviors” (p. 35, Gresham, Cook, Crews, and Kern, 2004). Problem behaviors bring extra challenge to classroom management and take up time and energy from teachers’ instructions. In addition, problem behaviors can lead to poor peer relations which in turn decrease the learning opportunity from positive peer interactions. Also, children exhibiting problem behavior patterns in preschool often have transition problems in kindergarten (Nix, Bierman, Domitrovich, & Gill, 2013). Beyond that, up to 50% of preschoolers with early onset behavior problems will exhibit more significant behavior disorders when they grow older (Webster-Stratton & Taylor, 2001).

Furthermore, longitudinal research showed preschoolers social behaviors are related to long term outcomes in a range of areas. Untreated problem behaviors in early childhood are related to academic underachievement, negative school adjustment, adolescent delinquency and low quality of life (Bulotsky-Shearer et al., 2010; Loeber & Farrington, 1998; McCabe & Altamura, 2011). Children who lack social and emotional skills in preschool are likely to have emotional and behavioral problems in school and exhibit long-term social adjustment problems and juvenile delinquency (Bornstein, Hahn, & Haynes, 2010). Vice versa, prosocial behaviors can be academic enablers (Gresham,

2015). Young children who are emotionally and socially competent are more likely to succeed in both academic and social areas (McCabe & Altamura, 2011).

Preschoolers with or at risk of EBD are characterized as lacking social skills. Gresham (1986) stated “Social competence represent an evaluative term based upon judgments (given certain criteria) that a person has performed a task adequately” (p 4). The development of social competence is pivotal for preschool children, as children who are socially competent in preschool are engaged in class activities well and have good peer relationships (McCabe & Altamura, 2011). Moreover, socially competent children are likely to succeed in academic and social areas and have a high quality of life in the future (Landry & Smith, 2010; Odom, McConnell, & Brown, 2008).

Although similar to social competence, social skills are a different construct. More than 16 definitions of social skills exist in the literature (Merrell & Gimpel, 2014). In the current review, we adopt the definition proposed by Gresham (1986), who defines social skills as “behaviors that, within given situations, predict important social outcomes for children” (p 7). Based on reviews of nine previous meta-analyses on social skills intervention, researchers generally agree that the construct of social skills can be divided into three categories: social interaction, prosocial behaviors and social-cognitive skills (Gresham, 2015).

### **Social Skills Interventions**

Aligning with the review by Gresham, Cook, Crews, and Kern (2004), social skills interventions are defined broadly as any behavioral, cognitive, or social

interventions that are directed at improving social skills or remediating social skills deficits. Depending on the theoretical framework, the social skills intervention components can vary considerably across social learning theory, behaviorism, cognitive theory and social-emotional learning theory. For example, interventions based on social learning theory (Bandura & Walters, 1977) emphasize modeling and coaching. Interventions based on the operant learning paradigm in behaviorism (Skinner, 1965) tend to include reinforcement. In contrast, cognitive approaches emphasize instructions on cognitive problem-solving scripts and coping skills for students to improve their problem solving in social environments (Kazdin, Siegel, & Bass, 1992). Additionally, social-emotional learning theory-based interventions commonly include components to help children to recognize and manage emotions, set and achieve positive goals, establish and maintain positive relationships, and handle interpersonal situations constructively (Elias et al., 1997). Studies on social skills interventions tend to adopt multimodal programs incorporating multiple components since the 1990s (Vaughn, Kim, Sloan, Hughes, Elbaum, & Sridhar, 2003).

A lot of studies have been conducted on the effect of social skills interventions since the 1970s including group design studies and single case studies (Gresham, 1986). As there is a variety of emotional and behavioral problems among at risk preschoolers, single case studies fit the purpose of examining intervention effects for the social skills interventions while taking individual needs into consideration. Single case research design is an experimental research design using a few participants to compare their performance pre and post intervention to examine the intervention effect (Ledford &

Gast, 2018). Single case studies are often criticized for the small number of participants and limitation in generalization. However single case studies provide a lot of precious information on the effect of interventions for children with special needs. Meta-analysis of single case research can be used to overcome the generalization problems mentioned previously and determine whether a practice is consistently effective across different settings on different behavior outcomes (Horner & Kratochwill, 2012; Kratochwill & Levin, 2014). Meta-analysis of single case research can be used to develop guidelines for evidence-based practice.

### **Evidence-based practice**

Since the beginning of the 21st century, legislative changes in Individuals with Disabilities Education Improvement Act (IDEA, 2004) and No Child Left Behind (NCLB, 2001) have impacted the field of special education to place more emphasis on evidence-based practices. These legislative changes push researchers to examine which practices are effective for a certain group of students with special needs. Evidence-based practices refer to “practices and programs shown by high-quality research to have meaningful effect on student outcomes” (Cook & Odom, 2013). Certain standards are needed to evaluate the quality of research when we want to determine whether a practice is EBP. Although it is easier to have a set of standards for group design studies, the standard for single case research design is still under development (Kratochwill et al, 2014).



Different associations and researchers have proposed different standards to evaluate the quality of single case studies in response to the EBP movement (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005; Horner & Kratochwill, 2012; Kratochwill et al., 2014). The guidelines for quality indicator reviews proposed by the associations and researchers typically emphasized the following methodological features: (a) operational descriptions of independent variables, dependent variables, settings and contexts; (b) the replication of treatment effects both within and across studies; (c) the collection and reporting of treatment fidelity data; (d) the collection and reporting of Inter-observer agreement (IOA); and (e) the collection and reporting of social validity data.

The standards proposed by What Works Clearinghouse (WWC), the Council for Exceptional Children (CEC) and Hornor et al., (2005) are most commonly used in the field of Special Education. WWC standards include guidelines to evaluate research design quality and guidelines to examine whether there is enough evidence of an intervention effect (Kratochwill et al., 2010). The Council for Exceptional Children (CEC) proposed eight quality indicators in CEC Standards for Evidence Based Practices in Special Education (CEC, 2014). The eight indicators are (a) context and settings, (b) participants, (c) intervention agent, (d) description and practice, (e) implementation fidelity, (f) internal validity, (g) outcome measures/dependent variables, and (h) data analysis. Horner et al., (2005) proposed that for studies to have sufficient replications, they must meet the following criteria: (a) include at least five studies meeting basic

design standards; (b) be conducted by at least three different research groups in three different geographic locations; and (c) include at least 20 participants.

In the present study, the What Works Clearinghouse (WWC) standards were used to examine the single case studies on social skills interventions for at risk preschoolers as WWC standards are widely used in educational fields. WWC standards include standards evaluating research design for single case studies and standards evaluating the strength of evidence of intervention effect. The research design standards are proposed as a guide for evaluating empirical support and determining EBP (Kratochwill et al., 2013). WWC standards classify studies into three categories based on research design quality: *Meets Design Standards*, *Meets Design Standards with Reservation*, or *Does Not Meet Design Standards*. The WWC standards include specific guidelines on how to use the standards to examine the research designs in review. To meet the design standards, studies must (a) systematically manipulate an independent variable, (b) systematically measure dependent variables over time by more than one observer, (c) include at least three demonstrations of intervention effect, and (d) include a minimum of five data points per phase. To determine whether there is evidence of intervention effect, we need to determine whether there is evidence of a functional relation between the intervention and outcome.

### **Previous meta-analyses and reviews**

Many descriptive, meta-analytic and quantitative reviews have been conducted on the effect of social skills interventions for children with or at risk of EBD since the 1980s (Ang & Hughes, 2001; Beelmann, Pfingsten, & Lösel, 1994; Cook et al., 2008; Durlak,

Fuhrman, & Lampman, 1991; Gresham, Cook, Crews, & Kern, 2004; Lösel & Beelmann, 2003; Magg, 2006; Quinn, Kavale, Mathur, Rutherford, & Forness, 1999; Schneider & Byrne, 1985; Schneider, 1992; Vaughn, Kim, Sloan, Hughes, Elbaum, & Sridhar, 2003). However, most of the previous reviews only synthesize group design studies. Only three meta-analyses include single case studies on the effect of SSIs for students with or at-risk of EBD (Mathur, Kavale, Quinn, Forness, & Rutherford, 1998; Kavale, Mathur, Forness, Rutherford, & Quinn 1997; Chenier et al., 2011) and two quantitative reviews focus on single case research (Lane & Ledford, 2016; Singh, Deitz, Epstein, & Singh, 1991). None of the previous meta-analyses focus on the population of preschoolers at risk of emotional and behavioral problems.

Most previous reviews for group design studies suggest that social skills interventions are effective in improving social cognitive skills and social emotional behaviors for children with or at risk for EBD (Ang & Hughes, 2001; Beelmann, Pfungsten, & Lösel, 1994; Cook et al., 2008; Durlak, Fuhrman, & Lampman, 1991; Gresham, Cook, Crews, & Kern, 2004; Lösel & Beelmann, 2003; Magg, 2006; Schneider & Byrne, 1985; Schneider, 1992; Vaughn, et al., 2003). The short-term effect is small to moderate, but the long-term effect is not studied extensively. Differential effects were reported in previous reviews; Beelmann, Pfungsten, and Lösel (1994) found a bigger effect size of social skills interventions on specific social skills than on broader constructs like social adjustment. Lösel and Beelmann (2003) found bigger effect sizes on social ( $d = 0.39$ ) or social-cognitive skills ( $d = 0.40$ ) measures than on antisocial behaviors ( $d = 0.26$ ).

Mathur et al., (1998) did a meta-analysis on SSIs for students with or at-risk of EBD and students with ASD. They reviewed 64 single-case studies and the mean percent of non-overlapping data (PND) effect size was 62% (SD = 33%) indicating a low treatment effect. The mean PND effect size for students with different diagnosis varies: students with delinquent behaviors (M = 76%, SD = 29%) were higher than students with EBD (M = 64%, SD = 31%) and students with ASD (M = 54%, SD = 37%). Furthermore, the meta-analysis revealed that the lowest treatment effects were in the preschool group (M = 55%, SD = 30%) compared to elementary (M = 63%, SD = 36%) and secondary students (M = 66%, SD = 29%). Bigger effects were found in improving social interaction skills (M = 66%, SD = 34%) and social behaviors (M = 63%, SD = 40%) than communication skills (M = 59%, SD = 27%).

Kavale et al., (1997) conducted a review on 35 group design studies and 64 single case research studies on social skills training for children and adolescents with emotional and behavioral disorders. They obtained an average effect size  $d = 0.199$  across the 35 included group design studies. The average percentage of nonoverlapping data (PND) effect size across the 64 single case studies was 62% indicating a moderate effect. For the single case studies, they found the lowest treatment effects in preschool students (M = 55%) and highest effects in adults (M = 68%). Elementary students (M = 63%) and secondary students (M = 64%) have similar effects. Intervention effect varies on different outcome variables. Bigger effects were found in improving social interaction skills (M = 66%, SD = 38%) and social behaviors (M = 63%, SD = 40%) than communication skills (M = 59%, SD = 27%).

Lane & Ledford (2016) reviewed 20 single case design studies published in 11 articles examining interventions to increase sharing behaviors in children with social delays. The authors calculated Tau-U effect size and did visual analysis, but the Tau-U confidence intervals aligned poorly with visual analysis. Ten studies in four included articles are methodologically sound and one article meet the standards with reservation according to WWC standards. These methodological sound studies showed the interventions are effective in increasing sharing initiations for the children. The Tau-U values for 9 studies indicate a strong effect and the other two studies showed a small effect.

Singh et al., (1991) did a quantitative review on 28 social skills intervention studies for children who are seriously emotionally disturbed. The majority of the studies used robust single case design, and a few are group design studies. They did not calculate an overall effect size for all the included studies. They evaluated the studies on a three-point scale with 2 as the most effective and 0 as least effective. The majority of the studies were found effective in controlling or increasing the target behavior of the students with seriously emotional disturbance. Sixteen of the study (57%) received a rating of 2 and seven (25%) were rated 1.

Overall, the previous reviews in this area did not control for experimental rigor or quality. Only the review by Lane and Ledford (2016) did a comprehensive quality evaluation for the included studies, but the topic was focus on sharing behaviors. To

determine whether the SSI is evidence-based practice for preschoolers at risk for EBD, it is needed to evaluate the quality of the single case studies in the literature.

### **Purpose and research questions**

The purpose of this chapter is to evaluate the quality of the single case studies on early interventions targeting at social skills for preschoolers with or at-risk of EBD. This study has the following research questions:

- d) What are the features of the participants and interventions for the SCR studies on SSIs for preschoolers with or at risk of EBD?
- e) What is the quality of the evidence base for SCR studies on SSIs for preschoolers with or at-risk of EBD?
- f) What are the methodological strengths and areas of improvement for the included SCR studies?

## **Method**

### **Article Identification**

**Literature search strategy.** The review covered studies published till Sep 2019. The following databases were searched: (a) ERIC, (b) PsycINFO, and (c) Academic Search Complete. Multiple combinations of the following search terms were used for the social aspects: interpersonal competence, prosocial behavior, social cognition, emotional development, social and emotional development, social skills, socio-emotional, social competence, and social interaction. The following search terms on disability status were

used: disab\*, handicapped, emotional disturbances, seriously emotional disturbance, emotional behavioral disorder, EBD, emotional disturbance, emotional problems, behavioral problems, developmental disabilities, developmental delays, and impairment. For Academic Search Complete, the following search terms were applied to limit the participants' age ranges: Preschoolers, 3-5 years, early childhood education, young children, and preschool. For ERIC and PsycINFO, no age limit was put in the search process as there is no filter on age in these two databases.

### **Inclusion criteria**

- 1) Peer reviewed journals: The studies are published in peer-reviewed journals.
- 2) Participants: The studies must have included preschoolers or young children aged 3-5 years old identified as having emotional and behavioral problems or at risk for emotional and behavioral disorders. The conceptual understanding noted in the review by Cook et al. (2008) is adopted in the current review; the term emotional and behavioral disorders is used to refer to the full spectrum of students with social, emotional, and behavioral problems regardless of whether they receive special education. Preschoolers are often not formally identified as having a disorder, so the current review focuses on at risk children. At risk children include the preschoolers who are identified as at risk by any reliable screening tool or the children nominated by teachers as demonstrating challenging behaviors, including chronic problem behaviors, aggressive behaviors, oppositional-defiant behavior, frequent tantrums, and noncompliance and rule infractions. The preschoolers who are identified as

having attention deficit/ hyperactivity disorder (ADHD), or show clear signs of externalizing behavior patterns are also included.

- 3) Design: Studies must use a single case research design. Single case research includes reversal design, multiple baseline design, multiple probe design, alternating treatment design, and changing criteria design.
- 4) Independent variables: The interventions used must have targeted children's social behaviors.
- 5) Implementer: The intervention implementers must be professionals (e.g., preschool teacher or teaching assistant), social instructors, or researchers.
- 6) Settings: the interventions were conducted in Head Start programs, private or public preschool programs, daycare programs, or early childhood classrooms with children with special needs.
- 7) Dependent variables: The study must have examined the effects of social skills interventions on one or more social, emotional, or behavioral outcomes.

#### **Exclusion criteria**

- 1) The studies are not written in English;
- 2) The studies do not have manipulation over interventions, for example, descriptive studies, reviews, or book chapters;
- 3) The study designs are not single case research designs: studies using group designs, systematic literature reviews, editorials, commentaries, practitioner guides, or descriptive studies;
- 4) The studies are on participants with autism or other developmental disabilities.



- 5) The research focuses on parenting training or interventions to improve parent child relationship and interactions;
- 6) The studies are conducted in clinic settings or psychiatric hospitals;

**Extended search.** Three ways were used to identify more potential articles of the topic. 1) References of the included articles were reviewed to identify other articles that meet the inclusion criteria. 2) The recent five years of the peer-reviewed journals from which the included articles were identified were searched. 3) Google scholar engine was used to search the newly published articles that have cited the included articles.

### **Coding**

Included articles were reviewed, and critical information including descriptive information and features of methodological design were extracted. Descriptive information includes participants, setting, study, and intervention characteristics. Each article was coded for (a) participant characteristics, (b) methodological features, and (c) intervention features.

**Participant characteristics.** Participants were coded on (a) gender, (b) ethnicity, (c) disability status and (d) educational setting. Gender was dichotomous as male and female. Ethnicity was coded as Caucasian, African American, Hispanic, Asian, Mixed, or not reported. Educational settings of participants were coded as inclusive preschool, Head Start program, Special Education classroom, community daycare or preschool, and kindergarten.

**Methodological features.** Research methodology was coded on research design. Research design was coded as reversal design, multiple baseline design, multiple probe design, alternating treatment design or combined design

**Intervention features.** Intervention features include (a) implementer, (b) sociodramatic play, (c) skills instruction, (d) intervention tier (e) dependent variable, (f) generalization, and (g) maintenance. Implementer was coded as *trained teacher or teaching assistant, researcher or social skills instructor trained by researcher, collaboration between researcher and teacher, and peers (similar age children who received training and delivered intervention to the target children)*; sociodramatic play was coded dichotomously as *included* or *not*; skills instruction was coded dichotomously as *included* or *not*; intervention tier was coded as *Tier-1, Tier-2* or *Tier-3*; dependent variable was coded as described in the study; generalization was coded as *included* or *not*; maintenance was coded as *included* or *not*.

### **Quality of Evidence Evaluation**

Quality of evidence evaluations and the application of the WWC SCR Standards was conducted following the model set by Maggin, Chafouleas, Goddard, and Johnson (2011). The included studies were evaluated on (a) the quality of the research design and (b) the magnitude of the evidence of the treatment effect.

**Coding for design standards.** The design standards focus on research design and methodological features. The following aspects were examined: (a) systematic manipulation of the independent variable; (b) inter-observer agreement; (c) experiment

control; and (d) demonstration of an effect. Each of the above aspects will be classified as *Meets this Standard*, *Meets this Standard with Reservation*, or *Does not Meet this Standard*. Treatment fidelity was also evaluated as an additional standard.

***Systematic manipulation of the independent variable.*** The independent variable must be systematically manipulated. For the current review, the researcher must determine when and how the social skill interventions must be implemented. If the intervention is described clearly that the study is replicable, the study will be coded as *Meets this Standards*. If the intervention is not described well or not delivered as the researcher designed, the study will be coded as *Does not Meet this Standard*.

***Inter-observer agreement.*** Each dependent variable must be measured repeatedly by more than one observer. Data on agreement between two observers need to be collected and reported for at least 20% of the data points in each condition, setting or phase and at least 20% of the data points overall. Furthermore, IOA must meet the minimum thresholds of agreement indices: 80% for percentage agreement or 60% for Cohen's Kappa.

This standard is examined in three parts: (a) collection and report of IOA for at least 20% of data overall; (b) IOA for at least 20% of data across each condition, setting or phase; (c) meeting minimum thresholds of agreement indices. If a study meets all the three parts, the study is rated as *Meets this standard*. If a study reported IOA for at least 20% of data overall and meet minimum thresholds of agreement indices but did not indicate if IOA is collected across each condition, setting or phase, the study is rated as

*Meets this Standard with Reservation.* If the IOA of a study is below the minimum thresholds of agreement indices, the study is rated as *Does not Meets this Standard.*

***Experiment control.*** Experiment control will be evaluated by the number of attempts to demonstrate an effect. The standard is the study must include at least three attempts to demonstrate intervention effect at three different time points. Furthermore, the attempt to demonstrate an intervention effect must occur between adjacent phase contrasts. Designs meeting the standards include but not limited to ABAB design, multiple baseline designs with at least three conditions, multiple probe designs with at least three conditions, alternating treatment design with two treatments compared with each other or at least three treatments compared to baseline, and changing criteria designs with at least three different criteria.

***Demonstration of an effect.*** Demonstration of an effect is possible when there is certain number of data points within a phase. To meet this standard, a phase must have at least five data points. To meet this standard with reservation, a phase must have at least three data points.

**Overall quality rating.** To receive an overall rating as *Meets Design Standards*, a study must be rated as *meets this standard* on all the items listed above. To receive an overall rating as *Meets Design Standards with Reservation*, a study must be rated as *meets this standard with reservation* or *meets this standard without reservation* on the previous items. If a study is rated as *does not meet the standard* on any of the item, the study will be rated as *Does not Meet Design Standards.*

**Treatment fidelity.** The adapted quality rubric was modified to include a standard on treatment fidelity. Treatment fidelity data is collected and reported to minimize the possibility of variables other than the intervention on the outcome variable. Treatment fidelity criteria was similar to design standards for IOA. To receive a rating of *Meets the Standard without Reservation*, a study must collect and report treatment fidelity data for at least 20% of all conditions, with percentages of accurate implementation at or above 80%. If a study collected treatment fidelity for less than 20% of all conditions or did not report the percentage, the study is rated as *Meets the Standard with Reservation*. If no measure of treatment fidelity was reported, the study *Did not Meet the Design Standard*.

**Evaluation for evidence standards.** An evaluation of evidence will be conducted for all the studies that meet design standards or meet design standards with reservation. The evidence evaluation mainly rely on visual analysis to assess (a) the consistency of level, trend, and variability in each phase; (b) factors that determine the existence of an intervention effect including the immediacy of effect, proportion of overlap, consistency of data across phases, and projected patterns of outcome variables; and (c) anomalies within the data such as sudden change in level or trend of the data. To ensure reliable evaluation, each graph was assessed according to the coding procedures from the coding manual in Kratochwill et al., (2002). Based on these visual analyses, each study was classified as having *strong evidence* (three demonstration, no non-effect), *moderate evidence* (three demonstration, one non-effect), or *no evidence* (less than three demonstration).

**Inter-rater agreement (IRA).** A second doctoral student did the quality indicator review and evidence evaluation for 21% of the included studies independently. IRA was calculated using the number of agreements divided by the total number of agreements and disagreements, then multiplied by 100. The IRA was 94%. The two raters had meetings to resolve the disagreements.

## Results

A total of 3246 articles were identified with the above search strategies. After screening the title and abstracts, 3011 articles were excluded in the first round because they did not meet the inclusion criteria. 235 articles were included for the full text screening. After the full text screening of the 235 articles, the 26 articles that met the inclusion criteria were included in the review. Five more articles were included after ancestry search, so a total of 31 articles were included in the quality indicator review (see Figure 1).

WWC design standards were applied to evaluate the quality of the study design of all the 31 articles including 33 studies that met the inclusion criteria. When there are three or more than three cases meet the standards with or without reservation, the study was rated as meet the standards with or without reservation. When there are less than three cases meet the standards without reservation, the study receives a rating as does not meet design standards.

**Participants and settings.** The included studies were published between 1974 and 2019. The majority of the studies were conducted in the US ( $n = 28$ ), four was in

New Zealand, and one was conducted in Canada. Out of a total of 271 participants across the 33 studies, 122 of them were target participants who were with or at risk of emotional and behavioral problems (See Table 1). 87 of the target participants were male and 35 target participants were female. More than half of the participants did not have any information regarding ethnicity reported (N = 80). Among the participants with ethnicity information, 24 Caucasian children, 13 African-American children, three Hispanic children, one Asian child, and one mixed racial child were included. The studies included 47 children with developmental delay, 27 children with language delay, 25 children with internalizing behaviors, 14 children diagnosed with EBD, and 10 children with externalizing behaviors. The majority of the children were educated in inclusive classrooms (N = 51), followed by Head Start programs (N = 21), Special Education preschool classes (N = 16), preschool or community daycare (N = 15), Kindergarten (N = 13) and summer programs (N = 6).

**Experimental design.** A total of 33 studies included in 31 articles were coded. Multiple baseline design or multiple probe design was the most commonly used design (54.5%, n = 18), followed by reversal/variation design (24.2%, n = 8), alternating treatment design (9.1%, n = 3), mixed design (12.1%, n = 4), and multiple treatment design (3%, n = 1). The three mixed designs include MBD combined with reversal design (Davis & Reichle, 1996; Fox & Others, 1986; Strain & Others, 1976) and an ABC multiple baseline design with counterbalanced treatment order (Benish & Bramlett, 2011).

**Intervention features.** The majority of the studies (n = 21) used measures of social interactions as dependent variables (see Table 2). Positive verbal or motor-gestural behaviors were dependent variables for four studies, and play behaviors was the dependent variable for three studies. Three studies used correct responding during instruction, one study used engagement in class activity and one study measured the aggressive behaviors as the dependent variable. As to implementer of the intervention, 12 studies used classroom teachers or teaching assistants to implement social skills interventions. 19 studies used researchers or social skills instructors trained by the researchers to implement the intervention. One study involved teacher and researcher collaboration in the intervention implementation and one study was implemented by the peers who were similar age children and received training to deliver the intervention to the target children. Regarding the intervention components, 14 studies included sociodramatic play while 19 studies did not include sociodramatic play. A total of 20 studies included skills instruction in the intervention while 13 studies did not include skills instruction (see Table 3).

### **Methodological Quality**

**Overall ratings.** Each study was assessed with the quality rubric and given an overall rating of methodological quality. For studies including more than one dependent variable, one major dependent variable was selected to evaluate. This resulted in the evaluation of 33 studies and 33 graphs across 31 articles. Only one graph was chosen for each study. 45.5% of all the studies (15 studies) *met the standards without reservations*.



About 12.1% of all the studies (n = 4) *met the standards with reservations*. About 42.4% of all the studies (14 studies across 13 articles) *did not meet the standards*. The overall ratings were based on the four design standards included in WWC standards.

**Individual design standards ratings.** The quality rubric evaluated four design standards (DSs): systematic manipulation of independent variable (DS 1), inter-observer agreement including sufficient number of IOA (DS 2A) and adequate high level of IOA (DS 2B), experimental control (DS 3) meaning more than 3 attempts to replicate effects, demonstration of effect including a sufficient number of data points (DS 4A) and additional criteria for MBD (DS 4B). Additionally, a fifth standard on treatment fidelity was also evaluated in the review. Treatment fidelity included sufficient number of treatment fidelity (DS 5A) and adequate high level of treatment fidelity (DS 5B). Table 4 displayed the WWC standards applied to the 33 single-case studies across 31 articles. A total of 122 cases, with each case representing a participant, within the studies were analyzed. Failing to report treatment fidelity (DS 5) was the most common shortage in the included studies (48.5%, n = 16). Failing to meet experimental control (DS 3) was the primary reason for studies being classified as *Did not Meet Design Standards* (39.3%, n = 13). One study did not report sufficient number of IOA (DS 2A) and inquiry email was sent, but no reply with extra information was received (Benish & Bramlett, 2011). One study only had the minimum number of data points (DS 4A) to demonstrate effect so they are classified as *Meet Standards with Reservation* (Green et al., 2013). The evaluation results of the five standards are presented below.

***Systematic manipulation of the independent variable (DS 1).*** All 122 cases within the 33 studies systematically introduced SSIs in their studies.

***Inter-observer agreement (DS 2).*** The majority of these studies (n = 32, 97%) reported IOA on more than 20% of their data at or above 80% for percentage agreement or 60% for Cohen's Kappa. Only one study fails to report the percentage of IOA data points they collected (Benish & Bramlett, 2011). Inquiry emails was sent, but no reply with extra information were received. 27.3% (n = 9) of studies did not specify if IOA was collected at least once for each condition.

***Experimental control (DS 3).*** Approximately 60.7% (n = 20) of the included studies meet this standard. While the other 39.3% (n = 13) of the evaluated studies did not demonstrate intervention effects for at least three different points in time. Of the 13 studies, four studies used multiple baseline design across participants, but the intervention began at less than three time points (Brown, Ragland, & Fox, 1988; Stanton-Chapman, Jamison, & Denning, 2008; Storey & Others, 1994). The other eight studies used reversal design or variations of reversal design, but they only have less than three phase contrasts to demonstrate intervention effect (Frea, Craig-Unkefer, Odom, & Johnson, 1999; Goldstein, Wickstrom, Hoyson, & Jamieson, 1988; Lewis, 1994; Macy & Bricker, 2007; McConnell & Others, 1991; Strain & Timm, 1974; Urlacher, Wolery, & Ledford, 2016) (Smart, Green, & Lynch, 2016). One study used multiple treatment design which did not have three different point in time to show intervention effect (Lemmon, 2015).

***Demonstration of effect (DS 4).*** About 60.6% (n = 20) of the studies included at least three cases for multiple baseline design or at least one case for reversal or alternating treatment design with at least five data points in each phase. 33.3% (n = 11) of the studies used designs that included at least three cases with three to four data points in each phase, so they are only classified as *Meet Standard with Reservation*. The other 6.1% of the studies (n = 2) did not meet the standard.

For all the studies that met the standards without reservation or met the standards with reservation, WWC evidence standards were used to evaluate the evidence of these studies. Ten studies across ten articles were rated as showing strong evidence of the effects of social skills interventions. One study was rated as showing moderate evidence and eight studies were rated as showing no evidence (See Table 5).

A total of 39 participants were included in the ten studies showing strong evidence. Four participants were included in the one study showing moderate evidence. The 11 studies showing evidence were conducted by ten research teams.

***Treatment fidelity (DS 5).*** About 51.5% (n = 17) of the studies reported treatment fidelity and 48.5% of the studies (n = 16) did not report treatment fidelity. The articles published after 2010 all reported treatment fidelity except one study (Hughett, Kohler, & Raschke, 2013).

## **Discussion**

The purpose of this quality indicator review was to evaluate the evidence base of SCR of social skills interventions for preschoolers at risk of emotional and behavioral

problems. This review provides critical information on the methodological quality within the social skills interventions' literature. The results inform the practitioners social skills interventions have enough evidence as effective interventions to remediate at risk preschoolers' social skills deficits. Three research questions were proposed in the review. Findings of each research question are discussed below.

***Research question one.*** *What are the features of the participants and interventions for the SCR studies on SSIs for preschoolers with or at risk of EBD?*

Most of the included studies reported enough information regarding participants and their educational settings. But 65.6% of the target participants did not have any ethnicity information reported.

***Research question two.*** *What is the methodological quality of SCR studies on SSIs for preschoolers with or at-risk of EBD?*

After the application of WWC quality standards to all 33 studies, the results indicate there is enough evidence to support SSIs as evidence-based intervention for at risk preschoolers. For methodological quality review, 15 studies met the standards without reservation; four studies met the standards with reservation; and 14 studies did not meet the standards. Overall the literature base show high methodology quality. As to evidence evaluation, ten studies provided *strong evidence*, one study provided *moderate evidence* and eight studies provided *no evidence*. In total, 39 participants in 11 studies conducted by ten research teams showed evidence to support SSI as effective intervention. According to the standard proposed by Horner, Carr, Halle, Mcgee, Odom,

and Wolery (2005), a practice may be considered evidence based when a minimum of five single subject studies with at least 20 participants conducted by three different research teams were published in peer reviewed journals. There is enough evidence to support SSI as evidence-based intervention for preschoolers with emotional and behavioral problems.

*Research question three. What are the methodological strengths and areas of improvement for the included SCR studies?*

From the evaluation, three areas of methodological weakness were identified: reliability, experimental control, and treatment fidelity.

*Reliability.* 97% (n = 32) of the evaluated studies reported acceptable data IOA with an adequately high level. However only 77.4% (n = 24) of them conducted IOA consistently across all the participants and phases. Nine studies in this review reported positive findings without adequate IOA measures. Adequate collection and reporting of IOA increases confidence in the reliability of the effects reported in the studies. Insufficient IOA decreases the overall quality of data reported and reduces confidence in the results. It is encouraging to see more researchers reported IOA in their studies. Comparing to previous review on SSI, more included articles collected and reported IOA in the present review. It's strongly recommended for future studies to collect and report adequate IOA according to the standards.

*Experimental control.* The second area of concern, demonstrating experimental control, is crucial in SCR. The appropriate experimental control ensures the functional

relationship between the independent variable and dependent variable. In SCR, WWC standards are required to have at least three demonstrations of experimental control at three different time points. Only 60.7% (n = 20) of the 33 studies included three or more demonstrations of experimental control at three different time points. The nine studies reporting positive outcomes lack the internal validity to support their findings. Further single case studies with rigorous methodological design related to internal validity are needed to strengthen the evidence of SSI for preschoolers with emotional and behavioral problems.

*Treatment fidelity.* More than half of the included studies (51.5%, n = 17) did not report treatment fidelity. But it is good to observe a trend of more studies reported treatment fidelity in the studies published after 2010. Thirteen out of the 14 included studies published after 2010 reported treatment fidelity. Treatment fidelity data are crucial to ensure the interventions were carried out as they were designed. It's strongly recommended to report treatment fidelity in future studies.

CHAPTER III  
A META-ANALYSIS OF SINGLE CASE STUDIES ON SOCIAL SKILLS  
INTERVENTIONS FOR PRESCHOOLERS WITH OR AT RISK FOR EMOTIONAL  
AND BEHAVIORAL PROBLEMS

**Introduction**

The development of social competence is pivotal in young children. As children enter early childhood education settings, they need more social skills to deal with the new relationship with teachers and peers. Specifically, they need to follow teachers' directions, engage in large group and small group activities and interact with other children. However, an alarming number of preschoolers exhibit social skills deficits and show problem behaviors that impeding effective interactions with adults and peers in classrooms (Brown & Conroy, 2011; Forness, Freeman, Paparella, Kauffman, and Walker, 2011). The early onset of problem behaviors place the preschoolers at higher risk of developing severe behavioral disorders and is related to a host of negative outcomes in the future (Bulotsky-Shearer, Domínguez, Bell, Rouse, & Fantuzzo, 2010; Campbell, Spieker, Burchinal, & Poe, 2006).

Social competence is defined as “the ability to integrate cognitive, affective, and behavioral states to achieve goals in a social context” (McCabe & Altamura, 2011, p. 515). Social competence can be evaluated as how well children get along with peers and adults and establish relationships with important people in their lives (Ashiabi, 2007).

The emergence of social competence starts as early as early childhood and evolves as children grow. Preschoolers start to develop problem solving skills, social interaction skills, and play skills that enable them to establish positive relationships with others (McCabe, & Altamura, 2011). Children with social competence can follow teachers' directions, manage their emotions and establish friendship with peers. Furthermore, social competence is predictive of many positive developmental outcomes including academic success, interpersonal acumen, and healthy psychological adjustment (Odom, McConnell, & Brown, 2008).

Preschoolers at risk for EBD are characterized as lacking social competence. They exhibit social skills deficits to different extents which means they lack necessary social skills. Social skills are defined as “socially acceptable learned behaviors that enable a person to interact effectively with others and to avoid or inhibit socially unacceptable behaviors” (Gresham, Cook, Crews, & Kern, 2004). When children lack adequate social skills, they exhibit problem behaviors in an attempt to achieve their social goals. Problem behaviors can be manifested as externalizing behaviors (e.g., aggression, disruptive behaviors) and internalizing behaviors (e.g., anxiety, depression).

Researchers and professionals make a lot of efforts to develop and evaluate different intervention programs to teach children social skills to remedy their deficits. In the current review, social skills interventions are defined broadly as “any intervention on the basis of behavioral, cognitive, or social interventions that were directed at training specific social skills and/or remediating particular social skills deficits” (Gresham et al.,



2004). Social skills interventions are widely used and examined in the effect of improving social behaviors in children with social deficits (Gresham, 2015).

Social skills interventions can be categorized to different approaches based on the specific techniques applied in the interventions. Specifically, Vaughn et al., (2003) synthesized 23 studies for 3-5-year-old children with disabilities and found the following features were often employed: prompting, rehearsal, reinforcement, modeling, storytelling, direct instruction, play-related activities, and free play generalization. Interventions emphasizing modeling and coaching are based on social learning theory (Bandura & Walters, 1977). Interventions relying on reinforcement are based on the operant learning paradigm in behaviorism (Skinner, 1965). Interventions using cognitive approach emphasize instructions on cognitive problem-solving scripts and coping skills for students to improve their problem solving in social environments (Kazdin, Siegel, & Bass, 1992). Studies on social skills training have tended to adopt multimodal programs incorporating multiple techniques since the 1990s (Vaughn et al., 2003).

### **Importance of early intervention**

Researchers have pointed to the critical importance of early intervention. There is only a short period of time for young children to have effective early intervention before their problems get worse and become more resistant to be changed later. Previous research suggests that programs for younger children have better outcomes than programs for older children (Ramey & Ramey, 1998). When children with significant problems are neither identified nor given appropriate treatment in a timely manner, their problems tend

to be long-lasting, resistant to treatment and need more intensive services and resources to treat (Dunlap et al., 2006).

### **Evidence based practice**

Legislative changes in Individuals with Disabilities Education Improvement Act (IDEA, 2004) and No Child Left Behind (NCLB, 2001) have placed more emphasis on evidence-based practices. Evidence-based practices (EBP) refer to “practices and programs shown by high-quality research to have meaningful effect on student outcomes” (Cook & Odom, 2013). Certain standards are needed to evaluate the quality of research when we want to determine whether a practice is EBP. These legislative changes push researchers to propose appraisal rubrics to examine which practices are most effective for certain group of students with special needs. Different associations and researchers have proposed different standards to evaluate the quality of single case studies in response to the EBP movement (Horner et al., 2005; Horner & Kratochwill, 2012; Kratochwill et al., 2014). The Council for Exceptional Children (CEC) proposed eight quality indicators in CEC Standards for Evidence Based Practices in Special Education (Cook et al., 2015). What Works Clearinghouse (WWC) standards include guidelines to evaluate research design quality and guidelines to examine whether there is enough evidence of an intervention effect (Kratochwill et al., 2014).

As an effort to examine the evidence base for SSI for preschoolers with or at risk for EBD, the author did a quality review for the single case studies in the literature. Furthermore, I calculated the effect sizes for the single case studies to determine whether

SSI showed enough evidence to be effective in the population of preschoolers with or at risk for EBD. Moderator analysis was also conducted to examine which factors can explain the heterogeneity among the included studies.

The conceptual understanding noted in the review by Cook et al. (2008) is adopted in the current review, the term emotional and behavioral disorders is used to refer to the full spectrum of students with social, emotional, and behavioral problems regardless of whether they receive special education. The preschoolers who are identified as attention deficit/ hyperactivity disorder (ADHD) or learning disabilities (LD) or show clear signs of externalizing behavior patterns including chronic problem behaviors, aggressive behaviors, oppositional-defiant behavior, frequent tantrums, and noncompliance and rule infractions are also included.

### **Previous meta-analyses and reviews**

Many descriptive, meta-analytic and quantitative reviews have been conducted on the effect of social skills interventions for children with or at risk of EBD since 1980s (Ang & Hughes, 2001; Beelmann, Pfingsten, & Lösel, 1994; Cook et al., 2008; Durlak, Fuhrman, & Lampman, 1991; Gresham, Cook, Crews, & Kern, 2004; Lösel & Beelmann, 2003; Magg, 2006; Quinn, Kavale, Mathur, Rutherford, & Forness, 1999; Schneider & Byrne, 1985; Schneider, 1992; Vaughn, Kin, Sloan, Hughes, Elbaum, & Sridhar, 2003). However, most of the previous reviews only synthesize group design studies. Only three meta-analysis include single case studies on the effect of SSIs for students with or at-risk of EBD (Mathur et al., 1998; Kavale, Mathur, Forness, Rutherford, & Quinn 1997;

Chenier et al., 2011) and two quantitative review focus on single case research (Lane & Ledford, 2016; Singh, Deitz, Epstein, & Singh, 1991). None of the previous meta-analysis focus on the population of preschoolers at risk of EBD.

Most previous reviews for group design studies suggest that social skills interventions are effective in improving social cognitive skills and social emotional behaviors for children with or at risk for EBD (Ang & Hughes, 2001; Beelmann et al., 1994; Cook et al., 2008; Durlak et al., 1991; Gresham et al., 2004; Lösel & Beelmann, 2003; Magg, 2006; Schneider & Byrne, 1985; Schneider, 1992; Vaughn et al., 2003). The effect is small to moderate in short term.

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; Cook et al., 2008; Mathur et al., 1998; Schneider et al., 1992). Mathur et al., (1998) suggest intervention effect varies on different outcome variables. Bigger effects were found in improving social interaction skills ( $M = 66\%$ ,  $SD = 38\%$ ) and social behaviors ( $M = 63\%$ ,  $SD = 40\%$ ) than communication skills ( $M = 59\%$ ,  $SD = 27\%$ ).

There are inconsistent conclusions about the moderating effect of age. Some find social skills interventions are less effective for elementary school children (Schneider & Byrne, 1985) than for preschoolers. However, Durlak, Fuhrman, & Lampman (1991) meta-analysis on cognitive-behavior therapy found bigger effect size for older children

(11-13 years old) who developed more advance in cognitive stage than younger children (5-10 years old).

Only two meta-analysis on SSI for students with or at-risk for EBD include single case studies. Mathur et al., (1998) did a meta-analysis on SSIs for students with or at-risk of EBD and students with ASD. They reviewed 64 single-case studies and the mean percent of non-overlapping data (PND) effect size was 62% (SD = 33%) indicating a low treatment effect. Kavale et al., (1997) conducted a review on 35 group design studies and 64 single case research studies on social skills training for children and adolescents with emotional and behavioral disorders. They obtained an average effect size  $d = 0.199$  across the 35 included group design studies. The average percentage of nonoverlapping data (PND) effect size across the 64 single case studies was 62% indicating a moderate effect.

Both of these two meta-analyses found similar differential effect for children of different age group. The meta-analysis by Marthur et al., (1998) revealed that the lowest treatment effects were in the preschool group ( $M = 55\%$ ,  $SD = 30\%$ ) compared to elementary ( $M = 63\%$ ,  $SD = 36\%$ ) and secondary students ( $M = 66\%$ ,  $SD = 29\%$ ). Kavale et al., (1997) found the smallest PND (55%) at the preschool level, following by elementary (PND = 63%), secondary (PND = 64%) and adult (PND = 68%). These findings are controversial to the findings from studies on early intervention that programs are more effective when they begin at a younger age (Ramey & Landesman Ramey, 1998).

## **Purpose and research questions**

The purpose of this chapter is to synthesize the effects of SSIs for preschoolers with or at-risk of EBD. A meta-analysis of SSI research using SCR is needed to provide support for SSIs as an Evidence-Based Practice (EBP) for preschoolers with or at risk of EBD. To address this gap in the literature, the present meta-analysis investigated the following research objectives:

- c) What is the overall effect size of SSIs for preschoolers with or at-risk of EBD across all the included SCR studies?
- d) Which variables moderate the effects of SSIs for preschoolers with or at-risk of EBD?

## **Method**

### **Literature search**

Systematic search for literature was done using identical strategies with the literature search in chapter II. Three databases (a) ERIC, (b) PsycINFO, and (c) Academic Search Complete were searched. Multiple combinations of the following search terms were used: interpersonal competence, prosocial behavior, social cognition, emotional development, social and emotional development, social skills, socio-emotional, social competence, social interaction; disab\*, handicapped, emotional disturbances, seriously emotional disturbance, emotional behavioral disorder, EBD, emotional disturbance, emotional problems, behavioral problems, developmental disabilities, developmental delays, impairment. For Academic Search Complete, the following search terms were applied to limit the participants' age ranges: Preschoolers, 3-5 years, early

childhood education, young children, and preschool. For ERIC and PsycINFO, no age limit was put in the search process.

**Title and abstract screening.** Title and abstract of all the articles obtained from the literature search were reviewed using the inclusion and exclusion criteria. Articles were excluded if they were (a) not in English, (b) a literature review, (c) descriptive (e.g., book reviews, chapters), (d) not delivered in classroom (e.g., parent training, interventions in clinic setting or psychiatric hospital).

**Full text screening.** The full text of the studies retained from title and abstract screening will be downloaded and screened. The full texts will be screened based on the inclusion and exclusion criteria. Included articles must be published in peer reviewed journals. Dissertations and conference reports will be excluded. Participants: The studies included must have included preschoolers or young children aged 3-5 years old identified as having emotional and behavioral problems or at risk for emotional and behavioral disorders. At risk children include the preschoolers who are identified as at risk by any reliable screening tool or the children nominated by teachers as demonstrating challenging behaviors. Preschoolers who are cognitively impaired or identified with autism spectrum disorder (ASD) are excluded. Design: Studies included must use single case research design. Single case research includes reversal design, multiple baseline design, multiple probe design, alternating treatment design and changing criteria design. The study designs are not single case research designs. Studies using group designs, systematic literature reviews, editorials, commentaries, practitioner guides, or descriptive

studies are excluded. Independent variables: The interventions used must have targeted one of three areas of social skills: social interaction, prosocial behaviors, or social-cognitive skills. The studies focused on inclusion or setting event of the classroom instead of certain interventions will be excluded. The research focused on parenting training or interventions to improve parent child relationship and interactions.

Implementer: The intervention implementers must be a professional (e.g., preschool teacher or teaching assistant) or therapist or researcher who provide services at the preschool settings. Dependent variables: The study must have examined the effects of social skills interventions on one or more social, emotional, or behavioral outcomes.

Results: The study must have reported enough statistics on intervention effectiveness that can be used to calculate effect size. The studies do not report enough statistical information to calculate effect size will be excluded.

**Extended literature search.** Three ways were used to identify more potential articles of the topic. 1) References of the included articles were reviewed to identify other articles that meet the inclusion criteria. 2) The recent five years of the peer-reviewed journals from which the included articles were identified were searched. 3) Google scholar engine was used to search the newly published articles that have cited the included articles.

**Interrater reliability coding.** A second doctoral student did full text screening for 20% of random selected articles independently. Inter-rater reliability was calculated using the total agreements divided by the sum of agreements and disagreements and multiplied by 100.



## Variable Coding

Participant characteristics, intervention features and dependent variables were coded for each included article.

**Participant characteristics.** Participants were coded on the following variables: (a) age, (b) gender, (c) ethnicity and (d) disability status. Age was coded in months; gender was coded dichotomously as male or female; ethnicity was coded as Caucasian, Hispanic, African American, Asian or not reported; disability status was coded as internalizing behavior, externalizing behavior, developmental delay, language delay or diagnosed as emotional disturbance.

**Intervention features.** Intervention features include (a) implementer, (b) social skilled peers, (c) target behavior, (d) skills instruction, (e) intervention format, (f) intervention components (g) generalization, and (h) maintenance. Each implementer was coded as researcher, teacher, peer or collaboration between researchers and teachers; social skilled peers were coded dichotomously as included or not; target behavior was described as the authors did in the studies; skills instruction was coded as having skills instruction or not; intervention format was coded as *individual* for interventions implemented in one-on-one settings; *small group* for interventions conducted in groups with 2-4 children, and *big group* for interventions conducted in big group containing more than 6 children; intervention components were described as main components in the interventions; generalization was coded dichotomously as having a generalization phase or not; maintenance was coded dichotomously as having a maintenance phase or not.

**Dependent variables.** The current review focus on preschoolers' social behaviors in classroom. Dependent variables were coded as social interaction, problem behavior, and responding to instructions. Social interactions refer to behaviors involving the student and other peers or teachers. Problem behaviors refer to behaviors that are disruptive to other children or teachers in classroom (e.g., aggressive behavior, tantrum, and disobedience). Responding to instructions refer to the correct responding to the implementers' task requests for the children (e.g., share a toy with a friend, point out a peer's preference).

**Reliability coding.** A second doctoral student independently coded 21% randomly selected studies of the included articles. Inter rater reliability was calculated. Inter-observer reliability was calculated by dividing the agreements by the total of agreements plus disagreements and multiplied by 100.

## **Quantitative Synthesis**

**Effect size estimation.** Traditionally, single case researchers use visual analysis to evaluate whether there is an effect of the intervention. As an effort to aggregate research findings across different studies, researchers are exploring different ways to estimate effect size for single case research. Multiple statistics from both non-parametric and parametric approach exist in the literature. Some commonly used non-parametric statistics are 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). Tau-U proposed by Parker and his colleagues is another index widely used recently (Parker, Vannest, Davis, & Sauber, 2011). Tau-U combines non-overlap between phases with trend within the intervention phase.

**Baseline Corrected Tau.** Baseline Corrected Tau as proposed by Tarlow (2017) as an improved rank correlation effect size statistic. Baseline Corrected Tau utilized Kendall's tau and incorporate possible baseline trend to calculate effect size estimate (Tarlow, 2017). Based on the limitations of Tau-U discussed in Tarlow (2017), Baseline Corrected Tau was used in the current meta-analysis. Three major limitations of Tau-U are: (a) the value is inflated and not bound between -1 and 1; (b) it cannot be visually graphed; and (c) the baseline trend correction is affected by the phase length. Baseline Corrected Tau showed several strengths. It is bounded between -1 and 1, just like Pearson  $r$ , which makes it easier to interpret and understand. The limited boundary is a strength of Baseline Corrected Tau compared to standard mean differences. Similar to Tau-U, Baseline Corrected Tau is also robust to autocorrelation.

**Data extraction.** Data on the graphs in the included study were extracted using plot digitizer. Studies included in the review used multiple-baseline design, multiple probe design, alternating treatment design and reversal design. Graphed data from A and B phases were extracted from included studies and transformed into raw numerical data in excel sheet. The first AB contrast for each participant was extracted to eliminate confounding effect for studies using ABAB design, multiple baseline design, or multiple

probe design. The phase contrast between the less effective intervention and the more effective intervention was extracted for the studies using alternating treatment design. If more than one dependent variable were reported in one study, only the main dependent variable was chosen to represent the study.

**Effect size calculation.** Effect sizes were computed using baseline corrected Tau proposed in Tarlow (2017). ESs were computed by comparing baseline to intervention phases or alternating treatment phases using the Baseline Corrected Tau (Tarlow, 2017). ES computations were conducted using web-based calculator available at <http://www.ktarlow.com/stats/tau> (Tarlow, 2016). The interrupted time-series (AB) data will be put in the Baseline Corrected Tau calculator. Then decisions were made following the guide on the website. Confidence intervals were obtained using the online calculator.

Meta-analytic aggregation was done based on the procedures proposed in Tarlow (2017). The recommendations in Tarlow (2017) take the estimate of baseline slope and boundedness of tau into consideration. Tarlow (2017) suggests to use the Theil-Sen slope as baseline slope. The Theil-Sen slope is basically the median of all slopes possible between two datapoints among the baseline data. When there is trend in baseline, it is possible to residualize the baseline and treatment data points based on the estimated baseline Theil-Sen slope first and then compare baseline and treatment phases.

The mean Baseline Corrected Tau and the standard errors were utilized via meta-analytic method in R to obtain an omnibus effect size with a standard error and

confidence interval (Tarlow, 2017). The heterogeneity of the results was evaluated using the Q statistics.

The following calculating formula were used in calculating the omnibus effect size across the included studies:

$$Weight = 1/variance$$

$$mean = \sum Weight * effect\ size / \sum Weight$$

The standard error was calculated using this formula:

$$Standard\ error = \sqrt{variance}$$

Neither a fixed-effects nor a random-effects model fit perfectly for SCR data (Borenstein, Hedges, Higgins, & Rothstein, 2011), a fixed-effects model was chosen in this meta-analysis as Q statistics suggest homogeneity among cases within one study. The total of Q statistics of all the studies were less than the degree of freedom which does not allow for reasonable estimation of variance under the random-effects model. Thus, the statistics using fixed-effects model in R were reported in the results section. Moderator analysis results can be interpreted using the ES magnitude with nonoverlap of the confidence interval.

**Publication bias.** A funnel plot of the average effect sizes of the included studies was made to examine publication bias. Publication bias was tested using the Egger's test (Egger, Smith, Schneider, & Minder, 1997).

## Results

### Weighted Effect Sizes

Baseline Corrected Tau effect sizes were estimated for all 67 cases, and random-effects means were calculated for each of the 19 studies. Baseline Corrected Tau can be interpreted as the correlation between social skills interventions and their outcome, controlling baseline trend when needed. Only two out of 67 cases had a significantly baseline trend, and therefore was corrected with the Baseline Corrected Tau procedure when calculating an effect size.

Within-study mean effects ranged from Baseline Corrected Tau = 0.32 – 0.89, with half of the values falling between 0.53 and 0.69 (see Table 7). All weighted within study effect sizes were statistically significant except for (Goldstein et al., 1988). This suggests that the social skills interventions in all but one study yielded positive results, which rejected the null hypothesis of no treatment effect.

Within-study heterogeneity indices should be interpreted with caution due to the small number of cases included in each combined mean effect. No study had statistically significant heterogeneity according to Q tests results. This suggested the treatment effects were homogenous across participants within the same study. However, the between study heterogeneity statistic suggests the treatment effects were not homogenous across studies.

The weighted random effect mean of all 48 cases was Baseline Corrected Tau = 0.66, 95% CI [0.61, 0.71], and  $p < .05$  ( $Q = 53.59$ ;  $p_Q = 0.000$ ). This Baseline Corrected Tau indicates that social skills intervention included in the meta-analysis yielded a large

positive effect on average. Moderator analyses were conducted to address the heterogeneity in this mean effect. Five potential moderators were examined to see whether any of them accounted for the differential outcomes between subgroups.

### **Publication bias**

We used fixed effects model for the Egger's test. The statistics (beta = -14.00, SE = 0.396,  $z = -35.37$ ,  $p = 0.000$ ) suggested the existence of publication bias. The funnel plot was shown in Figure 4.

### **Common components of social skills interventions**

Ten studies included socially skilled peers. Ten studies included adult prompts. Eleven studies employed reinforcement (e.g., contingent praise, token economy). Seven studies included social skills instruction. Four studies included video modeling and two studies included script training. One study included high-p request and one study used visual support (see Table 7). All these intervention components were antecedent interventions except reinforcement functioning as consequence interventions.

### **Dependent variables**

All the dependent variables in the 19 included studies were measures of social interactions. However, there is a range of different measures researchers chose in their studies. Most of researchers used frequency of social interactions (initiations and/or responses) ( $N = 11$ ). Other researchers used play behaviors ( $N = 3$ ), positive verbalization

or commenting ( $N = 4$ ), positive behaviors ( $N = 1$ ), and engagement in class activities ( $N = 1$ ).

### **Reliability**

The inter-rater reliability was calculated and the reliability was 92.6%. The two raters had meetings to resolve the disagreements in the variable coding.

### **Moderator effects**

Heterogeneity was examined in subgroup analyses. In the subgroup analyses, the test statistic  $Q^*_{Between}$  provides the statistical significance of between-group differences. It is similar to an ANOVA  $F$  test. Results of moderator analysis are presented in Table 8. In total 67 cases were included in the subgroup analyses and all these potential moderators were examined by cases. The first two potential moderators (gender and disability status) were analyzed with 64 cases as four cases have missing values because the author did not report the necessary information. The subgroup analyses suggested gender, social skilled peer and intervention format were significant moderators while disability status, interventionists, and skills instruction were not significant moderators.

**Gender.** Two gender categories were tested for between-group differences (male,  $n = 44$ ; female,  $n = 19$ ). There was a statistically significant difference between the two gender categories ( $Q^*_{between} = 7.40, p = .006$ ). The mean effect size for female ( $M = 0.75$ ) is bigger than that for male ( $M = 0.60$ ).



**Disability status.** Five disability categories were tested for between-group differences: internalizing behaviors ( $n = 18$ ), externalizing behaviors ( $n = 5$ ), developmental delays ( $n = 19$ ), language delays ( $n = 13$ ), and emotional disturbance ( $n = 8$ ). There was no statistically significant difference among the five disability category groups ( $Q^*_{between} = 9.08, p = .06$ ). The mean effect size for children with internalizing behaviors ( $M = 0.74$ ) were largest followed by the mean effect size for the children diagnosed with EBD ( $M = 0.67$ ). The mean effect size for children with externalizing behaviors were the smallest ( $M = 0.43$ ).

**Implementer.** Four implementer categories were tested for between-group differences: researcher ( $n = 37$ ), classroom teacher ( $n = 22$ ), peer ( $n = 4$ ), and collaboration ( $n = 4$ ). There was no statistically significant difference among the four interventionist category groups ( $Q^*_{between} = 5.37, p = .15$ ). The mean effect size for the studies with teachers as implementers was largest ( $M = 0.72$ ) followed by the mean effect size for the studies with peers as implementers ( $M = 0.63$ ). The mean effect size for the studies implemented by the researcher was 0.61.

**Skills instruction.** There was no statistically significant difference between the studies with skills instruction ( $n = 42$ ) and the studies without skills instruction ( $n = 25$ ,  $Q^*_{between} = 0.25, p = .62$ ). The mean effect size for the studies with skills instruction ( $M = 0.65$ ) was smaller than the effect size for the studies without skills instruction ( $M = 0.68$ ). The difference is very small and there is big overlap between the confidence intervals.

**Intervention format.** There was statistically significant difference between the studies using different format: individual ( $n = 9$ ), small group ( $n = 47$ ), and big group ( $n = 11$ ,  $Q^*_{between} = 11.62$ ,  $p = .003$ ). The studies conducted interventions in big group yielded largest effect sizes ( $M = 0.78$ ) than the studies conducted in small group ( $M = 0.62$ ) or individually ( $M = 0.50$ ).

## Discussion

The purpose of this review is to examine the effect of social skills interventions for preschoolers at risk for emotional and behavioral problems across published single-case studies. The first research question focused on the overall effect across the included SCR studies. The overall effect size (Baseline Corrected Tau = 0.66) across all the 19 included studies suggests social skills interventions are effective in improving social behaviors for preschoolers at risk for emotional and behavioral problems. This overall effect size is bigger than the effect sizes reported in previous reviews that have found small to moderate effects for social skills intervention for children with EBD across the studied age groups (Mathur et al., 1998; Kavale et al., 1997).

The second research question was to explore the potential moderator variables in order to examine their influence on the effects of SSIs for preschoolers with or at-risk of emotional and behavioral problems. Specifically, gender, disability status, implementers, socially skilled peers, social skills instruction, and intervention format were examined as potential moderators. Considering the heterogeneity of the effect sizes for the included

studies, subgroup analyses were conducted to examine which potential factors accounted for the variabilities.

Gender, socially skilled peers and intervention format were significant moderators for the effect of the social skills interventions as indicated by the  $Q^*$ *between* statistic. Participants' disability status, implementers, and social skills instructions were not statistically significant moderators. The results of subgroup analyses on these potential moderators are explained in the following paragraphs.

The mean effect size for females is bigger than that for males, which means social skills interventions showed a larger effect on at risk preschool girls than boys. Five disability categories were examined in a subgroup analysis. Disability status is not a significant moderator. The mean effect size for preschoolers with internalizing behaviors is the largest, followed by preschoolers diagnosed with emotional disturbance. The mean effect size for preschoolers with externalizing behaviors is the smallest. This is consistent with the findings in Kavale et al. (1997), who found social skills trainings are most effective in reducing symptoms related to anxiety ( $d = 0.422$ ) and least effective in reducing aggression ( $d = 0.129$ ). It is encouraging to see social skills interventions are effective for all the five disability categories even for preschoolers who were already diagnosed with EBD.

Most of the included studies have multiple components in their intervention package. Two commonly used intervention components were analyzed separately to examine whether they can explain the differences among the studies. It is not intended to

do component analysis. Interventions with multiple components are recommended. Socially skilled peers were viewed as an important component in social skills interventions as it is speculated socially skilled peers can serve as positive models for children with social skills deficits. More than half ( $n = 10$ ) of the included studies included socially skilled peers in their intervention. The component socially skilled peers turns out to be a statistically significant moderator, but the effect of the studies without socially skilled peers were larger than the effect of the studies with socially skilled peers. The interventions that did not include socially skilled peers usually include some other research-based interventions such as video modeling (Green et al., 2013), teacher prompts and praise (Lindeman & Others, 1993)(Strain & Others, 1976), script training (Goldstein et al., 1988; Gronna, Serna, Kennedy, & Prater, 1999), and high-p requests (Davis & Reichle, 1996). This implies socially skilled peers is not a necessary component in social skills intervention, and interventions including other research-based components can also be effective.

Social skills instruction was another commonly used component in social skills interventions. There was no statistically significant difference between studies with social skills instruction and those without skills instruction. The studies include social skills instruction in their interventions have similar effect size as the studies without social skills instruction. As mentioned above, the studies without social skills instructions usually adopted other research-based intervention components such as video modeling, teacher prompts and praise, or high-p requests.

The subgroup analyses on intervention components discussed above go along with the findings in the review by Vaughn et al., (2003) that “positive outcomes were associated with a range of interventions including modeling, play-related activities, rehearsal/practice, and prompting.” Overall, all the included studies included one or more of the research-based intervention components. Most of the social skills interventions have multiple components. Based on this finding, professionals who want to improve social skills for at risk preschoolers can design social skills intervention programs to include research-based components that are applicable and feasible in their classroom.

Intervention format is another statistically significant moderator. The social skills interventions that were conducted in big groups had largest effect size. It is speculated that social skills interventions conducted in big groups provided more opportunities for preschoolers to practice the targeted social skills.

Four interventionist categories were examined in a subgroup analysis. There were no significant differences among the studies with different interventionists. The studies that included teachers as interventionists have the biggest mean effect size. As behavior management is one of the most challenging behaviors for preschool classroom teachers, some people are concerned preschool teachers are not well equipped to manage children’s challenging behaviors. It is encouraging to know teachers are able to conduct effective social skills interventions after certain professional training and they can make behavior changes in at risk preschoolers.

**Limitation.** As the review focused on high quality research studies, only published peer-reviewed articles were included in the study. If the unpublished studies on the topic were included, the review may provide a more holistic picture of the literature. Another limitation is about the data analysis. As quality indicator review was conducted and only the studies that meet the standards with or without reservation were included in the meta-analysis. It is very common to have homogeneity among cases within one study in this review, which leads to the sum of  $Q^*_{between}$  was smaller than the degree of freedom. Thus, only the fixed-effect model can be used in data analysis. If more articles were included, it may be possible to have enough heterogeneity within the studies so that both the fixed-effect model and the random-effect model can be used to analyze data and compare the results.

**Future research.** Although researchers agree upon the importance of treatment integrity in intervention studies, only ten studies out of the 19 included studies reported treatment integrity. Treatment integrity helps to ensure the interventions are implemented as they are planned. Without treatment integrity, the readers have less confidence in the causality between the intervention and the results. It is strongly recommended to report treatment integrity in future studies.

Although all the main dependent variables in the included studies were related to social interactions, the variables are different across studies. The differences in the dependent variables may lead to different effect size. The studies measured duration of extended social interactions may yield smaller effect size than the studies measured

frequency of social initiations. But the difference could not reflect the true different effects of the interventions.

A common critic for social skills intervention is lack of generalization and maintenance (Gresham, 2015). Only two studies included both generalization and maintenance phase and three study only included generalization and nine studies only included maintenance phase. Including generalization and maintenance phases in the design of social skills intervention programs will help children maintain and generalize the skills they learned.

It is exciting to see the social skills interventions are very effective for preschoolers at risk for emotional and behavioral problems. If at risk preschoolers' social behaviors can be improved with effective social skills interventions, it is possible to prevent them from developing trajectories into more severe emotional and behavior problems and benefit them in a wide range of their academic achievement, social adjustment, and wellbeing.

## CHAPTER IV

### THE EFFECT OF PEER-MEDIATED SOCIAL SKILLS INTERVENTION ON PEER INTERACTIONS FOR PRESCHOOLERS WITH SOCIAL WITHDRAWAL

#### **Introduction**

Developing social and emotional competence in early childhood is one of the most important aspects of social development with long lasting outcomes (McCabe & Altamura, 2011). Longitudinal research suggests young children who are socially competent are likely to succeed in both academic and social areas in the future (McCabe & Altamura, 2011). As early as the 1980s, Parker and Asher (1987) pointed out peer ratings of social acceptance as an indicator of social competence in early childhood is a strong predictor for high school graduation. Furthermore, studies suggest the link between low social competence and delinquency, school dropout, substance use in adolescence and mental health problems in adulthood (Heckman, 2006; Malecki, & Elliott, 2002; Parker & Asher, 1987).

Social competence refers to overall judgment of a child's social functioning adequacy given by important people in a child's life (Gresham, 1998). Social competence with peers is one aspect that is extremely important. Peer related social competence is defined as the ability to establish friendship with peers and engage in reciprocal interactions (Stichter & Conroy, 2006). For example, establishing friendship, maintaining relationship with friends, obtaining toys and organizing play are all critical skills for



preschoolers to have positive peer interactions. Hartup (1983) stated establishing relationships with peers is a vital developmental task during early childhood. Children learn other important skills through their interactions with peers.

Social withdrawal can be conceptualized as an umbrella term describing a given behavioral prototype (solitude in one form or another) derived from a variety of underlying causes (Rubin & Coplan, 2004). Although social withdrawal is not a clinically defined behavioral, social, or emotional disorder in childhood, it is concerning that children with social withdrawal show the greatest stability in their behavior across developmental periods (Rubin & Asendorpj, 2013). Sadly, children with social withdrawal often experience peer rejection and victimization (Chen, DeSouza, Chen, & Wang, 2006; Oh, Rubin, Bowker, Booth-LaForce, Rose-Krasnor, & Laursen, 2008). Children with social withdrawal have fewer social interactions with peers which reduce the opportunity for them to practice play skills, communication skills and social skills with their peers. Furthermore, children with social withdrawal are at high risk for the development of internalizing problems such as anxiety and depression (Boivin, Hymel, & Bukowski, 1995; Prior, Smart, Sanson, & Oberklaid, 2000). Thus, children with social withdrawal need extra support in social interactions with peers (Craig-Unkefer & Kaiser, 2003; Guralnick, Connor, Neville, & Hammond, 2006).

### **Peer Related Social Skills**

Peer-related social skills are an important part of developing social competence and one of the most important aspects of social development in early childhood (Denham

& Weissberg, 2004). Positive and frequent peer interactions provide the main social context for young children to develop and maintain friendships and learn social communication skills (Hadley & Schuele, 1998). Communicating effectively with peers in classrooms is one indicator of emerging social competence. These social skills are not only beneficial to them in preschool, but are also found to be related to their academic and behavioral functioning in kindergarten (Nix, Bierman, Domitrovich, & Gill, 2013).

Focusing on teaching peer-related social skills is one way to promote the social competence of young children with social withdrawal problems (Stanton-Chapman & Brown, 2015; Stanton-Chapman, Kaiser, Vijay, & Chapman, 2008). Peer related social skills interventions focus on targeting social skills such as initiations, responses, turn takings, sharing or complimenting to improve young children's social interactions (Storey et al., 1994).

### **Peer-mediated interventions**

Peer-mediated interventions use preschool peers as intervention agents to deliver skills instruction, modeling, prompting and reinforcement for children with disabilities to promote appropriate social interactions and social skills. Adults train such peers to work as peer modelers, peer buddies, peer implementer or peer reinforcers in peer-mediated interventions (Morales & Ledford, 2016). In the current study, we plan to employ peer reinforcers along with social skills instructions to increase social interactions for the children with social withdrawal.

Peer-mediated procedures are one of the research-based interventions that prove to be effective for improving social outcomes for young children with social delays and related difficulties (Odom et al., 2003; Wang & Spillane, 2009). Previous research showed peer-mediated interventions are effective for promoting social interactions in children with autism and ADHD (Zhang & Wheeler, 2011).

Peer-mediated interventions have several advantages: (1) peers acting as intervention agents may increase the opportunity for children with disabilities to practice the skills taught and potentially place fewer demands on teachers to serve as the intervention agents and (2) peers as intervention agents may promote the generalization of the skills learned in natural settings as the reinforcement provided by peers can continue even after the intervention program ends (Zhang & Wheeler, 2011).

Storey et al., (1994) evaluated the effects of the social skills instruction with peer-mediated procedures on the use of social strategies and the generalization of the skills with five preschoolers with social delays in free play settings. The results indicated the social skills instruction was effective in increasing the five target children's social interactions with peers. However, the increase in the generalization setting beyond the intervention setting was not observed until the teacher-delivered token system was added. The authors pointed out that future research should address fading of the teacher-delivered token system to evaluate the generalization effect of the social skills instructions. To address this issue, the authors added a peer-mediated reinforcement

alongside an implementer delivered token system in the social skills intervention in the current study.

### **Purpose and research questions**

The current study replicated the study by Storey et al. (1994) on the effect of social skills instructions on peer interactions. In this study, the social strategies taught were reduced from five strategies to three and change the sequence of the social strategies. As Storey et al. (1994) pointed out the need for future research to address the fading of a teacher delivered token system, we incorporated a peer reinforcement component alongside an implementer delivered token system to improve the generalization to the natural classroom setting. The children were taught to give compliments to each other when they exhibit appropriate behaviors to function as a reinforcer for them.

The purpose of the current study is to evaluate the effects of peer-related social skills instruction combined with peer-mediated reinforcements and implementer delivered reinforcements for the preschoolers with social withdrawal. The research questions focus on:

- a) Will the peer-mediated social skills intervention increase the frequency of the social initiations and social responses for preschoolers with social withdrawal?
- b) Can the effect of peer-mediated social skills intervention lead to generalization and maintenance of improved social interactions in naturalistic play settings?

The first aim is to examine the effects of the peer-mediated social skills instructions on the frequency of the social interactions for the preschoolers with social withdrawal in integrated preschool classrooms. We expect to see an increase in the frequency of social interactions including social initiations and responses. The second aim is to examine whether the increase in social interaction can maintain in generalization settings and after the intervention stops.

## **Method**

### **Participants**

**Children.** Three 3-5 years old children with social withdrawal during peer play and activities and eight typical developing peers in a university affiliated preschool program.

**Inclusion criteria.** The three targeted children for inclusion in the study were selected by teacher nomination, and behavioral assessment using the Strength and Difficulty Questionnaire (SDQ) and the five subscales of SDQ—emotional problems scale, conduct problems scale, hyperactivity scale, peer problems scale, and prosocial scale—and direct observations by the researchers.

More specifically, inclusion criteria for the three target children were focus on: (1) 3-5 years old preschoolers; (2) be fluent in English; (3) referred by teacher or parent as being engaged in less social interactions with peers in classroom; (4) score higher than 4 on the peer problems scale or higher than 4 on the emotional problems scale in SDQ

teacher report; (5) demonstrate less social interactions with peers than typical developing peers in direct observations; (6) obtained parent consent on allowing him or her to participate in the study.

Each of the three target children was paired with two socially skilled peers based on the preference of the target children and teacher recommendations.

Inclusion criteria for these twelve peers consist of: (1) 3-5 years old preschoolers; (2) attend school on a regular basis; (3) be fluent in English; (4) be compliant with adults and willing to follow directions; (5) have age appropriate social skills; (6) scored higher than 6 on the prosocial scale in SDQ teacher report; (7) scored lower than 6 on the peer problems scale in SDQ; (8) obtained parent consent on allowing him or her to participate in the study.

**Teachers.** Two preschool classroom teachers were included in the study. They nominated children with social withdrawal and typical developing peers to participate in the study and they filled out the SDQ for the participants. Inclusion criteria for teachers: (1) be in the same classroom with the target children for at least four weeks; (2) be willing to accept behavioral support from the researchers; (3) be willing to nominate target children and social competent peers to participate in the study; (4) be willing to fill out the SDQ survey for the participating children.

**Settings.** Two university affiliated preschool classrooms were the main setting for the study. On average, there were twenty children and two adults per class.

**Materials.** All the play materials used in the study were from the preschool classrooms while the reinforcers including stickers and the toys are brought by the researcher. Legos, magnet tiles, mobile blocks, train track and kitchen set are randomly chosen for the participants to play with. The stickers were animals, Paw patrol or PJ masks themed stickers. The toys were small toys like squishy rubber ice-cream, race car, motorcycle, and PJ masks figures that are attracting to preschool children.

### **Data collection**

All sessions were video recorded and coded except the sessions with the Jay as his parent did not consent on taking video recording on him. Observers counted the frequency for the social initiation and social response. Observers also recorded the duration of the extended social engagement among the triad of children. Observations took place during center time in classroom.

### **Dependent variables**

Three dependent variables of social interactions between the children were coded. Both the targeted children's behaviors were coded during all the sessions.

1. **Initiations:** Any verbal or motor behavior that directed at a peer that could evoke a social response (e.g., asking another child "Hi Emily, can I play with the doll?", touching the other child's hand or grabbing a block without asking). The initiations were not limited to the skills being taught to the children. Initiations were coded as either desired initiations or undesired initiations. Desired initiations refer to socially acceptable initiations such as calling another child's name or

offering to share. Undesired initiations refer to inappropriate initiations such as grabbing the toys in another child's hands.

2. Responses: Any verbal or motor behavior demonstrated by the child that followed an initiation and occurred within 3 seconds of the initiation (e.g., verbalizing to the other child, smiling at or nodding to the other child). Responses were coded either desired or undesired responses. Desired responses refer to the responses that encourage continuous interactions (e.g., turn taking, sharing, or answering "Sure, here you are"). Undesired responses refer to the responses that discourage continuous interactions (e.g., turning away from a child, refusing to share or saying "No, that's mine").

### **Quantifiable measurement**

The children's social initiations and responses were reported as percentage of intervals with social initiations or responses occurred. The percentages of intervals were calculated using the following formulas:

$$\textit{The percentage of intervals with social initiations} = \frac{N \text{ social initiations}}{N \text{ total intervals}}$$

$$\textit{The percentage of intervals with social responses} = \frac{N \text{ social responses}}{N \text{ total intervals}}$$

### **Social validity**

The social validity was assessed with the teachers using a survey with 10 Likert scale questions regarding the appropriateness of the procedures, the effectiveness of the intervention and the practicality of the intervention (e.g., whether it is easy to incorporate



the intervention into class routine). An open-ended question was also included to give the teachers opportunity to give any comment and feedback to the researchers.

The social validity was assessed with the parents using a survey with 5 Likert scale questions regarding the generalization effect of the intervention and the acceptability of the intervention. An open-ended question was also included to give the parents opportunity to give any comment and feedback to the researchers.

### **Procedures**

The study is consisted of five phases: (a) pre-baseline assessment, (b) baseline, (c) skills training, (d) probe, and (e) maintenance.

The three triads of participants were randomized in the sequence of starting the intervention. Once the target children in the first group demonstrates increase in social interactions behaviors for a minimum of three consecutive sessions, the second group started with the skills training.

Experimental sessions were conducted in one of the activity centers in the classroom. The researcher picked a center area and randomly change the toys each day. The participants went to the assigned activity center for that day.

**Prebaseline.** The participating teachers nominated the children who typically engage in few peer interactions. The teachers completed the Strength and Difficulty Questionnaire (SDQ) for the nominated children. The researcher conducted direct

observations during center time for the nominated children. If the children showed less peer interactions than their typical developing peers, they were included in the study.

**Preference assessment.** The researcher conducted preference assessments for the participants to find out potential reinforcers for them. Multiple stimulus without replacement preference assessment was used to create a hierarchy of the children's preferences (Chazin & Ledford, 2016). Multiple stimulus without replacement assessments involve displaying a number of items to the child and letting the child select and play briefly with the selected item. This item is then put away and the remaining items are displayed, and the child is prompted to select another item. This allows for not only identifying preferred items but also determining the hierarchy of preference of the items.

**Baseline.** Experimental sessions were five minutes long. Sessions were conducted three to four days a week in the classroom where the participants receive their daily instruction. Every session the implementer observed and video recorded the target participant play with at least one peer in one of the play activity areas (e.g., home, blocks, or small toy) for 5 minutes. For the participant without parent consent on video recording, the implementer observed him and collect data in vivo. The implementer encourages the children to play together and keep the children in the play area.

**Skills Training.** During this training period, the implementer taught the three social strategies to all four triad participants. All three children in a given triad were taught together, however, triads were taught separately. Teaching each strategy took one

to three days until the participants demonstrate the social skills correctly for more than five times in one training sessions. Each training session will last for about 10 to 15 minutes. The social skills include 1) Compliments, 2) Sharing, 3) Suggest play ideas. Each skill was taught according to a systematic instruction approach: 1) Modeling the skill, for example, the implementer offered to share a toy with a child; 2) Introducing a description of the skill to be learned, for example, sharing is offering things to friends; 3) Practicing with another child, for example, one child offer to share a lego piece with another child; 4) Giving feedback and review. The implementer gave the children 10 minutes to play in one center area to practice the skills.

During the instruction, a 6" \* 6 " poster depicting each of the three skills was posted in the play area. The poster was displayed throughout the instruction and practice time. For example, the "sharing" poster depict a child look at another child's face and share a block with him. The implementer used a three-level prompting procedure. A) If the participant did not have any interaction with other children within 30 seconds, the implementer prompted him or her with visual cues of pointing to the poster. When the participant responds and use the strategy to interact with other children, give him or her a sticker. B) If the participant did not respond within five seconds, the implementer prompted the child to use a particular strategy with verbal expressions (e.g. "Remember to share toys with your friends"). If the participant used the strategy, the implementer gave him or her a sticker; C) If the participant did not respond within five seconds, the implementer used gestural prompts (e.g., give the participant a toy and say "share it with her"). If the participant responded and used any of the three skills to initiate an

interaction, the implementer gave him or her a sticker. If the participant showed undesired social initiation or response, the implementer reminded him or her with the skills they learned in the training. At the end of the training session, the children can exchange their tokens to access to their preferred toy. In the beginning of next training session, a brief review of previously taught skills was conducted before introducing a new skill.

**Probe.** Probe conditions were conducted once the students had learned all the three social skills. Probe sessions will be used to assess children’s social interactions with peers and their use of the learned skills. Each probe session last for five minutes.

The posters with the social skills were displayed prior to the five-minute play session. The implementer will briefly review the three skills before the session begins. The peers gave the target child compliments (verbal praise such as “good job”) when they use the learned social skills. The implementer gave one sticker to the participants when they use the learned skills or when they show desired social initiation or response. The participants can get access to their preferred toys if they earned more than five stickers at the end of the five-minute sessions.

**Generalization.** Generalization sessions were conducted for five minutes during free play following the center time intervention when children can choose any area in the classroom to play. The generalization sessions were conducted on the same days as the intervention sessions. The researcher observed the target children in an unobtrusive way.

The researcher collected data for children's social interactions for three generalization sessions

**Maintenance.** The target children were observed four weeks later after the last target child finish the last probe session. The target children were observed during their center time.

### **Treatment Integrity**

A checklist of the baseline phase, the strategy training phase and the probe phase were developed and followed by the implementer when working with the children. About 27.8% (five sessions) of the baseline phases were observed either in video or in vivo using the treatment integrity checklist for the baseline. In addition, a second doctoral student observed 20% (three sessions) of the strategy training sessions and used the checklist for the strategy training. Furthermore, 25% of the probe phase were observed either in video or in vivo using the treatment integrity for the probe phase. Treatment integrity were calculated using the number of correctly completed steps divided by the total number of steps and multiplied by 100. Treatment integrity obtained were 97% for the baseline, 93.75% for the strategy training, and 96.3% for the probe phase.

### **Interobserver Agreement**

A second observer conducted data collection on more than 20 percent across baseline, intervention, and generalization sessions across all participants. Data were collected for 28% of sessions for Sean, 30% of sessions for Peter, and 26% of sessions for Jay. Interobserver agreement was reported as percent agreement and was calculated as

the number of agreements divided by the number of agreements plus disagreements multiplied by 100. The observers had meetings and watched the videos to resolve the disagreements.

### **Experimental design and data analysis**

A multiple probe across participants design (Gast, Lloyd, & Ledford, 2018) was used to evaluate the effect of the peer-mediated social skills intervention.

Several methods were used to evaluate the collected data. Visual analysis was used to evaluate whether there is any effect of the intervention on the social interactions of the children participated. Three criteria recommended by Kazdin (2003) were used in visual analysis: 1) immediacy of the data changes following the start of intervention; 2) trend of the data across the intervention phase; 3) minimal score overlap which is the extent of the overlap between baseline data and intervention data.

The percentage of nonoverlapping data (PNDs) was calculated to quantify the effect of the intervention (Olive & Smith, 2005; Scruggs & Mastropieri, 1998). The PND was determined by calculating the percentage of data points in the intervention phase that do not overlap with the data points in baseline phase. The Baseline Corrected Tau was calculated using a web-based calculator available at <http://www.ktarlow.com/stats/tau> (Tarlow, 2016).

### **Social validity**

In order to measure the social validity of the intervention, a brief survey of several multiple-choice questions and an open-end question was developed for the teachers and parents. In the social validity survey for teachers, 5 questions using a 5-point Likert scale

(1 not at all; 3 somewhat true; 5 very well) and 1 open-ended question regarding their feedback to the researcher were asked. The 5 Likert scale questions were related to the teachers' perspective on the goal, the instruction process and the results of the intervention. In the social validity survey for parents, 4 questions using 5-point Likert scale (1 not at all; 3 somewhat true; 5 very well) and 1 open-ended question regarding their feedback to the researcher were asked. The 5 Likert scale questions were related to the teachers' perspective on the goal and the results of the intervention. The social validity surveys were distributed to all the participating teachers and the parents of the three targeted children.

## **Results**

Three participants with the pseudonyms of Sean, Peter, and Jay completed the study. The demographic information of the participants was shown in Table 10. All three participants were boys. Two of the three participants were Chinese Americans and another one was Korean American. All of the three participants were fluent in English and according to the language checklist in High Scope evaluation, and their language development is age appropriate. They were referred either by their classroom teacher or parent as showing fewer social interactions with peers than typical developing children. They showed fewer social interactions with peers in direct observations in class. Regarding the SDQ, two of the target children showed high risk in the subscale of peer problems, and one target child showed slightly raised risk in the subscale of conduct problems.

The first aim of the study was to examine the effect of the social skills instructions with peer mediated component and reinforcement on the participants' social interactions with their peers. Specifically speaking, two dependent variables—participants' rates of social initiation and social responses—were presented in line graphs in Figure 5, 6 respectively. Figure 5 and 6 displayed the percentage of intervals during which social initiations and responses were demonstrated in the study. A demonstration of experimental control was evident in that social initiations of the target participants increased after the intervention was introduced while the baseline data for the other participants remained constant in Figure 5. With the introduction of social skills instructions with implementer prompting and reinforcement, all three target children showed increase in their social initiations with peers. Although all of the three participants had variations in their social initiations in the intervention phase, all of them showed an increasing trend. Some changes were observed for the three targeted participants in Figure 6 for the percentage of intervals with social responses across different experimental phases. Average percentage of intervals with social initiations and social responses for baseline and intervention phases were presented in Table 11. The average percentage of intervals with social initiations increased for all three participants.

*Social initiations.* Social initiations were presented as the percentage of intervals when verbal or behavior initiations were made by the target child toward his peers during each session. During baseline phase, social initiations ranged from 0 to 14 percent of total intervals. The percentage of social initiations of the three participants were lower than the



range of social initiations of typical developing peers which falls between 10 to 26 percent, which were shown in the gray area in Figure 5.

*Sean.* The data for Sean in Figure 5 showed his social initiation rate was stable during baseline ranging from 0 to 2 percent. Following the social skills training sessions, five intervention data points were taken for Sean and his peers. Sean's social initiation rate immediately increased from 0 to 26 percent, and the data in the intervention phase presented an increasing trend throughout these sessions. Four more intervention data points were taken for this triad after the Christmas break. Sean's social initiation rate were still higher than the baseline phase, but was lower than the first five intervention sessions. Sean's average percentage of social initiation increased from 1.33 to 22.75 percent. The percentage of nonoverlapping data (PND) for the social initiation rates for Sean was 89% which was considered effective. The Baseline Corrected Tau for Sean was 0.621 and the standard deviation was 0.32.

*Peter.* Peter showed variable percentages of social initiations ranging from 0 to 14 and most of the sessions were consistent low. Peter's highest percentage of social initiation occurred on the first baseline session. Following the social skills training sessions, five intervention data points were taken for Peter and his peers. Peter's social initiation rate immediately increased from 0 to 12 percent in the first intervention session and presented an increasing trend. After Christmas break, four more intervention sessions were taken for this triad. Peter's social initiation rate were consistently higher than the baseline phase. Peter's average percentages increased from 2.67 to 18.75 percent. The

PND for the social initiations for Peter was 67% which was considered effective. The Baseline Corrected Tau for Peter's social initiations was 0.67 and the standard deviation was 0.271.

*Jay.* Jay showed consistent low percentages of social initiations ranging from 0 to 8. Jay's highest social initiations occurred on the first baseline session. Following the social skills training sessions, six intervention data points were taken for Jay and his peers. Jay's percentage of social initiations increased immediately from 0 to 26 percent and presented an increasing trend throughout intervention phase. Table 11 showed Jay's average increased from 2.44 to 34.00 percent. The PND for the social initiations for Jay was 100% which was considered very effective. The Baseline Corrected Tau for Jay's social initiations was 0.742 and the standard deviation was 0.245.

*Social responses.* Social responses were presented as the percentage of intervals when verbal or behavioral responses were made by the target child as a response to his peers' initiations during each session (see Figure 6). During baseline phase, the percentages of social responses ranged from 0 to 16 percent. The social responses of the three participants were lower than the range of social responses rates of typical developing children which fell between 30-38%, which was shown as the gray area in Figure 6. Although the data did not demonstrate experimental control in improving target children's social responses, the average percentage of social responses increased from baseline to intervention phases as presented in Table 11.

*Sean.* During baseline sessions, Sean's social response ranged from 2 to 16 percent with the highest response rate occurred on the first session. Following the social skills training sessions, five intervention data points were taken for Sean and his peers. Sean's percentage of social responses immediately increased from 0 to 26 percent and presented an increasing trend throughout these sessions. Four more intervention sessions were taken after the Christmas break. Although there was some overlap between the first five intervention data points and the baseline phase, the social response rates kept increasing after the Christmas break. Sean's average social responses increased from 10.00 to 14.50 percent. The PND for the social responses for Sean was 33% which was considered questionable. The Baseline Corrected Tau for Sean's social responses was 0.267 and the standard deviation was 0.393.

*Peter.* During baseline sessions, Peter's social responses ranged from 0 to 12 percent with the highest response rate on the first session. Following the social skills training sessions, five intervention data points were taken for Peter and his peers. Peter did not show much changes in his social responses in the first few sessions after the introduction of the social skills intervention package, but he showed much increase in his social responses later on even to a point exceeding the range of typical developing children's social responses. Peter's average social responses increased from 4.00 to 14.00 percent. The PND for Peter's social responses was 44% which was considered questionable. The Baseline Corrected Tau for Peter's social responses was 0.495 and the standard deviation was 0.317.

*Jay*. During baseline sessions, Jay's social responses ranged from 0 to 6 percent with the highest percentage of social responses occurred on the first session. Following the social skills training sessions, six intervention data points were taken for Jay and his peers. Jay's social responses increased immediately from 2 to 26 percent. Jay's average increased from 2.44 to 18.00 percent and present an increasing trend over time. The PND for the social responses for Jay was 67%. The intervention can be considered as effective in improving social response rates for Jay. The Baseline Corrected Tau for Jay's social responses was 0.522 and the standard deviation was 0.311.

The researcher changed the stickers to keep the activities attractive to the children. Peter was different from the other two target children in that he would walk away from the center area the researcher worked with him and went to show his teacher or friend what stickers he gained. The implementer would redirect him to come back to the center area where the researcher worked with the children. Most of the time, Peter would come back to the center area and resume the activities with his peers. But it affected his social interaction data in the first few intervention data points.

The researcher stopped collecting intervention data after five intervention data for the first two target children. After Christmas break, the researcher went back to the classroom again to collect more data. Sean did not respond as well as he did in the beginning of the intervention phase. Most of the sessions after Christmas break, he was working in the art area and focused on writing. But Peter was observed to show continuous growth in both social initiations and social responses.

The researcher started with intervention for Jay after the Christmas break. He responded well to the intervention and his social initiations increased immediately after the intervention started. His parent consented on him attending the study but they did not consent on taking video during the study. The researcher and the second observer need to go to the classroom together to take the IOA data. In the intervention phase, the researcher needs to bring another observer to take data.

## **IOA**

IOA for social initiations across conditions averaged 95% and ranged from 82% to 100%. IOA for social responses across conditions resulted in an average of 97.8% and a range of 96% to 100%. IOA for the duration of social engagement across conditions yielded a mean of 98.4% and a range of 96% to 100%.

## **Social validity**

Both the two teachers and all the three parents of the target children responded to the social validity survey (1 = strongly disagree, 5 = strongly agree). The social validity survey results are shown in Table 12. All of them strongly agree the goals ( $M = 5$ ) and the social skills taught in the social skills intervention ( $M = 5$ ) are appropriate for the children. Both the two teachers strongly agree the social skills instructions were clear and understandable to the children ( $M = 5$ ). The teachers reported the children showed improvement in their social behaviors in class ( $M = 4.5$ ). The parents didn't see much changes in their children's social behaviors at home ( $M = 3.3$ ). Both the teachers ( $M = 4$ )

and the parents ( $M = 4$ ) reported the children initiates social interactions with peers more frequently than before.

### **Generalization and Maintenance**

The second aim was to examine whether the increase in social interactions can maintain in generalization settings and after the intervention stopped. Only one participant showed increase in his social interactions with his peers in the generalization probes and maintenance probes. The other two participants did not show any changes in their social interactions with their peers in the generalization probes and maintenance probes. Additional strategies may be needed to promote changes in generalization settings.

### **Discussion**

The main purpose of the study was to evaluate the effect of a peer-mediated social skill intervention package on the social initiations and responses of preschool children with social withdrawal. The results showed the intervention package was effective in increasing the social initiations and the social responses for the three target children with social withdrawal. The social initiations of the three target children were improved to the level of typical developing peers after the intervention. Different changing patterns of the occurrences of social interactions and social responses were observed in the study. Several significant findings are discussed below.

First, following the intervention, the social initiations of the three target children with social withdrawal increased significantly. All the three children's social initiations

improved to the level of typical developing peers' social initiations in the same environment. Specifically, the effect sizes for the social initiations suggest the intervention was highly effective for one target child and moderately effective for the other two target children. These results are consistent with the findings in previous literature. Similar to the current study, Storey et al. (1994) found peer-mediated social interventions effective in increasing the occurrence of social behaviors for the five children with social withdrawal in their study.

Second, the peer-mediated social intervention slightly increased the social responses for the three target children. Two of the target children's percentage of intervals with social responses were improved to reach the level of typical developing peers' social responses at some point in the intervention phase, but there was big variability in each child's social responses. The effect size of social responses suggested the intervention was effective for improving one target child's social responses, but not effective for the other two target children. The children's social responses did not increase as much as their social initiations. This is not unexpected given all three social skills the researcher taught the children are related to social initiation skills. Moreover, the line graph in Figure 4 provided information about the changing pattern. The social responses of the first two target children increased more after the fifth intervention session. They started to respond to their peer's initiations better and engaged in longer interactions during observation. Because the children did not show immediate increases, we speculate young children may need more time to learn and practice social skills after they demonstrate the skills so they can apply the skills in social context fluently.

The separation of occurrence of social initiations and social responses clearly examine the difference in the change of social initiations and social responses. Storey et al. (1994) grouped the occurrence of social initiations and social responses together as social behaviors. The current study is different in that we recorded and reported social initiations and social responses separately. Splitting the social initiations and social responses as two dependent variables made it possible to observe the differences between the change patterns of the occurrences of social initiations and social responses.

According to Hadley and Rice (1991), participation in an interactive exchange requires pivotal social skills that include the ability to initiate an interaction and the ability to appropriately respond and maintain an interaction (p. 1308). Our study also suggest different social skills were needed for the occurrence of social initiations and social responses.

The final finding was on generalization and maintenance effects. Only one of the three target children showed improvement in his social initiations and responses in both the generalization and the maintenance phases. The other two target children did not show improvement in either the generalization phase or the maintenance phase.

Conducting generalization and maintenance phases is already a progress made in our study comparing to previous studies in the field. Many researchers did not include any generalization or maintenance phase in their study. For the studies including generalization and maintenance phases, there were no consistent findings so far. Similar to many short-term social skills interventions in previous studies, our generalization and maintenance findings were not robust. However, some researchers found the effect of



social skills intervention generalized and maintained to a level that was significantly different from the baseline condition. For those studies that did show a generalization effect, they included certain prompting or reinforcement for the desired behaviors. For example, Storey et al., (1994) found the children's social behaviors generalized when a teacher-delivered token economy system was added to the intervention. In the current study, we wanted to examine whether the improvement in social behaviors would generalize to natural classroom settings, so we withdrew the researcher-delivered token economy system and the prompts in the generalization sessions to make sure the generalization setting was as similar to the natural environment as possible.

As to innovative contribution to the literature, Gena and Kymissis (2001) underlines the importance of analyzing social interactions of typical developing children before we proceed to teach children with disabilities social skills. To address this, the researchers have collected data on social initiations and social responses of typical developing peers before the baseline phase to provide a comparison to the children with social withdrawal. The goal of the intervention is to help children with social withdrawal to increase their social initiations and social responses to reach the level of typical developing children.

### **Limitations**

The researcher did not collect intervention data continuously for the first two participants. Specifically speaking, the research collected 5 intervention data points and move on to the next triad, and the research continue to collect more intervention data

points after the Christmas break. For future research, it is recommended to collect more data points continuously to observe their behavior changes because it takes young children certain time to acquire social skills and apply the skills in social context.

The researchers taught the participants three social skill strategies in social skills instruction period. All three social skill strategies can be used as social initiations, but only one social strategy taught in the intervention (give compliment) can be used for social response. The children's social responses did not increase a lot may be contributed to that they did not learn enough strategies to respond to their peer appropriately. Future studies could include more social skill strategies for social responses in social skills instruction.

The implementer taught the participants to give compliments to their peers and it was designed as a peer-reinforcement component in the study. However, the target children did not use the strategy as social response to their peers' initiations much in the study. The participants did not give compliments to their peers upon their demonstration of desired behaviors in the study, so the strategy did not work as we expected.

### **Future research**

It is strongly recommended to design social skills intervention programs for longer time periods in future research. Gresham et al., (2006) pointed out that the typical social skills intervention averaged 2.5-3.0 hours per week for 10-12 weeks in their review. They speculated that the total time for social skills interventions may be insufficient to remediate social skills deficit. Consistent with their speculation, the

observation in the current study also suggested the target children's social responses and duration of social engagement increased more after 5 intervention sessions.

To obtain better generalization and maintenance results of social skills interventions, it is strongly recommended to involve the classroom teacher or teacher assistant for implementation of social skills intervention. Storey et al. (1994) already demonstrated teacher assistant can be trained to implement such interventions. Katz and Girolametto (2015) involved the classroom teacher as the implementer and they continue to pair the target children with a trained peer for specific play time 3 times a week in the classroom during the 4 weeks after intervention. Maybe involvement of teacher might explain Katz and Girolametto's (2015) findings that the increase of the social responses and initiations maintained 4 weeks after the intervention phase.

If the intervention elements such as prompts and reinforcements were designed to fade out gradually, it may be better for young children to maintain the improvement than withdrawing all the elements at once.

The current study replicated Storey et al., (1994) study and demonstrated short term peer-mediated social skills interventions with prompts and reinforcement can be effective in improving young children's social interactions. It is hopeful to close the gaps of social interactions between children with social withdrawal and typical developing children.

## CHAPTER V

### CONCLUSIONS

Social competence is pivotal in young children. Preschool children need social skills to build and maintain their relationship with other children and their teachers. However, the prevalence of preschoolers with or at risk of emotional and behavioral problems is alarming. Early onset of behavioral problems can place children on higher risk of developing chronic problems that are resistant to interventions than the problems developed later in their life. As preschoolers with or at risk of EBD are characterized as lacking social skills, social skills interventions are commonly used to remedy social skills deficits. This dissertation was conducted to examine the literature base of single case studies on social skills interventions for this particular population of preschoolers with or at risk of emotional and behavioral problems.

Three studies were conducted in this dissertation: (1) a quality indicator review using WWC standards to evaluate the design quality and evidence of the single case studies on social skills interventions for preschoolers with emotional and behavioral problems; (2) a meta-analysis on the single case studies that meet the WWC standards to evaluate the overall effect of social skills interventions for preschoolers' social behaviors; (3) a single case study to examine the effect of a peer-mediated social skills intervention on preschoolers with social withdrawal.

In the first study, a systematic literature review process was used to evaluate the literature base of social skills interventions for preschoolers with or at risk of emotional and behavioral problems. A total of 33 studies were examined using WWC standards on the methodological rigor and the strength of the evidence. Nineteen studies met the design standards with or without reservation and 11 studies showed strong or moderate evidence to support social skills interventions as effective in preschoolers' social behaviors. The results suggest there is established evidence to support social skills interventions are evidence-based intervention for preschoolers with or at risk of emotional and behavioral problems.

In the second study, a meta-analytic review was conducted to evaluate the 19 studies that meet the WWC SCR design standards. Baseline Corrected Tau effect sizes were estimated for all 67 cases in the 19 studies and an overall effect size of 0.66 was obtained as the average of all the cases. This Baseline Corrected Tau implicated social skills interventions yielded a large effect on social behaviors for children with emotional and behavioral problems. In the moderator analysis, gender and disability status were significant moderators for the intervention effect. Social skills interventions are more effective for girls and for children with internalizing problems.

In the third study, a single case design study was conducted to evaluate the effect of a peer-mediated social skills intervention on peer interaction for children with social withdrawal. The results suggest the social skills intervention package was effective in improving the target children's social initiations to the range of social initiations for

typical developing children, but the effect in improving children's social responses are not robust. Only one target participant's social responses were changed significantly. As to the generalization and maintenance effect, only one child's improvement in social interactions were generalized and maintained. Further research is needed to explore ways to improve generalization and maintenance of social skills.

In sum, social skills interventions have established evidence to support them as evidence-based practice and the overall effect size in the 19 included studies suggest a large effect in changing children's social behaviors in short term. Long-term intervention effects and the ways to generalize or maintain the effect of social skills intervention still need further research.

## REFERENCES

\*Indicated studies included in the review

- \*Anderson, D. H., Trinh, S. M., Caldarella, P., Hansen, B. D., & Richardson, M. J. (2018). Increasing positive playground interaction for kindergarten students at risk for emotional and behavioral disorders. *Early Childhood Education Journal*, 46(5), 487-496.
- Ang & Hughes. (2001). Differential benefits of skills training with antisocial youth based on group composition: A meta-analytic investigation. *School Psychology Review*, 31 (2001), pp. 164-185.
- Ashiabi, G. S. (2007). Play in the preschool classroom: Its socioemotional significance and the teacher's role in play. *Early Childhood Education Journal*, 35(2), 199-207.
- \*Benish, T. M., & Bramlett, R. K. (2011). Using social stories to decrease aggression and increase positive peer interactions in normally developing pre-school children. *Educational Psychology in Practice*, 27(1), 1-17. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ919201&site=ehost-live;http://www.informaworld.com/openurl?genre=article&id=doi:10.1080/02667363.2011.549350>

- Bandura, A., & Walters, R. H. (1977). *Social learning theory* (Vol. 1). Englewood Cliffs, NJ: Prentice-hall.
- Beelmann, A., Pfingsten, U., & Lösel, F. (1994). Effects of training social competence in children: A meta-analysis of recent evaluation studies. *Journal of clinical child psychology, 23*(3), 260-271.
- Boivin, M., Hymel, S., & Bukowski, W. M. (1995). The roles of social withdrawal, peer rejection, and victimization by peers in predicting loneliness and depressed mood in childhood. *Development and psychopathology, 7*(4), 765-785.
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2011). *Introduction to meta-analysis*. John Wiley & Sons.
- Bornstein, M. H., Hahn, C. S., & Haynes, O. M. (2010). Social competence, externalizing, and internalizing behavioral adjustment from early childhood through early adolescence: Developmental cascades. *Development and psychopathology, 22*(4), 717-735.
- Brown, W. H., & Conroy, M. A. (2011). Social-emotional competence in young children with developmental delays: Our reflection and vision for the future. *Journal of Early Intervention, 33*(4), 310-320.
- Brown, W. H., Odom, S. L., & McConnell, S. R. (Eds.). (2008). *Social competence of young children: Risk, disability, and intervention* (2nd ed.). Baltimore, MD: Brookes.



\*Brown, W. H., Ragland, E. U., & Fox, J. J. (1988). Effects of group socialization procedures on the social interactions of preschool children. *Research in Developmental Disabilities, 9*(4), 359-376. doi:10.1016/0891-4222(88)90031-5

Bulotsky-Shearer, R. J., Domínguez, X., Bell, E. R., Rouse, H. L., & Fantuzzo, J. W. (2010). Relations between behavior problems in classroom social and learning situations and peer social competence in Head Start and kindergarten. *Journal of Emotional and Behavioral Disorders, 18*, 195-210.

Chazin, K.T. & Ledford, J.R. (2016). Multiple stimulus without replacement (MSWO) preference assessment. In *Evidence-based instructional practices for young children with autism and other disabilities*. Retrieved from <http://vkc.mc.vanderbilt.edu/ebip/multiple-stimulus-without-replacement>

Chen, X., DeSouza, A. T., Chen, H., & Wang, L. (2006). Reticent behavior and experiences in peer interactions in Chinese and Canadian children. *Developmental Psychology, 42*(4), 656.

Chenier, J., Fisher, A., Hunter, K., Patty, E., Libster, L., O'Leary, K., . . . Gresham, F. M. (2011, February). What works regarding social skills interventions using single-subject designs? Symposium presented at the annual meeting of the National Association of School Psychologists, San Francisco, CA.

Campbell, S. B., Spieker, S., Burchinal, M., Poe, M. D., & NICHD Early Child Care Research Network. (2006). Trajectories of aggression from toddlerhood to age 9

predict academic and social functioning through age 12. *Journal of Child Psychology and Psychiatry*, 47(8), 791-800.

Cook, B. G., Buysse, V., Klingner, J., Landrum, T. J., McWilliam, R. A., Tankersley, M., & Test, D. W. (2015). CEC's standards for classifying the evidence base of practices in special education. *Remedial and Special Education*, 36, 220-234.

doi:10.1177/0741932514557271

Cook, C. R., Gresham, F. M., Kern, L., Barreras, R. B., Thornton, S., & Crews, S. D. (2008). Social skills training for secondary students with emotional and/or behavioral disorders: A review and analysis of the meta-analytic literature. *Journal of Emotional and Behavioral Disorders*, 16(3), 131-144.

Cook, B. G., & Odom, S. L. (2013). Evidence-based practices and implementation science in special education. *Exceptional children*, 79(2), 135-144.

Craig-Unkefer, L. A., & Kaiser, A. P. (2003). Increasing peer-directed social-communication skills of children enrolled in Head Start. *Journal of Early Intervention*, 25(4), 229-247.

\*Davis, C. A., & Reichle, J. (1996). Variant and invariant high-probability requests: Increasing appropriate behaviors in children with emotional-behavioral disorders. *Journal of Applied Behavior Analysis*, 29(4), 471-482. doi:10.1901/jaba.1996.29-471

Denham, S. A., & Weissberg, R. P. (2004). Social-emotional learning in early childhood: What we know and where to go from here. In E. Chesebrough, P. King, TP Gullota,

& M. Bloom (Eds.), A blueprint for the promotion of prosocial behavior in early childhood (pp. 1351). *New York: Kluwer/Plenum. Domitrovich, CE, & Greenberg, MT (2000). The study of implementation: Current findings from effective programs that prevent mental disorders in school-aged children. Journal of Educational & Psychological Consultation, 11(2), 193-221.*

Dunlap, G., Strain, P. S., Fox, L., Carta, J. J., Conroy, M., Smith, B. J., ... & Sailor, W. (2006). Prevention and intervention with young children's challenging behavior: Perspectives regarding current knowledge. *Behavioral Disorders, 32(1), 29-45.*

Durlak, J. A., Fuhrman, T., & Lampman, C. (1991). Effectiveness of cognitive-behavior therapy for maladapting children: A meta-analysis. *Psychological bulletin, 110(2), 204.*

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal, 315, 629-634.*

Elias, M. J., Zins, J. E., Weissberg, R. P., Frey, K. S., Greenberg, M. T., Haynes, N. M., et al. (1997). *Promoting social and emotional learning: Guidelines for educators.* Alexandria, VA: Association for Supervision and Curriculum Development.

Forness, S. R., Freeman, S. F., Paparella, T., Kauffman, J. M., & Walker, H. M. (2011). Special education implications of point and cumulative prevalence for children with emotional or behavioral disorders. *Journal of Emotional and Behavioral Disorders, 19(3), 4-18.* <http://dx.doi.org/10.1177/1063426611401624>

- \*Fox, J., & Others, A. (1986). Maintaining social initiations of withdrawn handicapped and nonhandicapped preschoolers through a response-dependent fading tactic. *Journal of Abnormal Child Psychology*, 14(3), 387-96. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ341375&site=ehost-live>
- \*Frea, W., Craig-Unkefer, L., Odom, S. L., & Johnson, D. (1999). Differential effects of structured social integration and group friendship activities for promoting social interaction with peers. *Journal of Early Intervention*, 22(3), 230-42. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ623222&site=ehost-live>
- Gast, D. L., Lloyd, B. P., & Ledford, J. R. (2018). Multiple baseline and multiple probe designs. In *Single case research methodology* (pp. 239-281). Routledge.
- Gena, A., & Kymissis, E. (2001). Assessing and setting goals for the attending and communicative behavior of three preschoolers with autism in inclusive kindergarten settings. *Journal of Developmental and Physical disabilities*, 13(1), 11-26.
- \*Green, V. A., Drysdale, H., Boelema, T., Smart, E., van der Meer, L., Achmadi, D., ... & Lancioni, G. (2013). Use of video modeling to increase positive peer interactions of four preschool children with social skills difficulties. *Education and Treatment of children*, 59-85.

- \*Green, V. A., Prior, T., Smart, E., Boelema, T., Drysdale, H., Harcourt, S., ... & Waddington, H. (2017). The Use of Individualized Video Modeling to Enhance Positive Peer Interactions in Three Preschool Children. *Education and Treatment of Children, 40*(3), 353-378.
- \*Goldstein, H., Wickstrom, S., Hoyson, M., & Jamieson, B. (1988). Effects of sociodramatic script training on social and communicative interaction. *Education & Treatment of Children, 11*(2), 97-117. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psych&AN=1989-20464-001&site=ehost-live>
- Gresham, F. M. (1998). Social skills training: Should we raze, remodel, or rebuild? *Behavioral Disorders, 24*(1), 19-25.
- Gresham, F. M. (1986). Conceptual and definitional issues in the assessment of children's social skills: Implications for classifications and training. *Journal of clinical child psychology, 15*(1), 3-15.
- Gresham, F. (2015). Evidence-based social skills interventions for students at risk for EBD. *Remedial and Special Education, 36*(2), 100-104.
- Gresham, F. M., Cook, C. R., Crews, S. D., & Kern, L. (2004). Social skills training for children and youth with emotional and behavioral disorders: Validity considerations and future directions. *Behavioral Disorders, 30*(1), 32-46.

- \*Green, V. A., Drysdale, H., Boelema, T., Smart, E., van, d. M., Achmadi, D., . . .  
Lancioni, G. (2013). Use of video modeling to increase positive peer interactions of four preschool children with social skills difficulties. *Education & Treatment of Children, 36*(2), 59-85. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=87600225&site=ehost-live>
- \*Gronna, S. S., Serna, L. A., Kennedy, C. H., & Prater, M. A. (1999). Promoting generalized social interactions using puppets and script training in an integrated preschool: A single-case study using multiple baseline design. *Behavior Modification, 23*(3), 419-440. doi:10.1177/0145445599233005
- Guralnick, M. J., Hammond, M. A., Connor, R. T., & Neville, B. (2006). Stability, change, and correlates of the peer relationships of young children with mild developmental delays. *Child Development, 77*(2), 312-324.
- Hadley, P. A., & Rice, M. L. (1991). Conversational responsiveness of speech-and language-impaired preschoolers. *Journal of Speech, Language, and Hearing Research, 34*(6), 1308-1317.
- Hadley, P. A., & Schuele, C. M. (1998). Facilitating peer interaction: Socially relevant objectives for preschool language intervention. *American Journal of Speech-Language Pathology, 7*(4), 25-36.
- Hartup, W. W. (1983). The peer system. *Handbook of child psychology, 4*, 103-196.

Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science*, 312(5782), 1900-1902.

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional children*, 71(2), 165-179.

Horner, R. H., & Kratochwill, T. R. (2012). Synthesizing single-case research to identify evidence-based practices: Some brief reflections. *Journal of Behavioral Education*, 21, 266-272. doi:10.1007/s10864-012-9152-2

\*Hughett, K., Kohler, F. W., & Raschke, D. (2013). The effects of a buddy skills package on preschool children's social interactions and play. *Topics in Early Childhood Special Education*, 32(4), 246-254. Retrieved from [http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ995640&site=ehost-live;](http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ995640&site=ehost-live)  
<http://dx.doi.org/10.1177/0271121411424927>

\*Hundert, J., & Houghton, A. (1992). Promoting social interaction of children with disabilities in integrated preschools: A failure to generalize. *Exceptional Children*, 58(4), 311-320.

Individuals with Disabilities Education Improvement Act of 2004 (IDEA), Pub. L. No. 108-446, 118 Stat. 2647 (2004).

- Katz, E., & Girolametto, L. (2015). Peer-mediated intervention for pre-schoolers with ASD: Effects on responses and initiations. *International journal of speech-language pathology, 17*(6), 565-576.
- Kavale, K. A., Mathur, S. R., Forness, S. R., Rutherford, R. B., & Quinn, M. M. (1997). Effectiveness of social skills training for students with behavior disorders: A meta-analysis. *Advances in learning and behavioral disabilities, 11*, 1-26.
- Kazdin, A. E. (2003). Research design in clinical psychology.
- Kazdin, A. E., Siegel, T. C., & Bass, D. (1992). Cognitive problem-solving skills training and parent management training in the treatment of antisocial behavior in children. *Journal of consulting and clinical psychology, 60*(5), 733.
- Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2014). Single-case designs technical documentation, version 3.0. Retrieved from What Works Clearinghouse website  
[http://ies.ed.gov/ncee/wwc/pdf/wwc\\_scd.pdf](http://ies.ed.gov/ncee/wwc/pdf/wwc_scd.pdf)
- Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education, 34*, 26-38. doi:10.1177/0741932512452794
- Kratochwill, T. R., & Levin, J. R. (2014). Meta-and statistical analysis of single-case intervention research data: Quantitative gifts and a wish list. *Journal of School*



*Psychology*, 52, 231-235. doi:10.1016/j.jsp.2014.01.003

Landry, S. H., & Smith, K. E. (2010). Early social and cognitive precursors and parental support for self-regulation and executive function: Relations from early childhood into adolescence.

\*Lane, J. D., Gast, D. L., Ledford, J. R., & Shepley, C. (2017). Increasing social behaviors in young children with social-communication delays in a group arrangement in preschool. *Education and Treatment of Children*, 40(2), 115-144.

Lane, J. D., & Ledford, J. R. (2016). A review of interventions designed to increase sharing behaviors in children with social delays or deficits. *Journal of Behavioral Education*, 25(1), 69-94.

Ledford, J. R., & Gast, D. L. (2018). *Single case research methodology: Applications in special education and behavioral sciences*. Routledge.

\*Lewis, T. J. (1994). A comparative analysis of the effects of social skill training and teacher-directed contingencies on social behavior of preschool children with disabilities. *Journal of Behavioral Education*, 4(3), 267-281.

doi:10.1007/BF01531983

\*Lindeman, D. P., & Others, A. (1993). Increasing and maintaining withdrawn preschoolers' peer interactions: Effects of double prompting and booster session procedures. *Behavioral Disorders*, 19(1), 54-66. Retrieved from <http://lib->

[ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ475935&site=ehost-live](http://ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ475935&site=ehost-live)

Loeber, R., & Farrington, D. P. (1998). Never too early, never too late: Risk factors and successful interventions for serious and violent juvenile offenders. *Studies on Crime & Crime Prevention*.

Lösel, F., & Beelmann, A. (2003). Effects of child skills training in preventing antisocial behavior: A systematic review of randomized evaluations. *The Annals of the American Academy of Political and Social Science*, 587(1), 84-109.

Maag, J. W. (2006). Social skills training for students with emotional and behavioral disorders: A review of reviews. *Behavioral Disorders*, 32(1), 4-17.

\*Macy, M. G., & Bricker, D. D. (2007). Embedding individualized social goals into routine activities in inclusive early childhood classrooms. *Early Child Development and Care*, 177(2), 107-120. Retrieved from [http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ764097&site=ehost-live;](http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ764097&site=ehost-live;http://www.informaworld.com/openurl?genre=article&id=doi:10.1080/03004430500337265)  
<http://www.informaworld.com/openurl?genre=article&id=doi:10.1080/03004430500337265>

Maggin, D. M., Chafouleas, S. M., Goddard, K. M., & Johnson, A. H. (2011). A systematic evaluation of token economies as a classroom management tool for students with challenging behavior. *Journal of School Psychology*, 49(5), 529-554.

- Malecki, C. K., & Elliot, S. N. (2002). Children's social behaviors as predictors of academic achievement: A longitudinal analysis. *School psychology quarterly, 17*(1), 1.
- Mathur, S. R., Kavale, K. A., Quinn, M. M., Forness, S. R., & Rutherford Jr, R. B. (1998). Social skills interventions with students with emotional and behavioral problems: A quantitative synthesis of single-subject research. *Behavioral Disorders, 23*(3), 193-201.
- McCabe, P. C., & Altamura, M. (2011). Empirically valid strategies to improve social and emotional competence of preschool children. *Psychology in the Schools, 48*(5), 513-540.
- \*McConnell, S. R., Sisson, L. A., Cort, C. A., & Strain, P. S. (1991). Effects of social skills training and contingency management on reciprocal interaction of preschool children with behavioral handicaps. *The Journal of Special Education, 24*(4), 473-495. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ425803&site=ehost-live>
- Merrell, K. W., & Gimpel, G. (2014). *Social skills of children and adolescents: Conceptualization, assessment, treatment*. Psychology Press.
- Nix, R. L., Bierman, K. L., Domitrovich, C. E., & Gill, S. (2013). Promoting children's social-emotional skills in preschool can enhance academic and behavioral

functioning in kindergarten: Findings from Head Start REDI. *Early Education & Development*, 24(7), 1000-1019.

No Child Left Behind Act of 2001, Pub. L. No. 107-110. Retrieved January 13, 2006, from <http://www.ed.gov/legislation/ESEA02/> [Google Scholar](#)

Ogders, C. L., Moffitt, T. E., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., ... & Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and psychopathology*, 20(2), 673-716.

Odom, S. L., Brown, W. H., Frey, T., Karasu, N., Smith-Canter, L. L. & Strain, P. S. (2003). Evidence-based practices for young children with autism: Contributions for single-subject design research. *Focus on Autism and Other Developmental Disabilities*, 18, 166-175

\*Odom, S. L., Hoyson, M., Jamieson, B., & Strain, P. S. (1985). INCREASING HANDICAPPED PRESCHOOLERS' PEER SOCIAL INTERACTIONS: CROSS-SETTING AND COMPONENT ANALYSIS. *Journal of applied behavior analysis*, 18(1), 3-16.

Odom, S. L., McConnell, S. R., & Brown, W. H. (2008). Social competence of young children: Conceptualization, assessment, and influences. In W. H. Brown, S. L. Odom, & S. R. McConnell (Eds.), *Social competence of young children: Risk, disability, and intervention* (pp. 3–29). Baltimore, MD: Paul H Brookes Publishing.

- Olive, M. L., & Smith, B. W. (2005). Effect size calculations and single subject designs. *Educational Psychology, 25*(2-3), 313-324.
- \*Oh-Young, C., Filler, J., Kucskar, M., Buchter, J., O'Hara, K., & Gelfer, J. (2018). A Comparison of Peer Network and Peer Video Modeling to Increase Positive Verbal Social Interactions in Young Children With Disabilities. *Journal of Special Education Technology, 33*(4), 270-283.
- Parker, J. G., & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk? *Psychological bulletin, 102*(3), 357.
- Parker, R. I., Hagan-Burke, S., & Vannest, K. (2007). Percentage of all non-overlapping data (PAND) an alternative to PND. *The Journal of Special Education, 40*(4), 194-204.
- Parker, R. I., & Vannest, K. (2009). An improved effect size for single-case research: Nonoverlap of all pairs. *Behavior Therapy, 40*(4), 357-367.
- Parker, R. I., Vannest, K. J., & Brown, L. (2009). The improvement rate difference for single-case research. *Exceptional Children, 75*(2), 135-150.
- Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining nonoverlap and trend for single-case research: Tau-U. *Behavior Therapy, 42*(2), 284-299.
- Prior, M., Smart, D., Sanson, A. N. N., & Oberklaid, F. (2000). Does shy-inhibited temperament in childhood lead to anxiety problems in adolescence? *Journal of the American Academy of Child & Adolescent Psychiatry, 39*(4), 461-468.

- Qi, C. H., & Kaiser, AP (2003). Behavior problems of preschool children from low-income families: Review of the literature. *Topics in Early Childhood Special Education, 23*, 188-216.
- Quinn, M. M., Kavale, K. A., Mathur, S. R., Rutherford Jr, R. B., & Forness, S. R. (1999). A meta-analysis of social skill interventions for students with emotional or behavioral disorders. *Journal of Emotional and Behavioral Disorders, 7*(1), 54-64.
- Ramey, C. T., & Ramey, S. L. (1998). Early intervention and early experience. *American psychologist, 53*(2), 109.
- Rubin, K. H., & Asendorpj, J. B. (2013). Social withdrawal, inhibition, and shyness in childhood: Conceptual and definitional issues. In *Social withdrawal, inhibition, and shyness in childhood* (pp. 13-28). Psychology Press.
- Rubin, K. H., & Coplan, R. J. (2004). Paying attention to and not neglecting social withdrawal and social isolation. *Merrill-Palmer Quarterly (1982-), 50*6-534.
- Schneider, B. H. (1992). Didactic methods for enhancing children's peer relations: A quantitative review. *Clinical Psychology Review, 12*(3), 363-382.
- Schneider, B. H., & Byrne, B. M. (1985). Children's social skills training: A meta-analysis. In *Children's peer relations: Issues in assessment and intervention* (pp. 175-192). Springer, New York, NY.

- Scruggs, T. E., Mastropieri, M. A., & Casto, G. (1987). The quantitative synthesis of single-subject research: Methodology and validation. *Remedial and Special Education, 8*(2), 24-33.
- Singh, N. N., Deitz, D. D., Epstein, M. H., & Singh, J. (1991). Social behavior of students who are seriously emotionally disturbed: A quantitative analysis of intervention studies. *Behavior Modification, 15*, 74-94.
- Skinner, B. F. (1965). *Science and human behavior* (No. 92904). Simon and Schuster.
- \*Smart, E., Green, V. A., & Lynch, T. E. (2016). Effectiveness of a video modelling intervention in a shy, withdrawn preschool child. *Australasian Journal of Early Childhood, 41*(3), 77-85.
- \*Stanton-Chapman, T. L., & Brown, T. S. (2015). Facilitating commenting and requesting skills in 3-year-old children with disabilities. *Journal of Early Intervention, 37*(2), 103-118.
- \*Stanton-Chapman, T. L., & Brown, T. S. (2015). A strategy to increase the social interactions of 3-year-old children with disabilities in an inclusive classroom. *Topics in Early Childhood Special Education, 35*(1), 4-14.
- Stanton-Chapman, T. L., Denning, C. B., & Jamison, K. R. (2012). Communication skill building in young children with and without disabilities in a preschool classroom. *The Journal of Special Education, 46*(2), 78-93.

- Stanton-Chapman, T. L., Kaiser, A. P., Vijay, P., & Chapman, C. (2008). A multicomponent intervention to increase peer-directed communication in Head Start children. *Journal of Early Intervention, 30*(3), 188-212.
- \*Stanton-Chapman, T. L., Kaiser, A. P., & Wolery, M. (2006). Building social communication skills in Head Start children using storybooks: The effects of prompting on social interactions. *Journal of Early Intervention, 28*(3), 197-212.
- \*Stanton-Chapman, T., Jamison, K. R., & Denning, C. B. (2008). Building school communication skills in young children with disabilities: An intervention to promote peer social interactions in preschool settings. *Early Childhood Services: An Interdisciplinary Journal of Effectiveness, 2*(4), 225-251. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2009-06949-004&site=ehost-live>
- \*Stanton-Chapman, T. L., & Snell, M. E. (2011). Promoting turn-taking skills in preschool children with disabilities: The effects of a peer-based social communication intervention. *Early Childhood Research Quarterly, 26*(3), 303-319.
- Stichter, J. P., & Conroy, M. A. (2006). *How to teach social skills and plan for peer social interactions*. Pro-Ed.
- \*Storey, K., Danko, C. D., Ashworth, R., & Strain, P. S. (1994). Generalization of social skills intervention for preschoolers with social delays. *Education and Treatment of Children, 17*(1), 29-51. Retrieved from <http://lib->



[ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ485028&site=ehost-live](http://ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ485028&site=ehost-live)

\*Strain, P. S., Shores, R. E., & Kerr, M. M. (1976). *An experimental analysis of "spillover" effects on the social interaction of behaviorally handicapped preschool children* Journal of Applied Behavior Analysis. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ138091&site=ehost-live>

\*Strain, P. S., & Timm, M. A. (1974). *An experimental analysis of social interaction between a behaviorally disordered preschool child and her classroom peers* Journal of Applied Behavior Analysis. Retrieved from <http://lib-ezproxy.tamu.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ112558&site=ehost-live>

Tarlow, K. R. (2016). Baseline Corrected Tau Calculator. Retrieved from <http://www.ktarlow.com/stats/tau>

Tarlow, K. R. (2017). An improved rank correlation effect size statistic for single-case designs: Baseline corrected Tau. *Behavior Modification*, 41(4), 427-467.

\*Urlacher, S., Wolery, M., & Ledford, J. R. (2016). Peer modeling of commenting during small group direct instruction for academic behaviors. *Journal of Early Intervention*, 38(1), 24-40. doi:10.1177/1053815116636645

- Vaughn, S., Kim, A. H., Morris Sloan, C. V., Hughes, M. T., Elbaum, B., & Sridhar, D. (2003). Social skills interventions for young children with disabilities: A synthesis of group design studies. *Remedial and Special Education, 24*(1), 2-15.
- Wang, P., & Spillane, A. (2009). Evidence-based social skills interventions for children with autism: A meta-analysis. In *Database of Abstracts of Reviews of Effects (DARE): Quality-assessed Reviews [Internet]*. Centre for Reviews and Dissemination (UK).
- Webster-Stratton, C., & Hammond, M. (1997). Treating children with early-onset conduct problems: A comparison of child and parent training interventions. *Journal of Consulting and Clinical Psychology, 65*, 93–109.
- Webster-Stratton, C., & Taylor, T. (2001). Nipping early risk factors in the bud: Preventing substance abuse, delinquency, and violence in adolescence through interventions targeted at young children (0–8 years). *Prevention science, 2*(3), 165-192.
- Zhang, J., & Wheeler, J. J. (2011). A meta-analysis of peer-mediated interventions for young children with autism spectrum disorders. *Education and Training in Autism and Developmental Disabilities, 62*-77.
- \*Zimmerman, K. N., Ledford, J. R., Gagnon, K. L., & Martin, J. L. (2019). Social Stories and Visual Supports Interventions for Students at Risk for Emotional and Behavioral Disorders. *Behavioral Disorders, 0198742919874050*.

## APPENDIX A

Table 1 *Participants and Intervention Features*

	N	%
Gender		
Male	87	71.3%
Female	35	28.7%
Race		
Caucasian	24	19.7%
African-American	13	10.7%
Hispanic	3	2.5%
Asian	1	0.8%
Mixed	1	0.8%
Not Reported	80	65.6%
Disability		
Internalizing Behaviors	25	20.5%
Externalizing Behaviors	10	8.2%
Developmental Delay	47	38.5%
Language Delay	26	21.3%
EBD	14	11.5%
Educational Setting		
Inclusive preschool	51	41.8%
Head Start Program	21	17.2%
Special Education Class	16	13.1%
Preschool or community daycare	15	12.3%
Kindergarten	13	10.7%
Summer program	6	4.9%
Implementer		
Researcher or social skills instructor	65	53.3%
Teacher or TA or paraprofessional	39	32.0%
Peer	4	3.3%
Collaboration	14	11.5%
Tier		
Tier-1	18	14.8%
Tier-2	98	80.3%
Tier-3	6	4.9%

Study	Design	N	n	M	Disability	Settings	Imple- menter	So- Dra	Skills ins.	Dependent variable	Gen.	Main.
Zimmerman, 2019 <sup>a</sup>	ATD	3	3	3	DD, IB	Kinder and Pre	R	N	N	Engagement	N	N
Oh-Young, 2018	ATD	1 1	5	5	DD, LD	IP	T	N	N	Positive verbal social interactions	Y	N
Anderson, 2017	MBD	3	3	1	EB, IB	Kinder	R	N	Y	Social interaction	N	Y
Green, 2017	MPD	3	3	2	EB, IB	Kinder	R	N	N	Positive social interactions with peers	N	Y
Lane, 2017	MPD	6	6	5	DD, EB, IB	SEP	R	N	Y	Correct responding during peer preference instruction	Y	Y
Smart, 2016	AB	1	1	0	IB	Kinder	R	N	N	Sharing, reciprocal peer interactions, positive verbalization, adult interaction	N	Y
Urlacher, 2016	MPD	6	2	2	LD, DD	IP	R	N	Y	Correct responding for sign words, correct responding for commenting	Y	Y
Lemmon, 2015	MTD	4	1	1	EB	Pre	R	N	N	Making an invitation to play, positive communication, and sustained interaction	N	Y
Stanton- Chapman, 2015a	MBD	6	6	3	DD, LD	SEP	R	Y	Y	Commenting and request for verbal behavior	N	N

Study	Design	N	n	M	Disability	Settings	Imple- menter	So- Dra	Skills ins.	Dependent variable	Gen.	Main.
Stanton- Chapman, 2015b	MBD	6	3	2	DD, LD	IP	R	Y	Y	Parallel play	N	N
Green, 2013	MPD	4	4	4	EB, IB	Kinder	R	N	Y	Social interactions	N	Y*
Hughett, 2013	MBD	9	3	2	SD, LD	IP	T	Y	Y	Cooperative play	N	Y
Benish, 2011	MBD	3	3	2	EB	HS	T	N	Y	Aggressive behavior	N	Y
Stanton- Chapman, 2010	MBD	1 0	1 0	9	EBD, DD, LD	IP	R	Y	Y	Social initiations and responses	Y	N
Stanton- Chapman, 2008	MBD	8	8	7	LD, DD	HS	R	Y	Y	Social communication strategy use and positive verbalizations	Y	N
Macy, 2007	ABAB	3	3	3	DD, IB	HS	R	N	N	Correct response to their target social goals	N	N
Stanton- Chapman, 2006	ATD	8	4	2	LD	HS	R	Y	Y	Positive verbalizations	N	N
Frea, 1999	ABAB	2	2	1	DD, EB	HS	R	Y	N	Positive interactions	Y	N
Gronna, 1999	MBD	1 6	4	2	IB	IP	R	Y	Y	Correctly performed social skills	Y	Y
Davis, 1996	MBD and ABAB	1 6	4	2	EBD	Daycare and Kinder	Peers	N	N	Compliance to low-p requests	N	Y*
Liewis, 1994	ABAB	4	4	3	LD	IP	T	N	Y	Social interactions	N	N
Storey, 1994	MPD	1 5	5	4	IB	Pre and HS	T	Y	Y	Social initiations and responses, peer strategy use	Y	N
Lindeman, 1993	MBD	4	4	1	IB	Pre	T	N	N	Social initiations and social interactions	N	Y

Study	Design	N	n	M	Disability	Settings	Imple- menter	So- Dra	Skills ins.	Dependent variable	Gen.	Main.
Hundert, 1992	MBD	14	14	12	DD, EBD	IP	C	Y	Y	Positive play	Y	Y
McConnell, 1991	ABAB	11	4	1	IB	IP	R	Y	Y	Social initiations and responses	Y	N
Brown (1), 1988	MBD	20	2	1	IB, DD	HS	T	N	N	Prompted and unprompted Social interactions	Y	N
Brown (2), 1988	MBD	17	2	2	ED, ID	Pre for at risk	T	N	N	Prompted and unprompted Social interactions	Y	N
Goldstein (1), 1988	ABAB	6	2	2	LD, EB	IP	T	Y	Y	Social responses	N	N
Goldstein (2), 1988	ABA	6	6	3	LD	Summer program	R	Y	Y	Social responses	N	N
Fox, 1986	MBD and ABAB	20	3	2	IB	IP	T	N	Y	Social initiations and extended interactions	N	Y
Odom, 1985	MBD	6	3	3	IB	IP	T	Y	Y	Social interactions	N	N
Strain, 1976	MBD and ABAB	10	3	3	EBD	SEP	T	N	N	Positive and negative behaviors	N	N
Strain, 1974	ABAB	21	1	0	LD	SEP	R	N	N	Positive motor-gestural behaviors	N	N

Note. <sup>a</sup> The study included five participants in total. Only three of them met the inclusion criteria in this review.

ATD = alternating treatment design, MBD = multiple baseline design, MPD = multiple probe design, MTP = multiple treatment design, N = number of total participants, n = number of target participants, M = number of male target participants, DD = developmental delay, LD = language delay, IB = internalizing behavior, EB = externalizing behavior, EBD = emotional and behavioral disorder, Kinder = kindergarten, Pre = preschool, IP = inclusive preschool, SEP = special education preschool, HS = Head Start, R = researcher, T = teacher or TA, C = collaboration between researcher and teacher, N = no, Y = yes, So-Dra = socio-dramatic play, Skill Ins. = social skills instruction, Gen. = generalization, Main.= maintenance

Table 3 *Social Skills Interventions*

Study	Social skills intervention
Zimmerman, 2019	Social story, visual support
Oh-Young, 2018	Peer networking, peer video modeling, time delay, and least to most prompting, and praise
Anderson, 2017	Social skills instruction, adult mediation, self-evaluation and reinforcement, and parent involvement
Green, 2017	Video modeling
Lane, 2017	Progressive time delay instruction on peer preferences and sharing, reinforcement
Smart, 2016	Video modeling
Urlacher, 2016	Progressive time delay, teach sign words and commenting, prompts, and reinforcement
Lemmon, 2015	Self video modeling
Stanton-Chapman, 2015a	High scope curriculum play organizer + play + review
Stanton-Chapman, 2015b	High scope curriculum play organizer + play + review
Green, 2013	Video modeling
Hughett, 2013	Buddy skills intervention
Benish, 2011	Social story
Stanton-Chapman, 2010	High scope curriculum play organizer + play + review
Stanton-Chapman, 2008	High scope curriculum play organizer + play + review
Macy, 2007	teacher embedding learning opportunities into classroom activities that addressed their target children's social goals
Stanton-Chapman, 2006	1) storybooks, 2) thematic play materials, and 3) High scope curriculum play organizer + play + review
Frea, 1999	SIA: Thematic play, leader role modeling, verbal prompting, GFA: sing songs and incorporate interactive activities
Gronna, 1999	Puppet script training
Davis, 1996	High-p intervention and praise
Liewis, 1994	1) social skill instruction (review + introduction of new skill + teaching essential rule + modeling + student role play + testing; 2) prompt and praise



---

Table 3. *Social Skills Interventions*

---

Study	Social skills intervention
Storey, 1994	skills instruction, modeling, prompts and token system
Lindeman, 1993	double-prompting and contingent social praise
Hundert, 1992	Classwide social skills program (CSSP): social skills instructions, puppet modeling, teacher prompting and reinforcement
McConnell, 1991	social skills instructions, modeling, prompts and praise
Brown (1), 1988	group socialization procedures: script training and prompting
Brown (2), 1988	group socialization procedures: script training and prompting
Goldstein (1), 1988	social dramatic script training and role prompt
Goldstein (2), 1988	social dramatic script training and role prompt
Fox, 1986	verbal and physical prompts and contingent praise
Odom, 1985	peer-initiation intervention, confederate training, teacher prompt, and token reinforcement
Strain, 1976	a combination of verbal and physical prompts, plus verbal praise contingent on appropriate social behaviors
Strain, 1974	reinforcement

---

Table 4 *Evaluation Using What Works Clearinghouse Design Standards for Single-Case Design*

Study /ID	Design	Participant ID	OV	DS#1	DS#2A	DS#2B	DS#3	DS#4A	DS#4B	DS#5A	DS#5B
Zimmerman, 2019*											
	ATD	Jason	1	1	1	1	1	1	N/A	1	1
		Marc	1	1	1	1	1	1	N/A	1	1
		Michael	1	1	1	1	1	1	N/A	1	1
Oh-Young, 2018											
	ATD	Abe	2	1	1	1	1	2	N/A	1	1
		Bruce	2	1	1	1	1	2	N/A	1	1
		Cyrus	2	1	1	1	1	2	N/A	1	1
		Darian	2	1	1	1	1	2	N/A	1	1
		Flavio	2	1	1	1	1	2	N/A	1	1
Anderson, 2017*											
	MBD x P	Billy	1	1	1	1	1	1	1	1	1
		Rachel	2	1	1	1	1	2	1	1	1
		Lauren	2	1	1	1	1	2	1	1	1
Green, 2017*											
	MPD	Ahmed	2	1	1	1	1	2	1	1	1
		Kirsty	2	1	1	1	1	2	1	1	1
		Kirk	2	1	1	1	1	2	1	1	1
Lane, 2017*											
	MPD	Chad	1	1	1	1	1	1	1	1	1
		Ellis	1	1	1	1	1	1	1	1	1
		Jared	1	1	1	1	1	1	1	1	1
		Michael	1	1	1	1	1	1	1	1	1
		Jessica	1	1	1	1	1	1	1	1	1
		Levi	1	1	1	1	1	1	1	1	1

Table 4 *Evaluation Using What Works Clearinghouse Design Standards for Single-Case Design*

Study /ID	Design	Participant ID	OV	DS#1	DS#2A	DS#2B	DS#3	DS#4A	DS#4B	DS#5A	DS#5B
Urlacher, 2016*											
	AB	Aiden	0	1	1	1	0	0	1	1	1
		Ben	0	1	1	1	0	0	1	1	1
Smart, 2016*											
	AB	Zara	0	1	1	1	0	2	N/A	1	1
Lemmon, 2015*											
	MTD	Tyler	0	1	1	1	0	1	1	1	1
Stanton-Chapman, 2015a*											
	MBD	Joshua	2	1	1	1	1	2	1	1	1
		Ashley	2	1	1	1	1	2	1	1	1
		Montel	2	1	1	1	1	2	1	1	1
		Mia	2	1	1	1	1	2	1	1	1
		Shontelle	2	1	1	1	1	2	1	1	1
		Blake	2	1	1	1	1	2	1	1	1
Stanton-Chapman, 2015b*											
	MBD x P	Cody	2	1	1	1	1	2	1	1	1
		Andre	2	1	1	1	1	2	1	1	1
		Monique	2	1	1	1	1	2	1	1	1
Green, 2013*											
	MPD x P	Billy	1	1	1	1	1	1	1	1	1
	MPD x P	Oliver	1	1	1	1	1	1	1	1	1
	MPD x P	Harry	2	1	1	1	1	2	1	1	1
	MPD x P	Derek	0	1	1	1	1	1	0	1	1
Hughett, 2013*											
	MBD x P	Whalen	2	1	1	1	1	2	1	0	0
		Samantha	2	1	1	1	1	2	1	0	0
		Stuart	2	1	1	1	1	2	1	0	0

Table 4 *Evaluation Using What Works Clearinghouse Design Standards for Single-Case Design*

Study /ID	Design	Participant ID	OV	DS#1	DS#2A	DS#2B	DS#3	DS#4A	DS#4B	DS#5A	DS#5B
Benish, 2011											
	ABC and MBD x P	Lisa	0	1	0	1	1	1	1	1	1
		Kyle	0	1	0	1	1	1	1	1	1
		John	0	1	0	1	1	2	1	1	1
Stanton-Chapman, 2010*											
	MBD x P	Dyad A	1	1	1	1	1	1	1	1	1
		Dyad B	2	1	1	1	1	2	1	1	1
		Dyad C	2	1	1	1	1	2	1	1	1
		Dyad D	2	1	1	1	1	2	1	1	1
		Dyad E	2	1	1	1	1	2	1	1	1
Stanton-Chapman, 2008											
	MBD	Child A1	0	1	1	1	0	2	1	1	1
		Child A2	0	1	1	1	0	2	1	1	1
		Child B1	0	1	1	1	0	2	1	1	1
		Child B2	0	1	1	1	0	2	1	1	1
Macy, 2007*											
	AB	Ron	0	1	1	1	0	1	N/A	0	0
		Aziano	0	1	1	1	0	1	N/A	0	0
		Earl	0	1	1	1	0	1	N/A	0	0
Stanton-Chapman, 2006*											
	ATD	Child A1	2	1	1	1	1	2	N/A	1	1
		Child B1	2	1	1	1	1	2	N/A	1	1
		Child C1	2	1	1	1	1	2	N/A	1	1
		Child D1	2	1	1	1	1	2	N/A	1	1

Table 4 Evaluation Using What Works Clearinghouse Design Standards for Single-Case Design

Study /ID	Design	Participant ID	OV	DS#1	DS#2A	DS#2B	DS#3	DS#4A	DS#4B	DS#5A	DS#5B
Frea, 1999*											
	ABACAD	Arin	0	1	1	1	0	1	N/A	1	1
		Lou	0	1	1	1	0	1	N/A	1	1
Gronna, 1999*											
	MBD x Skills	Skill 1	0	1	1	1	1	0	1	0	0
		Skill 2	1	1	1	1	1	1	1	0	0
		Skill 3	2	1	1	1	1	2	1	0	0
		Skill 4	2	1	1	1	1	2	1	0	0
		Skill 5	2	1	1	1	1	2	1	0	0
Davis, 1996											
	MBD and ABAB	Rhonda	2	1	1	1	1	2	1	1	1
		Peter	2	1	1	1	1	2	1	1	1
		Keith	2	1	1	1	1	2	1	1	1
		Patty	2	1	1	1	1	2	1	1	1
Liewis, 1994*											
	ABAC	Ricky	0	1	1	1	0	1	N/A	0	0
		Maggie	0	1	1	1	0	1	N/A	0	0
		Tommy	0	1	1	1	0	1	N/A	0	0
		Paul	0	1	1	1	0	1	N/A	0	0
Storey, 1994											
	MBD x P	Jeremiah	0	1	1	1	0	2	0	0	0
		Drew	0	1	1	1	0	2	0	0	0
		Zeus	0	1	1	1	0	2	0	0	0
		Miko	0	1	1	1	0	2	0	0	0
		Domicica	0	1	1	1	0	2	0	0	0

Table 4 *Evaluation Using What Works Clearinghouse Design Standards for Single-Case Design*

Study /ID	Design	Participant ID	OV	DS#1	DS#2A	DS#2B	DS#3	DS#4A	DS#4B	DS#5A	DS#5B
Lindeman, 1993											
	MBD x P	Kerry	2	1	1	1	1	2	1	0	0
		Steven	2	1	1	1	1	2	1	0	0
		Erica	2	1	1	1	1	2	1	0	0
		Evelyn	2	1	1	1	1	2	1	0	0
Hundert, 1992											
	MBD x P	Group 1	2	1	1	1	1	2	1	0	0
		Group 2	2	1	1	1	1	2	1	0	0
		Group 3	2	1	1	1	1	2	1	0	0
		Group 4	2	1	1	1	1	2	1	0	0
McConnell, 1991*											
	ABACAD	Candace	0	1	1	1	0	1	N/A	0	0
		Hilda	0	1	1	1	0	1	N/A	0	0
		Ramona	0	1	1	1	0	1	N/A	0	0
		Rupert	0	1	1	1	0	1	N/A	0	0
Brown, 1988, study 1											
	MBD x P	Charles	0	1	1	1	0	2	1	0	0
		Julie	0	1	1	1	0	2	1	0	0
Brown, 1988, Study 2											
	MBD x P	Howard	0	1	1	1	0	2	1	0	0
		Shaun	0	1	1	1	0	2	1	0	0
Goldstein, 1988, Study 1*											
	ABAB	Sean	2	1	1	1	1	2	N/A	0	0
		David	2	1	1	1	1	2	N/A	0	0
		Scott	2	1	1	1	1	2	N/A	0	0
		Bret	2	1	1	1	1	2	N/A	0	0

Table 4 *Evaluation Using What Works Clearinghouse Design Standards for Single-Case Design*

Study /ID	Design	Participant ID	OV	DS#1	DS#2A	DS#2B	DS#3	DS#4A	DS#4B	DS#5A	DS#5B
		Michele	2	1	1	1	1	2	N/A	0	0
		Melinda	2	1	1	1	1	2	N/A	0	0
Goldstein, 1988, Study 2*											
	ABA	Sharon	0	1	1	1	0	1	N/A	0	0
		Bobby	0	1	1	1	0	1	N/A	0	0
		Michael	0	1	1	1	0	1	N/A	0	0
		Mary	0	1	1	1	0	1	N/A	0	0
		Melissa	0	1	1	1	0	1	N/A	0	0
		Benjamin	0	1	1	1	0	1	N/A	0	0
		Fox, 1986*									
	ABAB and MBD x P	Arthur	2	1	1	1	1	2	1	0	0
		Evelyn	0	1	1	1	1	1	0	0	0
		Donald	2	1	1	1	1	2	1	0	0
Odom, 1985*											
	MBD x S x P	Gary	2	1	1	1	1	2	1	0	0
		Garvin	2	1	1	1	1	2	1	0	0
		Jack	2	1	1	1	1	2	1	0	0
Strain, 1976*											
	MBD x P and ABABA	Dan	2	1	1	1	1	2	1	0	0
		Hank	2	1	1	1	1	2	1	0	0
		Ricky	2	1	1	1	1	2	1	0	0
Strain, 1974*											
	ABABA	Martha	0	1	1	1	0	2	N/A	0	0

*Note.* OV = overall, ATD = alternating treatment design, MBD = multiple baseline design, MPD = multiple probe design, MTP = multiple treatment design, x P = across participants, x S = across skills, N/A = not relevant, 1 = meets the standard, 0 = does not meet the standard. For column DS#4A, 2 = meets the standard without reservation, 1 = meets the standard with reservation, 0 = does not meet the standard.



Table 5 Evidence Evaluation for the Studies that Meet WWC Design Standards

Study	Participant	Baseline phase analysis							Between phase analysis					Ratio	OE
		change	PRE	VAR	Trend	PRE	VAR	Trend	OC Level	OC Trend	OC VAR	IC Level	Overlap		
Zimmerman, 2019*	Jason	1	1	1	1	1	1	1	1	1	1	1	1	3/0	2
	Marc	1	1	1	1	1	1	1	1	1	1	1	1		
Oh-Young, 2018*	Michael	1	1	1	1	1	1	1	1	1	1	1	1	14/11	0
	Abe	1	1	1	0	1	1	1	0	1	1	1	0		
	Bruce	1	1	1	0	1	1	1	0	1	1	0	0		
	Cyrus	1	1	1	1	1	1	1	1	1	1	0	1		
	Darian	1	1	1	1	1	1	1	0	1	1	0	0		
	Flavio	1	1	1	1	1	1	0	0	0	1	1	0		
Anderson, 2017	Billy	1	1	1	1	1	1	1	1	1	1	1	1	3/0	2
	Rachel	1	1	1	1	1	1	1	1	1	1	1	1		
Green, 2017	Lauren	1	1	1	1	1	1	1	1	1	1	1	1	0/3	0
	Ahmed	1	1	1	1	1	0	1	1	1	0	0	0		
	Kirsty	1	1	1	1	1	0	1	1	1	0	0	1		
Lane, 2017	Kirk	1	1	1	1	1	0	1	1	1	0	0	0	18/0	2
	Chad	1	1	1	1	1	1	1	1	1	1	0	1		
	Ellis	1	1	1	1	1	1	1	1	1	1	1	1		
	Jared	1	1	1	1	1	1	1	1	1	1	1	1		
	Michael	1	1	1	1	1	1	1	1	1	1	1	1		
	Jessica	1	1	1	1	1	1	1	1	1	1	1	1		
Stanton-Chapman, 2015a	Levi	1	1	1	1	1	1	1	1	1	1	1	1	2/4	0
	Joshua	1	1	1	1	1	1	1	1	1	1	1	0		

Table 5 Evidence Evaluation for the Studies that Meet WWC Design Standards

Study	Participant	Baseline phase analysis							Between phase analysis					Ratio	OE
		change	PRE	VAR	Trend	PRE	VAR	Trend	OC Level	OC Trend	OC VAR	IC Level	Overlap		
Stanton-Chapman, 2015b	Ashley	1	1	1	1	1	1	1	1	1	1	1	0		
	Montel	1	1	1	1	1	1	1	1	1	1	1	0		
	Mia	1	1	1	1	1	1	1	1	1	1	1	0		
	Shontelle	1	1	1	1	1	1	1	1	1	1	1	1		
	Blake	1	1	1	1	1	1	1	1	1	1	1	1		
	Cody	1	1	1	1	1	1	1	1	1	1	0	1	0/3	0
	Andre	1	1	1	1	1	1	1	1	1	1	0	1		
	Monique	1	1	1	1	1	1	1	1	1	1	0	1		
Green, 2013	Billy	1	1	1	1	0	1	1	1	1	1	0	1	2/1	0
	Oliver	1	1	1	1	1	1	1	1	1	1	1	1		
	Harry	1	1	1	1	1	1	1	1	1	1	1	1		
Hughett, 2013	Whalen	1	1	1	1	1	1	1	1	1	1	1	1	3/0	2
	Samantha	1	1	1	1	1	1	1	1	1	1	1	1		
	Stuart	1	1	1	1	1	1	1	1	1	1	1	1		
Stanton-Chapman, 2011	Dyad A	1	1	1	1	1	1	1	1	1	1	1	1	5/0	2
	Dyad B	1	1	1	1	1	1	1	1	1	1	1	1		
	Dyad C	1	1	1	1	1	1	1	1	1	1	1	1		
	Dyad D	1	1	1	1	1	1	1	1	1	1	1	1		

Table 5 Evidence Evaluation for the Studies that Meet WWC Design Standards

Study	Participant	Baseline phase analysis							Between phase analysis						
		change	PRE	VAR	Trend	PRE	VAR	Trend	OC Level	OC Trend	OC VAR	IC Level	Overlap	Ratio	OE
Stanton-Chapman, 2006*	Dyad E	1	1	1	1	1	1	1	1	1	1	1	1		
	Dyad A	1	1	1	1	1	1	1	0	1	1	0	0	0/4	0
	Dyad B	1	1	1	1	1	1	1	0	1	1	1	0		
	Dyad C	1	1	1	1	1	1	1	1	1	1	1	0		
	Dyad D	0	1	1	1	1	1	1	0	1	1	0	0		
Gronna, 1999	Skill 1	1	1	1	1	1	1	1	1	1	1	1	1	4/1	1
	Skill 1	1	1	1	1	1	1	1	1	1	1	1	1		
	Skill 3	1	1	1	1	1	1	1	1	1	1	1	1		
	Skill 4	1	1	1	1	1	1	1	1	1	1	1	1		
	Skill 5	1	1	1	1	1	1	1	1	1	1	1	1		
Davis, 1996	Ronda	1	1	1	1	1	1	1	1	1	1	1	1	10/2	1
	Peter	1	1	1	1	1	1	1	1	1	1	1	1		
	Keith	0	1	1	1	1	1	1	1	0	1	0	0		
	Patty	0	1	1	1	1	1	1	1	1	1	1	1		
Lindeman, 1993	Kerry	1	1	1	1	1	1	1	1	1	1	1	1	4/0	2
	Steven	1	1	1	1	1	1	1	1	1	1	1	1		
	Erica	1	1	1	1	1	1	1	1	1	1	1	1		
	Evelyn	1	1	1	1	1	1	1	1	1	1	1	1		
Hundert, 1992	G1	1	1	1	1	1	1	1	1	1	1	0	0	1/3	0
	G2	1	1	1	1	1	1	0	1	0	1	1	1		

Table 5 Evidence Evaluation for the Studies that Meet WWC Design Standards

Study	Participant	Baseline phase analysis							Between phase analysis					Ratio	OE
		change	PRE	VAR	Trend	PRE	VAR	Trend	OC Level	OC Trend	OC VAR	IC Level	Overlap		
Goldstein, 1988	G3	1	1	1	1	1	0	1	1	1	0	1	1	15/3	0
	G4	1	1	1	1	1	1	1	1	1	1	1			
	Sean	0	1	0	1	1	1	1	0	0	1	1	0		
	David	1	1	1	1	1	1	1	1	1	1	1	1		
	Scott	1	1	1	1	1	1	1	1	1	1	1	1		
	Bret	1	1	1	1	1	1	1	1	1	1	1	1		
Fox, 1986	Michele	1	1	1	1	1	1	1	1	1	1	1	1	7/0	2
	Melinda	1	1	1	1	1	1	1	0	1	1	0			
	Arthur	1	1	1	1	1	1	1	1	1	1	1	1		
	Evelyn	1	1	1	1	1	1	1	1	1	1	1	1		
Odom, 1985	Donald	1	1	1	1	1	1	1	1	1	1	1	1	9/0	2
	Gary	1	1	1	1	1	1	1	1	1	1	1	1		
	Garvin	1	1	1	1	1	1	1	1	1	1	1	1		
Strain, 1976	Jack	1	1	1	1	1	1	1	1	1	1	1	1	11/0	2
	Dan	1	1	1	1	1	1	1	1	1	1	1	1		
	Hank	1	1	1	1	1	1	1	1	1	1	1	1		
	Ricky	1	1	1	1	1	1	1	1	1	1	1	1		

Note. PRE = predictability; VAR = consistency of variability; OD = overall difference; IC = immediacy of change; OC = overall change; ID = immediacy of difference; OE = Overall Evaluation; N/A = not applicable; 1 = evidence; 0 = no evidence

\* the studies using alternating treatment design, we use less effective treatment as baseline, more effective treatment as intervention phase

Table 6 *Summary of Evidence Evaluation*

	Evidence	No Evidence
Baseline/ Less effective intervention (ATD)	13 (68.4%)	6 (18.2%)
Intervention/ Better intervention (ATD)	15 (78.9%)	4 (12.1%)
Between phase	11 (57.9%)	8 (42.1%)
Overall evidence	11 (57.9%)	8 (42.1%)

Table 7 *Within-Study Random-Effects Means and Confidence Intervals*

<b>Study</b>	<b>Cases</b>	<b>BC-Tau</b>	<b>95% CI</b>	<b><i>p</i></b>	<b><i>Q</i></b>
Zimmerman, 2019	3	0.68	[0.28, 1.08]	< .001	0.14
Oh-Young, 2018	5	0.37	[0.02, 0.72]	< .05	1.89
Anderson, 2017	3	0.67	[0.39, 0.95]	< .001	0.03
Green, 2017	3	0.32	[0.07, 0.57]	< .05	1.26
Lane, 2017	6	0.53	[0.29, 0.76]	< .001	0.24
Stanton-Chapman, 2015a	6	0.70	[0.54, 0.86]	< .001	0.86
Stanton-Chapman, 2015b	3	0.55	[0.28, 0.82]	< .001	0.04
Green, 2013	3	0.60	[0.26, 0.94]	< .001	0.57
Hughett, 2013	3	0.68	[0.49, 0.87]	< .001	0.21
Stanton-Chapman, 2010	5	0.68	[0.50, 0.85]	< .001	1.34
Stanton-Chapman, 2006	4	0.34	[0.07, 0.61]	< .001	3.19
Gronna, 1999	1	0.87	[0.57, 1.17]	< .001	-
Davis, 1996	4	0.63	[0.36, 0.90]	< .001	1.38
Lindeman, 1993	4	0.80	[0.68, 0.92]	< .001	0.69
Hundert, 1992	4	0.59	[0.40, 0.78]	< .001	3.65
Goldstein, 1988	2	0.37	[-0.01, 0.75]	0.06	0.70
Fox, 1986	2	0.89	[0.71, 1.07]	< .001	0.37
Odom, 1985	3	0.53	[0.32, 0.74]	< .001	0.07
Strain, 1976	3	0.72	[0.55, 0.88]	< .001	1.05
All Studies Combined	67	0.66	[0.61, 0.71]	< .001	53.59

*Note:* BC-Tau = Baseline Corrected Tau; CI = confidence interval.

Table 8 *Fixed-effects Moderator Analyses*

<b>Moderator</b>	<b>Cases</b>	<b>BC-Tau</b>	<b>95% CI</b>	<b><i>p</i></b>	<b><i>Q</i></b>	<b><i>Q</i><sup>*between</sup></b>
<b>Gender<sup>a</sup></b>	-	-	-	-	-	<b>7.40**</b>
Male	44	0.60	[0.54, 0.67]	<.001	29.65	-
Female	19	0.75	[0.67, 0.83]	<.001	12.32	-
<b>Disability<sup>a</sup></b>	-	-	-	-	-	<b>9.06</b>
Internalizing behaviors	18	0.74	[0.66, 0.82]	<.001	16.75	-
Externalizing behaviors	5	0.43	[0.20, 0.66]	<.001	4.11	-
Developmental delay	19	0.60	[0.47, 0.71]	<.001	5.71	-
Language delay	13	0.63	[0.52, 0.74]	<.001	9.96	-
EBD	8	0.67	[0.53, 0.81]	<.001	3.79	-
<b>Implementer</b>	-	-	-	-	-	<b>5.37</b>
Researcher	37	0.60	[0.53, 0.68]	<.001	22.47	-
Teacher	22	0.72	[0.65, 0.79]	<.001	20.71	-
Peer	4	0.63	[0.36, 0.90]	<.001	1.38	-
Collaboration	4	0.59	[0.40, 0.78]	<.001	3.65	-
<b>Social skilled peer</b>	-	-	-	-	-	<b>6.91***</b>
Included	38	0.56	[0.48, 0.63]	<.001	27.78	-
Not included	29	0.74	[0.67, 0.80]	<.001	13.35	-
<b>Skills instruction</b>	-	-	-	-	-	<b>0.25</b>
Included	42	0.65	[0.59, 0.71]	<.001	30.98	-
Not included	25	0.68	[0.60, 0.76]	<.001	22.36	-
<b>Intervention format</b>	-	-	-	-	-	<b>11.62**</b>
Individual	9	0.50	[0.34, 0.66]	<.001	5.63	-
Small group	47	0.62	[0.56, 0.69]	<.001	26.15	-
Big group	11	0.78	[0.69, 0.87]	<.001	10.18	-

Note: BC-Tau = Baseline Corrected Tau, <sup>a</sup> the two moderators with <sup>a</sup> have missing values, and total number of cases were 63.

\**p* < .05; \*\**p* < .01; \*\*\**p* < .001

Table 9 *Common Components of Social Skills Interventions*

Study	Socially skilled peer	Social stories	Social skills instructions	Video Modeling	Adult prompt	Reinforcement	High-p request	Script training	Visual support
Zimmerman, 2019	Y	Y							Y
Oh-Young, 2018	Y			Y	Y	Y			
Anderson, 2017	Y		Y		Y	Y			
Green, 2017				Y					
Lane, 2017			Y			Y			
Stanton-Chapman, 2015a			Y						
Stanton-Chapman, 2015b	Y		Y						
Green, 2013				Y					
Hughett, 2013	Y		Y		Y	Y			
Stanton-Chapman, 2010					Y	Y			
Stanton-Chapman, 2006	Y		Y						
Gronna, 1999	Y							Y	



Table 9 *Common Components of Social Skills Interventions*

Study	Socially skilled peer	Social stories	Social skills instructions	Video Modeling	Adult prompt	Reinforcement	High-p request	Script training	Visual support
Davis, 1996	Y					Y	Y		
Lindeman, 1993					Y	Y			
Hundert, 1992			Y	Y	Y	Y			
Goldstein, 1988	Y				Y			Y	
Fox, 1986					Y	Y			
Odom, 1985	Y				Y	Y			
Strain, 1976					Y	Y			

Table 10 *Participants Characteristics*

Participant	Gender	Ethnicity	English proficiency	SDQ
Sean	Male	Chinese	Fluent	7
Peter	Male	Korean	Fluent	23
Jay	Male	Chinese	Fluent	19

Table 11 *Mean Percentage, Standard Deviations and Effect Sizes of Social Interactions*

Experimental Phase	Mean rate of social interactions and (standard deviation)					
	Sean		Peter		Jay	
	Social Initiations	Social Responses	Social Initiations	Social Responses	Social Initiations	Social Responses
Baseline	1.33 (1.15)	10.00 (7.21)	2.67 (5.61)	4.00 (5.06)	2.44 (2.60)	2.44 (2.40)
Intervention	22.75 (14.30)	14.50 (6.91)	18.75 (7.78)	14.00 (12.60)	34.00 (21.07)	18.00 (10.68)
Maintenance	0 (0)	18 (11.31)	14 (5.66)	23 (4.24)	10 (--)	2 (--)
Mean	21.42	4.5	16.08	10	31.56	15.56
differences						
PNG	89%	33%	67%	44%	100%	67%
BC Tau	0.621 (0.32)	0.267 (0.393)	0.67 (0.271)	0.495 (0.317)	0.742 (0.245)	0.522 (0.311)

*Note.* PNG = the percentage of nonoverlapping data; BC Tau = Baseline Corrected Tau

Table 12 *Social Validity Survey Results*

Questions	Teachers	Parents
1. The goals set for the social skills interventions are appropriate for the child.	5	5
2. The social skills (compliment, sharing, and suggest play ideas) taught to the child are age appropriate.	5	5
3. (For teachers) The instructions for the child are clear and understandable to the child.	5	--
4. (For teachers) The child shows improvement in his social behaviors in class.	4.5	--
(For parents) The child shows improvement in his social behaviors at home.	--	3.3
5. The child initiates social interactions with his peers more frequently than before.	4	4

## APPENDIX B

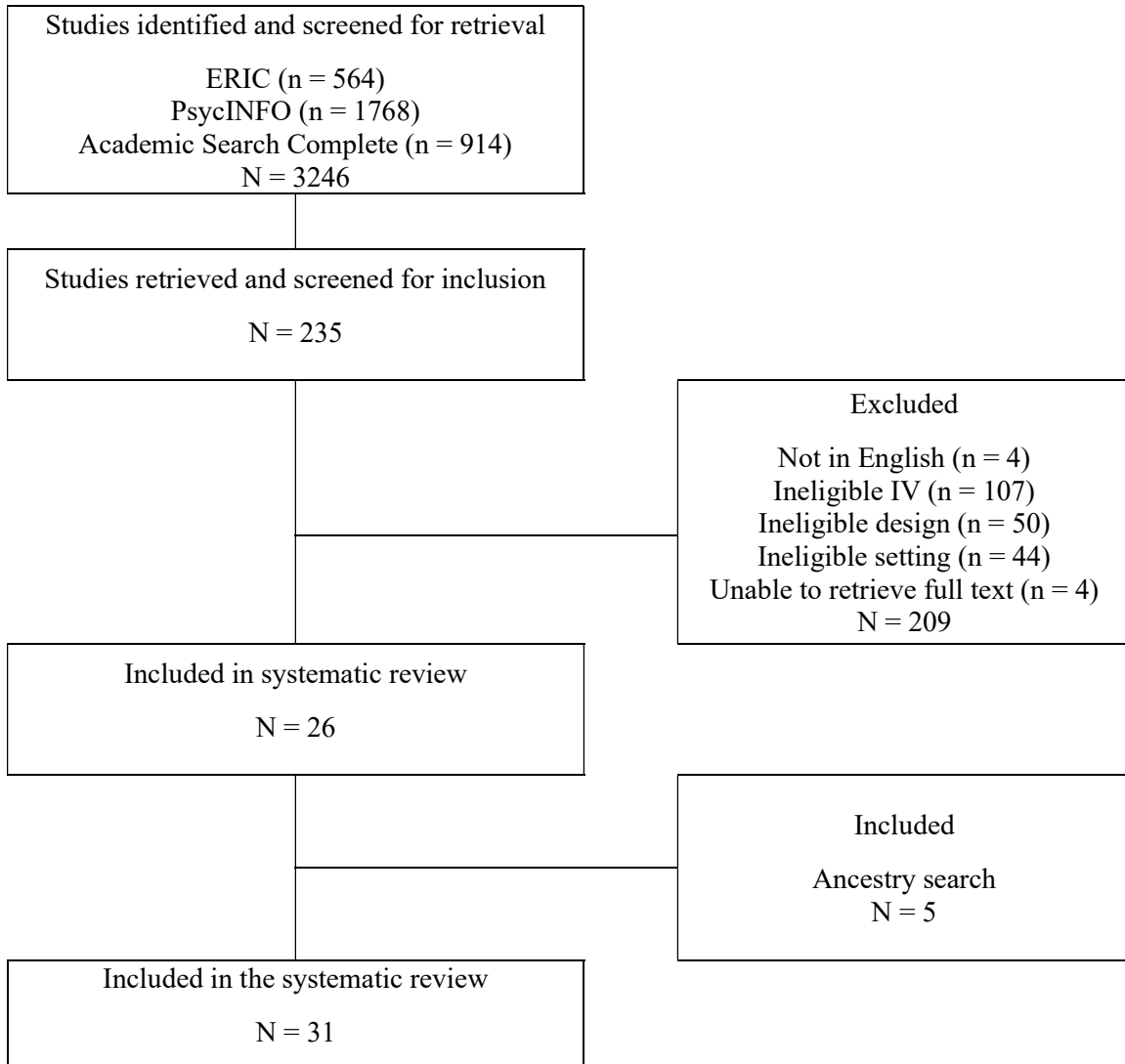


Figure 1 Results of the Literature Search and Inclusion Screening for the Systematic Review

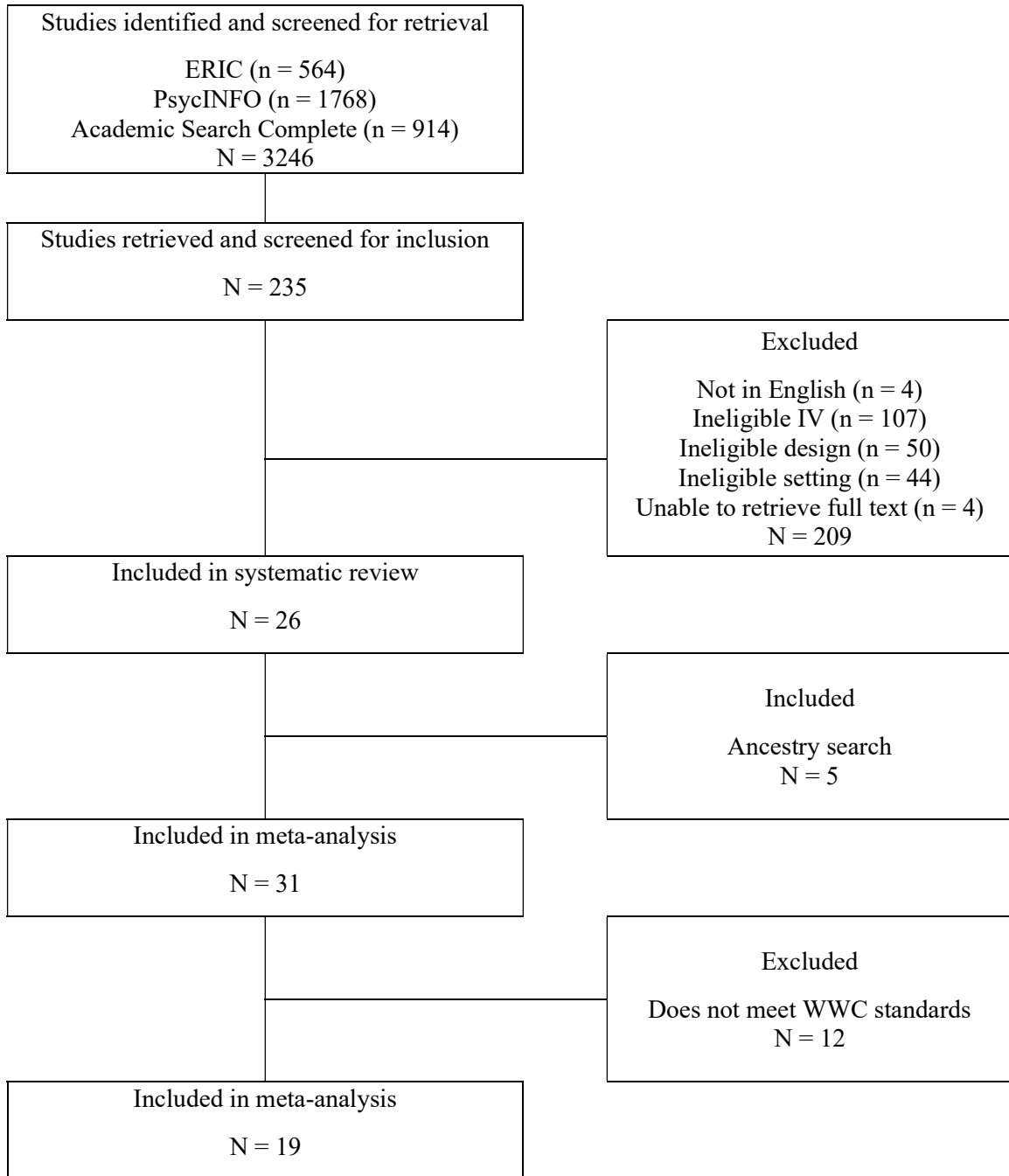


Figure 2 Results of the Literature Search and Inclusion Screening for the Meta-analysis

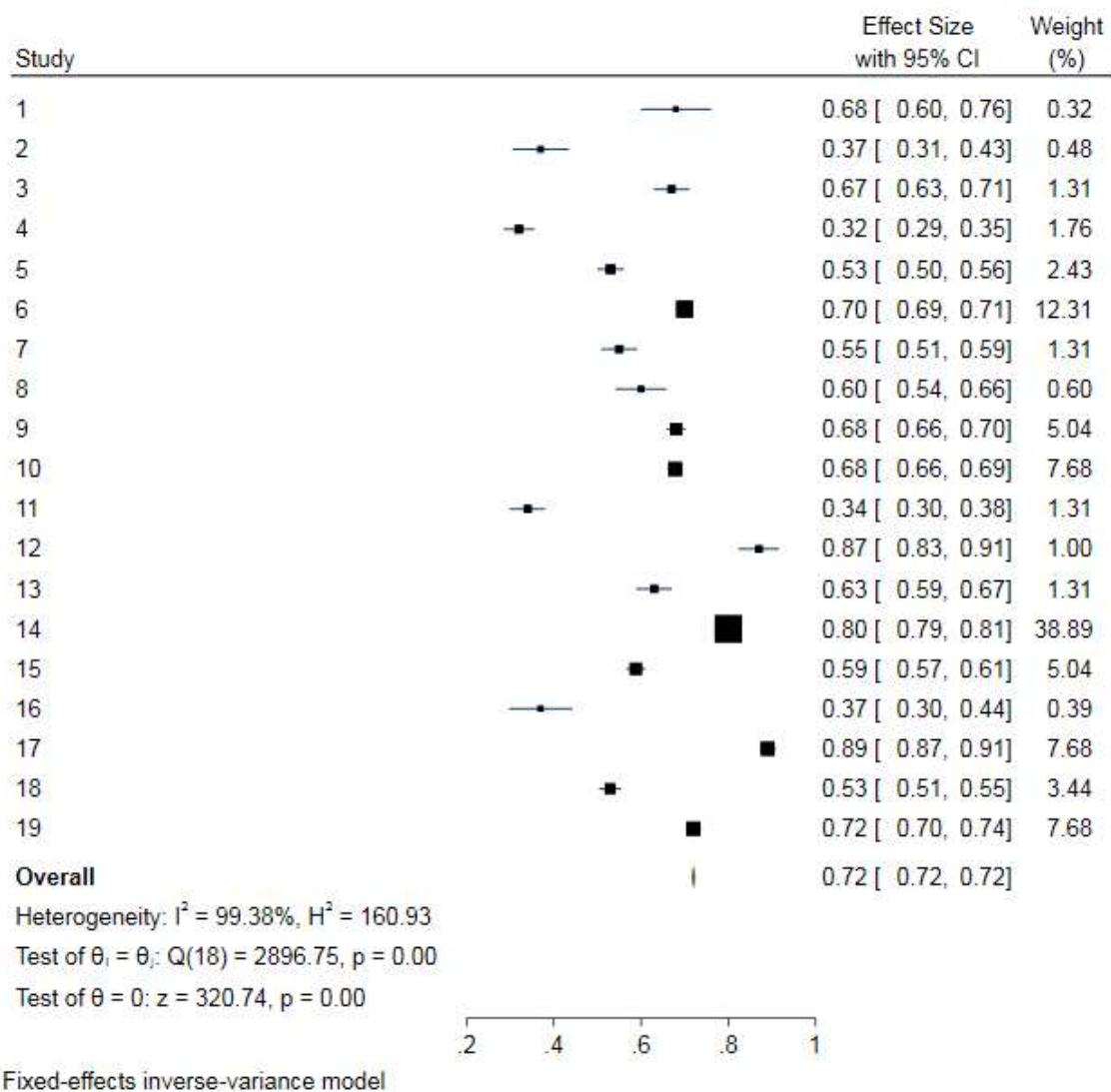


Figure 3 *Forrest Plot of the Included Studies*

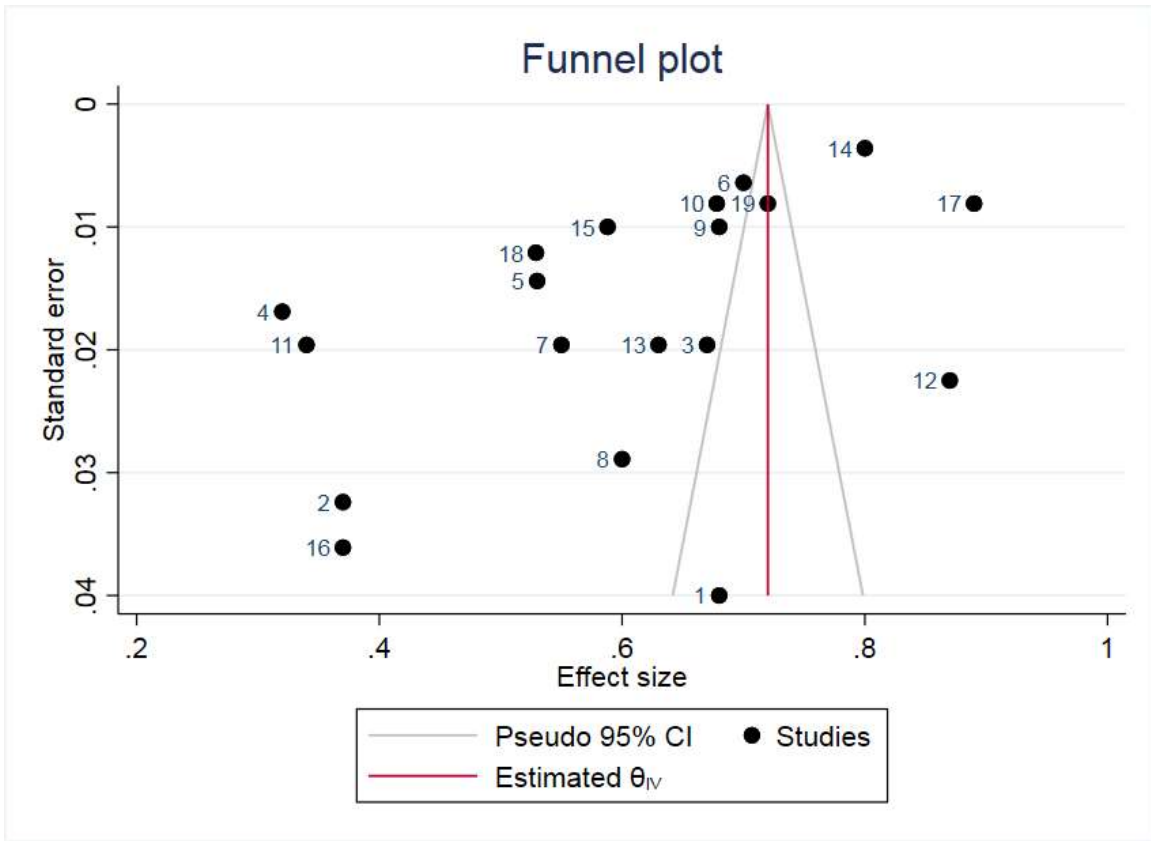


Figure 4 *Funnel Plot of the Included Studies*



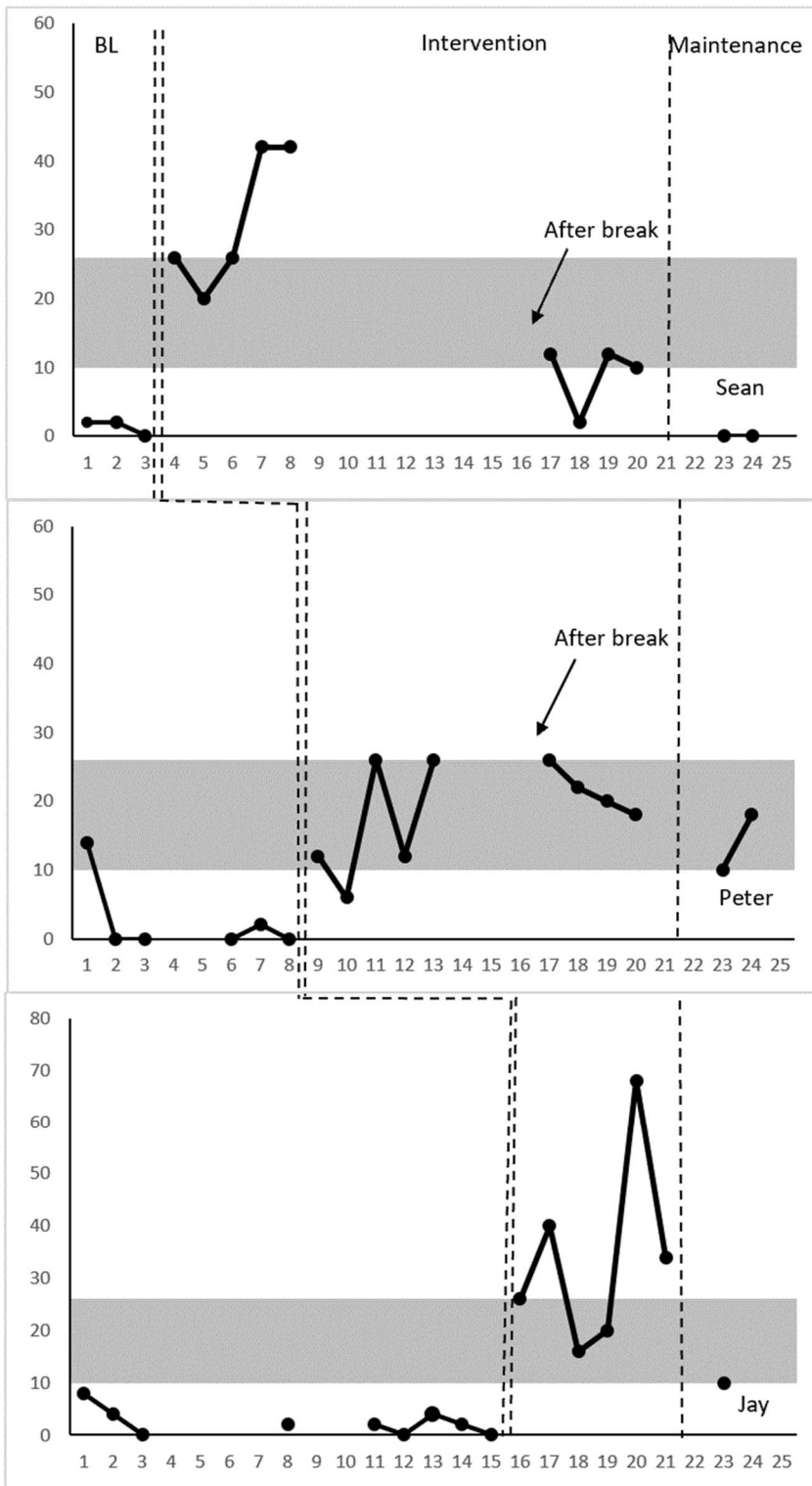


Figure 5 Percentages of Intervals with Social Initiations

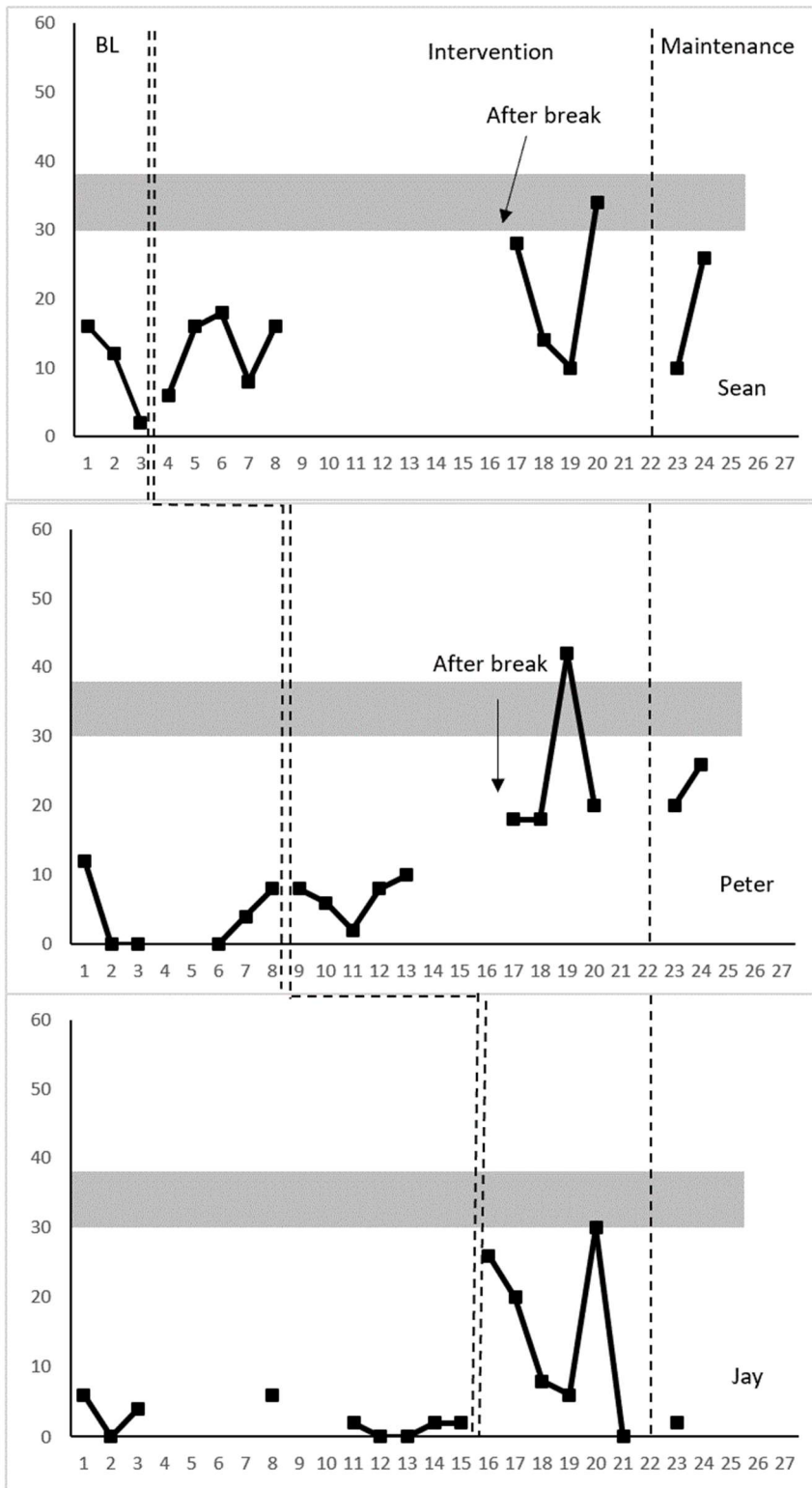


Figure 6 Percentage of Intervals with Social Responses

APPENDIX C

**Treatment Fidelity Checklist for Baseline**

<b>Implementer:</b>	<b>Child:</b>
<b>Date:</b>	<b>Observer:</b>

<b>No.</b>	<b>Steps</b>	<b>Did +/- Did not -</b>	<b>Notes</b>
1.	Tell the teacher “I’m going to ask A, B, and C” to play in one center area for 10 minutes, can you help me to tell the other children not coming to this area?		
2.	Lead one triad of children to one of the center areas		
3.	Tell the triad of children “Can you play with each other in the area for 10 minutes? I’ll set up my timer and you can choose to stay or go to other area when the timer rings.”		
4.	Set up timer for 10 minutes		
5.	Set up recording on iPad		
6.	The implementer will encourage the children to stay in the play area		
7.	It’s been ten minutes. You can choose to go to another area or stay here.		
	<b>Treatment Fidelity</b>	<b>/7</b>	<b>Percent Correct: %</b>

## Treatment Fidelity Checklist for Skills Training Phase

<b>Implementer:</b>	<b>Child:</b>
<b>Date:</b>	<b>Observer:</b>

No.	Steps	Did +/- Did not -/NA	Notes
1.	Put up the poster and set up iPad in the center area		
2.	Ask the teacher to tell the class “Ms. Cynthia is working with A, B, and C in the area, all the other children please go to any other area for your work time”		
3.	Lead the triad of children to the center area		
4.	Press recording button on iPad and say “Session X starts now”		
5.	Open conversation and end with “Ready to learn?”		
6.	Briefly review previous learned skills		
7.	Model the skill and say “let me show you how I give a compliment /share /suggest play idea”		
8.	Teach the skill <ul style="list-style-type: none"> <li>• Teach, tell the definition of the behavior “sharing is offering things to your friends”</li> <li>• Lead, “say it with me”</li> <li>• Ask, “now your turn” for example “what is sharing?”</li> </ul>		
9.	The implementer say: “Now, practice sharing with your friends and you will get a sticker. When you earn more than 5 stickers when the timer rings, you can play with my toy”		

---

**Treatment Fidelity Checklist for Skills Training Phase (Continued)**

---

10. Child practice with other children in the triad.
  - If the child did not start showing the skill within 30 s, the implementer provides three level prompts
  - If the child shows the skills, the implementer will praise and give the child a sticker within 5s
11. The implementer says “there are two more minutes to practice today”
12. Review. The implementer say “Time is up. Let’s review. Sharing is offering things to your friends.”
13. The implementer says “You all did a good job, you can choose a toy and play for one minute”

**Treatment Fidelity:**                      **/16**                      **Percent Correct:**    **%**

---

### Treatment Fidelity Checklist for Probe Phase

<b>Implementer:</b>	<b>Child:</b>
<b>Date:</b>	<b>Observer:</b>

No.	Steps	Did +/ Did not -	Notes
1.	Put up the poster and set up iPad in the play area		
2.	Ask the teacher to tell the class “Ms. Cynthia is working with A, B, and C in the area, please go to any other area for your work time all the other friends”		
3.	Lead the triad of children to the play area		
4.	Press recording on iPad to video session		
5.	Implementer reviews the learned skills and she says, “Ready to play?”		
6.	The implementer say: “Now, practice these skills with your friends and you will get a sticker. When you earn more than 5 stickers when the timer rings, you can play with my toy”		
7.	Children practice <ul style="list-style-type: none"> <li>• If the child demonstrates desired social behaviors, the implementer will give the child a sticker</li> <li>• Prompt other children to give compliment to the child who shows desired social behaviors within 5 s.</li> </ul>		
8.	The implementer says “Time is up.” and praise the children for practicing.		

### Treatment Fidelity Checklist for Probe Phase (Continued)

- 
9. Let the children with more than 5 stickers play with his/her preferred toy for one minute.

**Treatment Fidelity:**                    /9            **Percent Correct:**    %

---