COACHING INTERVENTIONS TARGETING TEACHER PRACTICES TO IMPROVE SOCIAL, EMOTIONAL, AND BEHAVIORAL OUTCOMES IN PRESCHOOL SETTINGS: A REVIEW OF QUALITY AND META-ANALYSIS OF THE SINGLE-CASE RESEARCH LITERATURE

A Dissertation

by

LISA RODRIGUEZ SANCHEZ

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,	Lisa Bowman-Perrott
	Shanna Hagan-Burke
	Robin Rackley
Head of Department,	Shanna Hagan-Burke

May 2020

Major Subject: Educational Psychology

ABSTRACT

The purpose of this dissertation was to: (1) conduct a systematic review of the literature to identify single-case research studies that examines coaching interventions focused on targeted teacher practices that address social, emotional, and behavioral outcomes of children in preschool settings (2) review the quality of studies meeting specific inclusion criteria by applying the What Works Clearinghouse (WWC) design standards, and (3) conduct a meta-analysis of the studies which met the WWC design standards. In the first study, 14 studies across 13 articles met the inclusion criteria. Descriptive data was extracted to provide a summary of the coaching characteristics, and each study was appraised by case for quality to determine if they met the WWC basic design standards. The second study provides the results of the meta-analysis of single-case research from 12 studies which met the WWC design standards. The Baseline Corrected Tau was used to calculate effect sizes of coaching interventions, and results show the overall estimate effect size was .76. Preliminary findings of this meta-analysis indicate that coaching interventions are effective to improve teacher practices related to social-emotional or behavioral outcomes, but more research is still needed to identify moderator variables. Limitations, implications for research in coaching are also discussed.

DEDICATION

To my parents: You have always been there to pick me up when I stumbled. Thank you for believing in me, and helping me throughout this challenging endeavor. I will forever be indebted to you both. Thank you so much for supporting me emotionally, and sometimes financially, throughout this challenging endeavor. None of this would have been possible without your faith and love.

To my beautiful girls: Cecilia, your words of encouragement helped keep me motivated. Each time you grabbed my face and said, "Mom, you can do this!" brought me such joy and inspiration. Juliana, your sweet smile helped carry me through the most challenging days and nights. I love you both so much and will always support and encourage you to follow your dreams.

To my family: Your support throughout my graduate program was amazing. I am blessed and fortunate to be surrounded by such love, prayers, and encouragement. Especially my Aunt Norma, who did literally anything to help out. The world would be a better place if everyone had someone like you in their lives.

To my husband: My best friend, my partner, and my soul mate. Thank you. Without your unwavering love, support, patience, and encouragement, none of this would have been possible. I love you so much and will continue to support your ambitions as you have supported mine.

ACKNOWLEDGEMENTS

I would first and foremost like to acknowledge my advisor, Dr. Mack D. Burke, for his continuous support throughout my academic journey. Under your guidance, I was provided opportunities to attend and present at national and international conferences, meet leaders in the field of special education, and gain experience teaching undergraduate and master's level classes. I am forever grateful to be a part of your academic family. Thank you for never giving up on me. I would also like to acknowledge Dr. Mandy Rispoli for introducing me into the world of early childhood research, and for continuing to mentor me from a distance. It was truly an honor and privilege to work with you on Project STEP. Thank you to my other committee members, Dr. Bowman-Perrott, Dr. Rackley, for continuing to encourage me to complete my dissertation after having two children. Without your guidance and support, I may not have been able to complete this dissertation. I would like to especially thank Dr. Hagan-Burke, for all your candid conversations to get me on the right track and for helping me regain focus during this phase of my academic career. I would also like to acknowledge several doctoral students who supported me throughout my time at Texas A&M: Stephanie Gerow, Kristi Morin, Heather Hatton, Jennifer Ninci, Samar Zaini, Xin Dong, Grace Ko, Sandy Smith, and Aaron Campbell. I am blessed with your friendship, and look forward to working with you as colleagues in the field of special education.

CONTRIBUTORS AND FUNDING SOURCES

Contributors

This work was supervised by a dissertation committee consisting of Associate Professor Mack D. Burke (chair and advisor), Associate Professor Lisa Bowman-Perrott, and Professor Shana Hagan-Burke of the Department of Educational Psychology, and Clinical Professor Robin Rackley. of the Department of Teaching, Learning, and Culture. Two doctoral students from the Department of Educational Psychology, Xin Dong and Aaron Campbell, provided additional support for reliability.

All other work conducted for the dissertation was completed by the student independently.

Funding Sources

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

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

Overview

High-quality early childhood education has become a national priority, with an emphasis on providing professional development (PD) that ensures teachers have the knowledge and skills necessary to promote young children's development (Snyder et al., 2012). Research has shown that one-time professional development workshops are not sufficient to sustain a change in teacher practices and student learning (Yoon et al., 2007). Darling-Hammond and colleagues (2009) reported that only 59 percent of teachers found their PD opportunities useful. This is concerning, as a recent report found public school districts spend about $18,000 on PD for each teacher, each school year (Jacob & McGovern, 2015).

High-quality preschools can greatly impact a child's social and emotional development (Yoshikawa & Zigler, 2013). Children's social, emotional, and behavioral adjustment is critical for their chances to succeed in school, and yet often times the focus is placed on academic and literacy preparedness (Raver & Knitzer, 2002; Yates et al., 2008). It is necessary to provide early childhood educators with professional development that addresses and improves social, emotional and behavioral outcomes, especially since PD opportunities for this population of teachers are lacking in comparison to supports provided to K-12 teachers (Phillips et al. 2016).

In 2015, the No Child Left Behind Act was replaced with the Every Student Succeeds Act (ESSA), which introduced a new definition for the term professional development described as activities that are sustained (not stand alone, short term or 1 day workshops), intensive, collaborative, job-embedded, classroom focused, and data- driven (P.L. 114-95). As schools

and programs develop more effective professional development activities, it is necessary to evaluate the various approaches in which PD is provided to teachers, and what specific features of PD contribute to effectiveness (Kraft et al., 2018; Wayne, et al., 2008). Furthermore, PD that combined training and coaching has demonstrated to impact the implementation of evidence-based practices amongst early childhood teachers (Snyder et al., 2015).

The National Association ffor the Education of Young Children and the National Association of Child Care Resource & Referral Agencies ([NAEYC & NACCRRA], 2011) describe early childhood professional development as a continuum of learning and support activities that encompass education, training, and technical assistance to prepare individuals to work with young children. Coaching is a professional development approach that can support teachers in implementing new practices and improve classroom instruction. Unfortunately, the term "coaching" is often poorly defined in research, and the fidelity of implementation varies greatly across studies (Gupta & Daniels, 2012; Pianta et al., 2017). The goal of this two-part dissertation is to explore the coaching literature focused on improving targeted teacher practices that address social, emotional, and behavioral outcomes of young children (typically developing, at-risk, and those with disabilities) in preschool settings,

Research Objective for Study One

The purpose of the first study is to systematically review the literature to identify single-case design (SCD) research that examines coaching interventions focused on improving targeted teacher practices that address social, emotional, and behavioral outcomes of young children (typically developing, at-risk, and those with disabilities) in preschool settings, and evaluate the rigor and quality of the research literature by applying What Works Clearinghouse (WWC) Pilot Single-Case Design Standards (U.S. Department of Education, Institute of Education Sciences,

& What Works Clearinghouse, 2017). This literature review will describe the common components of coaching interventions implemented to address social, emotional, and behavioral outcomes, and discuss the descriptive characteristics related to participants, settings, targeted outcomes, delivery methods, dosage, intensity, and duration of the coaching sessions found in included studies. This study will seek to answer the following research questions:

RQ1: What are the components of coaching interventions being implemented in preschool settings to improve teacher practices aimed to improve the social, emotional, or behavioral outcomes in young children?

RQ2: What is the quality of single-case research design literature on implementing coaching interventions in preschool settings as evaluated by the What Works Clearinghouse (WWC) Standards?

Research Objective for Study Two

The purpose of this study is to conduct a meta-analysis of the single-case research literature that examines coaching interventions to improve teacher practices related to social, emotional, and behavioral outcomes for children (typically developing, at-risk, and those with disabilities) in preschool settings. Based on the single-case design studies that meet inclusion criteria, the goal will be to provide an estimate of the magnitude of effect coaching interventions have on improving teacher practices. Specifically, this study aims to answer the following research questions:

RQ1: What is the overall effect of coaching interventions on targeted teacher practices to improve social, emotional, or behavioral outcomes in preschool settings?

RQ2: Does coaching have differential effects based on the outcome targeted?

CHAPTER II

AN EXAMINATION OF THE QUALITY OF COACHING INTERVENTIONS ON TARGETED TEACHER PRACTICES TO IMPROVE SOCIAL, EMOTIONAL, AND BEHAVIORAL OUTCOMES IN PRESCHOOL SETTINGS

Introduction

With the passing of the Every Student Succeeds Act (ESSA) in 2015, the need to provide a more encompassing professional development for educators in the United States has grown, with an even greater interest on how to sustain these efforts. ESSA outlines a new definition for professional development, emphasizing it should no longer be considered as a short-term, 1-day, stand alone workshop, but rather activities which are sustained, collaborative, intensive, job-embedded, classroom focused, and data-driven. Professional development (PD) can provide teachers professional learning through education, training, and technical assistance, with the aim to improve mastery of content and teaching skills, while also influencing teacher practice and behaviors (Darling-Hammond et al., 2009; NAEYC & NACCRRA, 2011). Research has shown that one-time professional development workshops are not sufficient to sustain a change in teacher practices and student learning (Yoon et al., 2007), and therefore a more comprehensive, ongoing PD is necessary for long-lasting changes to occur. Coaching is a professional development approach that can support teachers in implementing new practices, however there is a lack of consensus on the definition of coaching and little evidence to support the use of specific coaching models in early childhood settings (Gupta & Daniels, 2012; Wilson et al., 2012).

In 1982, Joyce and Showers published “The Coaching of Teaching”, which introduced the theory of teacher coaching as a promising practice for educators in the classroom. In this

seminal article, Joyce and Showers compared teachers to athletes, emphasizing that both groups are more likely to adopt new skills if they are coached (Joyce & Showers, 1982). Interestingly enough, they note how athletes understand that mastery of a newly acquired skill does not occur immediately or with ease, unlike educators who often assume that skills can be mastered after a workshop or training (Joyce & Showers, 1982). Their early work produced some of the first empirical research that revealed the potential of coaching teachers to improve instructional practices in the classroom (Joyce & Showers, 1982; Showers, 1984, 1985), though it's use was not common in schools for most of the 1980's and 1990's (Kraft et al., 2017).

In an effort to better understand the mechanisms that drive professional learning, Joyce and Showers (2002) conducted an extensive study to examine what training components lead to better outcomes for teachers learning new skills, and their ability to transfer their learning into their instructional practice. Table 1 provides a summary of the professional development components and related outcomes. If presented simply with a lecture or presentation, teacher outcomes in relation to knowledge of content, skill implementation, and classroom application are poor, with only 5% reported to demonstrate their ability to implement the newly learned skill. Even with opportunities to practice the new skill, only 5% of teachers will be able to transfer their knowledge in to their classrooms (Joyce & Showers, 2002). When all training components are combined in conjunction with coaching with feedback, outcomes improved immensely

Table 1

Percentage of Teachers Transferring Learning into the Classroom

Professional development component	**Knowledge level** (Estimate % of participants understanding content)	**Skill attainment** (Estimate % of participants demonstrating proficiency in the instructional practices)	**Transfer to practice** (Estimate % of participants regularly implementing instructional practices in the classroom)
Theory and discussion (e.g. presenter explains what it is, why it's important, and how to teach it)	10%	5%	0%
Demonstration (e.g. presenter models practice)	30%	20%	0%
Practice (e.g. participant models practices during session)	60%	60%	5%
Coaching (e.g. participants receive ongoing support & guidance when they return to classroom)	95%	95%	95%

Note. Adapted from Joyce and Showers (2002).

with 95% of teachers transferring their knowledge and applying it in their classroom (Joyce & Showers, 2002). This landmark study also revealed that in order to extend practice into the classroom, teachers need about 20 instances to practice their new skill before mastery is attained. Coaching can greatly impact educators in the classroom, however the various components that are embedded within the coaching process have made it challenging to evaluate. More research is needed to determine what components of coaching are most effective, and determine who may benefit the most and in what context (Zaslow et al., 2010).

Defining Coaching

Coaching has grown as a common approach to support educators in developing or improving new skills, knowledge, and practices (Artman-Meeker et al., 2015; Rush & Shelden, 2011). Coaching is embedded within the larger encompassing professional development umbrella, and can be considered an approach when providing PD, training, and/or technical assistance to teachers. In past research training, coaching, consultation, and technical assistance have been used interchangeably in the literature (Zaslow et al., 2010). It is necessary to distinguish the differences, and understand how coaching relates to each of the terms. The NAEYC and NACCRRA (2011) published a glossary of terminology related to PD methods in order to create consistency in terms and definitions amongst the early childhood workforce (see Table 2). Coaching can be embedded in training, professional development, and technical assistance, thus the features and components of coaching and delivery methods are wide-ranging across studies.

Table 2

Adapted Summary of Terms from the Early Childhood Education and Professional Development Training and Technical Assistance Glossary

	Training	**Technical Assistance (TA)**	**Coaching**	**Consultation**
Focus	• Part of PD • Builds/enhances knowledge • Training sessions and programs can include: -Information dissemination -Comprehension of content -Application of knowledge/skills -Analysis of content	• Includes mentoring, coaching, consultation, PD advising, peer-to-peer • Supports a reflective process that professionals need to translate theories and knowledge through education and/or training into best practices • Embedded in a broader PD plan	• Focuses on a performance-based outcome • Supports the development of targeted skills and practices • Embedded in a broader PD plan which provides theoretical background knowledge to skills being addressed	• Resolution of a specific concern or set of concerns. • Capacity-building approach to facilitate the recipient's continued use of the process employed during or as a result of the consultation
Relationships	• Intentional building of positive relationships is beneficial • Can be delivered by an individual or a team to an individual or a group	• Relationship-based • Intentional building of positive relationships is beneficial • Can be delivered to individuals, a group, or teams	• Requires interactions that build trust and respect • Should be distinguished from a supervisory /evaluative process	• Requires a collaborative relationship between the consultant and the person to whom he/she provides recommendations. • Consultants may be engaged by the administrative leadership of a workplace • Consultancy may be arranged or directed by a regulatory or funding agency or organization

(continued)

Table 2 *Continued*

	Training	Technical Assistance (TA)	Coaching	Consultation
Process	• Planned and conducted based on standards • Defined learning outcomes • Follows adult learning principles including: -Interactive learning activities -Instructional aids (handouts, audiovisuals) -Evaluative component -Embedded in a broader PD plan	May include combinations of: • information and resource dissemination and referrals • coaching • mentoring • Consultation • professional development advising • peer-to-peer TA	• Starts with collaborative agreement between coach/coachee to create plan and set guidelines and goals • Includes combinations of questioning, listening, observation, reflection, feedback, prompting, modeling, and practice • Concludes when goal has been achieved	• Begins with joint goal setting • Supports the development of goal-related solutions and the implementation strategies recommended to achieve them. Recommendations may include the provisions of other relationship-based TA methods. • Concludes with a summary process and an evaluation of the effectiveness of the consultation provided
Duration	Can occur one time or in a series of sessions (training program=series of planned sessions)	Varies greatly, depending on needs, responses, and resources.	Varies, can occur one time, or a series of sessions, dependent on achieving set goals	Short-term (generally)
Delivery	• face-to-face • distance • technology-based • hybrid methods	• face-to-face • distance • technology-based • hybrid methods	• face-to-face • distance • technology-based • hybrid methods	• face-to-face • distance • technology-based • hybrid methods

Note. (NAEYC and NACCRRA, 2011).

Joyce and Showers (1982) began characterizing coaching as a cyclical model of observations and feedback in an ongoing instructional setting. Kretlow and Bartholomew (2010) describe coaching as an expert providing initial training followed by individualized support in order to ensure fidelity of implementation of new teaching behaviors and practices. Rush and Shelden (2011) define coaching as a learning strategy for adults where a coach promotes a learner's ability to reflect on their own actions in order to determine the effectiveness of a practice and develop course of action for refinement and use of the practice in immediate as well as future situations. For the purposes of this review, we use the definition provided by the NAEYC and NACCRRA (2011) as it encompasses coaching through an early childhood lens.

Coaching is defined as "a relationship-based process led by an expert with specialized early learning and adult learning knowledge and skills…designed to build capacity for specific professional dispositions, skills, and behaviors and is focused on goal-setting and achievement for an individual or group" (NAEYC & NACCRRA, 2011, p.11)

Coaching Components and Characteristics

In early childhood research, a wide array of coaching approaches and characteristics related to a practitioner's implementation of effective practices to improve child outcomes can be found across the literature (Barton et al., 2018). Classrooms implementing newly acquired skills have sustained the implementation of evidence-based practices when coaching is involved in the process (Neuman & Cunningham, 2009; Rudd et al.,2009). Studies have investigated coaching frameworks

such as practice-based coaching, a cyclical coaching model consisting of joint planning, focused observations, action/practice, reflection, and feedback, to improve teacher practices (Artman-Meeker et al., 2015; National Center on Quality Teaching and Learning [NCQTL] 2012; Rush & Shelden, 2011; Snyder et al.,2015). Some studies examining the effects of coaching provide an initial training or professional development prior to coaching sessions, in order to introduce program content or intervention, and to foster relationship building between the teachers and coaches (Fox et al., 2011; Hemmeter et al., 2015). Other studies have examined the impact of coaching individual practices to change teacher behavior. For example, Ottley and Hanline (2014) examined the impact of coaching via live performance feedback (bug in ear technology) on teachers' use of communication strategies. Other studies implemented coaching models which combine several characteristics to help teachers improve practices that address language and literacy in their classrooms. For example, Diamond and Powell (2011) examined iterative coaching approaches to improve teacher's language and literacy instruction, which included joint planning sessions between the teacher and coach, video modeling, self-reflection, and performance feedback. Given that coaching can be time intensive, identifying common characteristics across the literature base that focus on improving teacher practices that impact children's social and emotional outcomes can be beneficial to coaches and teachers alike.

Traditional methods of coaching are generally performed by experts (Artman-Meeker et al. 2015; Diamond & Powell 2011; Showers & Joyce 1996; Snyder et al., 2012), although studies have explored the effects of peer coaching (Johnson et al.,2017)

and self-coaching/self-monitoring (Bishop et al., 2015). There is also a growing interest in alternative delivery methods other than face to face coaching, such as distance coaching via email (McLeod et al., 2018), and even using video technology (Bishop et al., 2015).

Social, Emotional, and Behavioral Outcomes

The Center on the Social Emotional Foundations for Early Learning (CSEFEL) describes social emotional competence as the developing capacity for young children, birth through 5 years old, to build close relationships with both adults and their peers; the ability to experience, self-regulate and express their own emotions in socially acceptable and culturally appropriate ways; and the ability to explore and learn from their environment within the context of their family and culture (Yates et al., 2008). Some of these key social and emotional skills necessary for young children to be prepared for school include the ability to persist on challenging tasks, the ability to listen to instructions, the ability to problem solve, the ability to build self-confidence, and the capacity to create positive relationships with both peers and adults (Hemmeter, Ostrosky, et al., 2006; Shonkoff & Phillips, 2000). The development of these skills are crucial for a child's overall well being (Damon et al., 2006; Fabes et al., 2006; Halle et al., 2014).

When children lack these social emotional skills, they often engage in challenging behaviors. Some of the most common challenging behaviors include aggression, defiance, noncompliance, tantrums, and destruction of property (Strain & Timm, 2001). Teachers have described the need for additional training to address and manage challenging behaviors in their classrooms as a priority (Yoshikawa & Zigler

2000). Teachers reported that addressing challenging behaviors is their first area in need of training, followed by promoting social and emotional development (Fox & Smith, 2007). Research also shows that persistent challenging behaviors in early childhood directly relate to later problems in school success, social relationships, educational and vocational success, and social adjustment (Campbell, 1995; Campbell & Ewing, 1990; Fox & Smith, 2007). A promising approach emerging in the early childhood literature that addresses these concerns is the Pyramid model, a multi-tiered system of support to promote the social and emotional competence in young children and prevent challenging behaviors (Fox et al., 2003; Hemmeter, Ostrosky et al., 2006). The pyramid model consists of universal strategies that support building nurturing and responsive relationships and high quality environments for all children, secondary supports that target social and emotional skills for children at risk for problem behaviors, and tertiary supports which focus on individual, intensive interventions for children with persistent challenging behaviors (Hemmeter, Ostrosky et al., 2006; Fox et al., 2011).

Previous Literature Reviews

There are several recent literature reviews related to coaching in early childhood settings. Snyder et al. (2012) conducted a systematic review to identify the key components of early childhood professional development (PD) components. The study reported 9 categories of professional development found in the literature: inservice, staff development, preservice, in situ consultation/coaching, web training, induction/mentoring, providing materials only, shared inquiry, and other type of PD. Of the 256 studies included, 15.6% of the studies used coaching or in-situ consultation as

the primary form of professional development, but 51.6% used coaching with performance feedback as a systematic follow up to the initial PD provided.

Second, Kretlow and Bartholomew (2010) conducted a review of literature to identify the impact of coaching interventions on pre-service and in-service teachers' implementation of evidence-based practices (EBPs). Of the 13 studies included in their review, all of the studies provided strong evidence that coaching improved teacher's fidelity of implementation of EBPs. Supervisory coaching and side-by-side coaching were the primary coaching methods implemented across the included studies. Supervisory coaching was largely defined as a coach providing nonevaluative, descriptive feedback to a teacher after a focused observation occurred, followed by discussion of the teacher's strengths and opportunities for improvement. Side by side coaching occurs during the observation, and can allow for the teacher to observe the coach demonstrate specific practices in the context of their own classroom. Eight of the studies (Filcheck, et al., 2004; Hasbrouck, 1997; Kohler et al., 1997; 1999; Kretlow et al., 2009; Maheady et al., 2004; Miller et al., 1991; Morgan et al., 1994) used a coaching model that consisted of in-service training or professional development, followed by individual coaching sessions. Five of the studies (Kohler et al., 1999; Lignauris-Kraft & Marchand-Martell, 1993; Peck et al., 1989; Pierce & Miller, 1994) began by observing teacher's in their classrooms, followed by coaching sessions. The intent of the coaching interventions varied from improving the accuracy of targeted instructional skills specific to EBPs being implemented (e.g., reinforcements related to Positive Behavior Supports, signaling in Direct Instruction) to improving instructional design variables, like

prompting or modeling. Most of these studies took place in elementary schools, with only 2 conducted in a secondary setting. Based on their findings from the review, Kretlow & Bartholomew proposed adding a coaching component to in-service and pre-service teacher trainings to promote high fidelity of implementation of EBPs in the classroom.

Artman-Meeker et al. (2015) conducted a review to analyze the literature on coaching strategies in early childhood settings. They examined types of coaching strategies used to improve teachers' use of intervention practices, the coaching components currently being implemented in the literature, the preparation provided to the coaches in each study, and the rigor and quality of the research. Artman-Meeker et al. (2015) aggregated the coaching strategies across the 49 included studies into 5 main categories that encompassed a more comprehensive coaching model, which included a focus on partnerships and collaboration, developing an action planning, conducting focused observations, providing feedback and promoting self-reflection, and action in the work setting. Most notably, this study found that performance feedback was the coaching practice most often implemented in early childhood settings, however how it was delivered varied across studies (e.g. checklists, email, face to face, videos). Seventeen of the 49 studies utilized a single-case research design, of which only 4 were classified as *Meets Standards* according to the What Works Clearinghouse SCD standards (Casey & McWilliam, 2011; Fox et al., 2011; Ingvarsson & Hanley, 2006; Peck et al., 1989). These 4 studies also were found to have *strong evidence* of demonstrating a functional relation between coaching and teacher behaviors.

Fallon and colleagues (2015) conducted a systematic literature review and evaluation to determine if performance feedback to support teacher's use of school-based practices is considered an evidence-based practice. Their findings show that performance feedback is the first coaching strategy that meets the What Works Clearinghouse (WWC) research design standards and evidence criteria (Kratochwill et al., 2010). Although all of these literature reviews have contributed to the early childhood professional development literature, none have exclusively evaluated SCD studies and evaluated the rigor of their designs and evidence.

Single-Case Research

The purpose of the first study is to systematically review the literature to identify single- case research studies that examine coaching interventions in preschool settings that focus on improving social, emotional, and behavioral outcomes for children, and evaluate the quality of the studies by applying the U.S. Department of Education, Institute of Education Sciences, WWC (2017) Standards 4.0 for single-case designs. SCDs, also referred to as single-case research designs, single-subject designs, and single-case experimental designs, are a rigorous scientific methodology that uses an interrupted time-series design to evaluate the effects of an intervention (Horner et al., 2005; Kratchowill et al., 2010; Shadish et al., 2015). In SCD research, each participant or subject serves as his or her own control, and involves a repeated, systematic measurement of an outcome measure before, during, and after the implementation of an intervention (Horner et al., 2005; Kratochwill et al., 2013). One of the main goals of single case research designs are to establish a causal inference following the introduction

of the intervention, which can be achieved through various forms of replication within a study (Kratochwill et al., 2013).

Single-case research design studies have become more prevalent in applied research, specifically in the behavioral sciences and special education, to establish an empirical basis for evidence-based practices and interventions (Horner et al. 2005; Ledford & Gast, 2018). Studies that implement a single-case research designs can provide an experimental evaluation of intervention effects, and aim to answer the basic underlying question, "Which intervention is effective for this case/these cases?" (Kratchowill et al., 2010). Although previous literature reviews have investigated coaching strategies implemented in early childhood settings, none have examined single-case research design intervention studies exclusively.

Establishing Evidence-Based Practices Through SCD Research

Over the last decade, an emphasis on accountability in education has led to federal legislation mandating the implementation of evidence-based practices (EBPs) in regards to academic and behavioral interventions (ESSA, 2015; Fallon et al., 2015; Mechling et al., 2018; Hitchcock et al, 2015; Individuals with Disabilities Education Act, 2006). An EBP refers intervention procedures that have been scientifically validated as being effective for changing specific behaviors, for particular participants, under certain conditions (Mechling et al., 2018; Simeonson et al., 2008). In order to deem an intervention as an EBP, agencies have developed guidelines to review, evaluate, and identify effective practices. For example, the Institute of Education Sciences (IES) developed guidelines to evaluate practices, and established the What Works

Clearinghouse (WWC) to disseminate findings to educators, researchers, and other stakeholders (WWC; http://ies.ed.gov/ncee/wwc).

In 2009, the What Works Clearinghouse (WWC) assembled a group of experts to review the scientific evidence and establish standards for disciplines implementing single-case research designs (Kratochwill et al., 2010). This panel created a handbook using the single-case design quality indicators proposed by Horner et al. (2005), and developed design and evidence standards to determine if empirical evidence exists to identify a practice or intervention as evidence-based (Kratochwill et al., 2010). The most recent version of the *What Works Clearinghouse Procedures and Standards Handbook* (version 4.0), provides a detailed description of the criteria, and is intended to guide researchers in identifying and evaluating single-case research designs (U.S. Department of Education, Institute of Education Sciences, & What Works Clearinghouse, 2017). This review focuses on single-case research design literature that examines coaching interventions implemented in preschool settings, and aims to evaluate the quality of research using the WWC standards to identify effective coaching models that provide empirical support to be considered an EBP.

Purpose and Research questions

The purpose of this study is to conduct a systematic review of the literature that examines coaching interventions implemented in preschool settings. Specifically, this study seeks to find out:

1. What are the descriptive characteristics of each study?
    a. Participant and setting

b. Coaching components of intervention

c. Coaching dosage

d. Outcome Characteristics

2. What are the components of coaching interventions being implemented to improve the social, emotional, and behavioral outcomes of young children in preschool settings?

3. What is the quality of the studies as evaluated by the WWC standards?

4. What is the evidence of coaching effects from visual analysis?

5. What coaching interventions qualify an EBP classification based on the WWC standards?

Method

Search Procedures

A systematic review of literature was conducted to identify single-case design studies that examined the effects of early childhood coaching interventions implemented in preschool settings. Studies included in the review were identified using a three step process☹a) an initial search of key terms in relevant electronic databases, (b) a title and abstract screening of initial search results, (c) ancestral search of included studies.

Initial Search

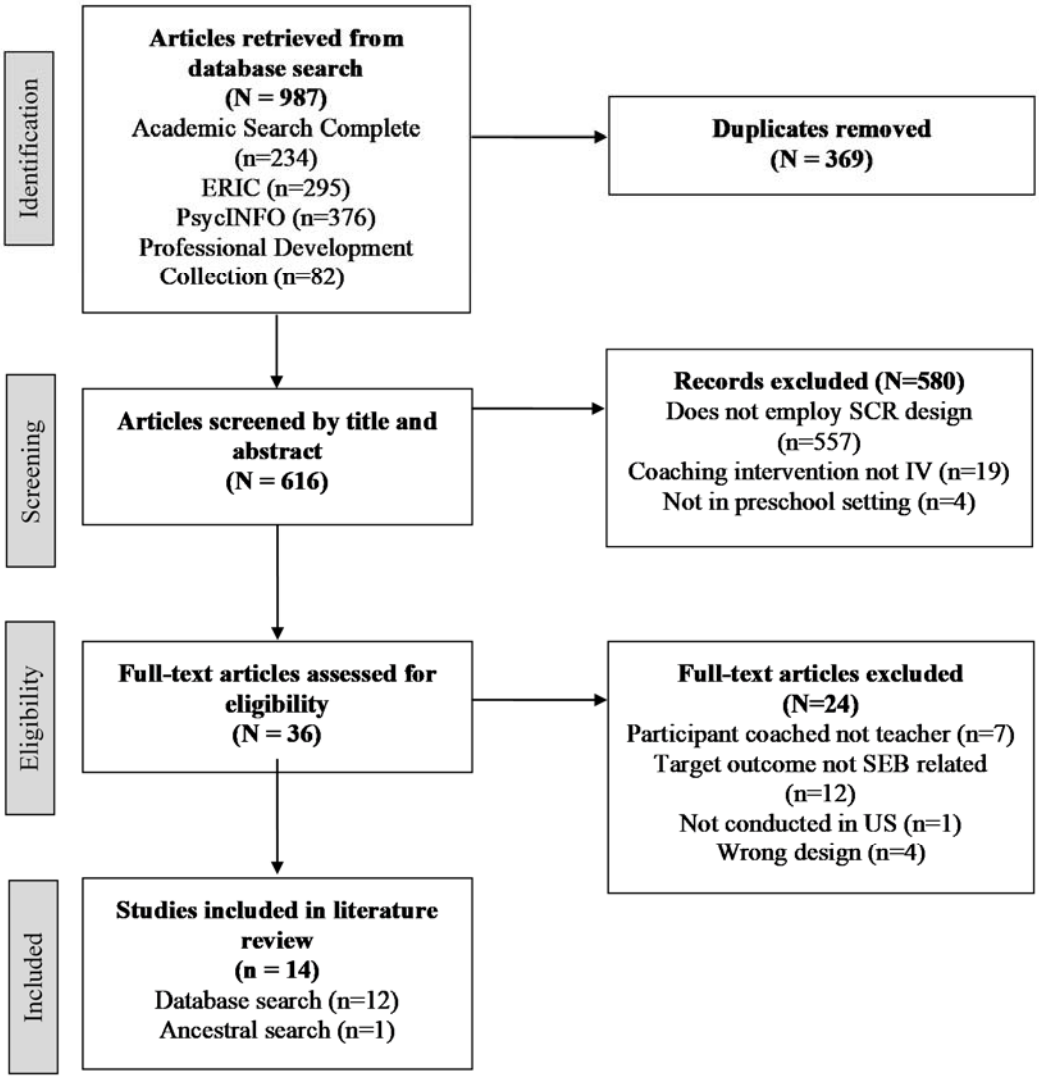
A string of key terms related to professional development and coaching in early childhood settings were entered into the following electronic databases: (a) Academic Search Ultimate, (b) Education Resources Information Center (ERIC), (c) PsycINFO, and (d) Professional Development Collection. The searches were conducted in

September of 2019, and limited to include peer-reviewed studies in English. The first string included the following terms: *coaching, coaching interventions, coaching models, coaching and training, coaching performance, professional development.* These terms were joined with the Boolean operator *OR.* The second search string included the following terms, also joined with the Boolean operator OR: *early childhood, preschool, young children, toddlers,* and *pre-kindergarten.* The third search string included combinations of the following terms: *social and emotional development, social and emotional competence, behavior, challenging behavior, problem behavior, social* and *emotional learning.* All three strings were then combined with Boolean operator AND to identify the initial pool of articles. A total of 987 studies were identified across all four databases. Duplicates were removed, resulting in a total of 618 articles to be reviewed.

Inclusion Criteria

For inclusion in the review, studies had to adhere to the following criteria: (a) published in a peer-reviewed, English language journal, (b) employ a single-case design (e.g. alternating treatment, multiple baseline, reversal) (c) include a coaching intervention as the primary independent variable (d) participant being coached is a teacher, teacher assistant, pre-service teacher (not parent), € take place in an early childhood preschool setting (e.g., preschool, head start, day care), (f) be conducted in the USA. Meta-analyses and literature reviews were excluded. Qualitative Studies (interviews, non-experimental) and descriptive studies were also excluded from this review. Of the studies found using initial search procedures, 618 were reviewed by title and abstract excluded for not meeting the inclusion criteria for this review. Given that

one article included two studies, a total of 14 studies were included in this literature review. Figure 1 provides a diagram of the search process and results.



Note. PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

Figure 1. PRISMA flowchart of the search procedures.

Descriptive Coding Procedures

Data was systematically extracted and recorded to summarize characteristics and features of all included studies. The descriptive characteristics are summarized across four categories: (a) participant and setting characteristics (b) coach characteristics, (c) intervention components, and (d) outcome characteristics.

Participant and setting characteristics. Items related to participant characteristics included: (a) teacher experience, (b) teacher age, (c) teacher's educational background, (d) teacher ethnicity, and € teacher gender. Items coded for the setting of the study included (a)preschool classroom, (b) university-based preschool, (c) head start classroom, (d) day care/child care center.

Coach characteristics. Characteristics of the coach were also extracted from the studies that met inclusion criteria. The following are items coded to describe the coach: (a) number of coaches, (b) coaching experience, and (c) coach title (e.g. graduate/doctoral student, researcher, faculty member, therapist).

Intervention components. Fifteen items were coded to describe the components featured in the coaching interventions. These items included: (a) didactic training prior to coaching, (b) use of manual/script, (c) video clips (d) joint planning € goal setting (f) observations (g) in-vivo support/prompting, (h) modeling, (i) opportunities to practice, (j) role play, (k) performance based feedback, (l) sharing data (checklists), (m) sharing graphs, (n) reflection, and (o) coaching booster sessions. Nine additional intervention characteristics related to coaching dosage were also extracted including: (a) partnership established prior to coaching, (b) observation format (e.g., in person, video), (c)

observation duration, (d) time of coaching (before observation, during observation, after observation), € delivery of coaching (face to face, distance) (f) coaching duration (number of coaching sessions), (g) coaching dosage (how often coaching occurs), (h) coaching intensity (total minutes of coaching), and (i) procedural fidelity for coaching process.

Outcome characteristics. The following items were coded for characteristics of the outcome(s) of studies included in the review: (a) measurement of outcome variables (dependent variables), (b) study reported results of teacher outcomes (positive, neutral/mixed, negative), (c) data recording procedure, and (d) student outcomes.

WWC Coding Procedures

In order to determine if coaching interventions provide sufficient empirical support to be recommended as an EBP in early childhood settings, a two-part evaluation process was applied to studies meeting inclusion criteria. First, studies were evaluated at the case level using the design standards developed by WWC Single-Case Design Standards (U.S. Department of Education, Institute of Education Sciences, & What Works Clearinghouse, 2017). The WWC Standards Handbook (version 4.0) provides the design standards which address the following aspects of the methodological quality of a study: (a) the independent variable must be systematically manipulated, (b) the dependent variable is measured repeatedly over time, (c) interobserver agreement (IOA) is reported for each dependent measure for at least 20% of the sessions (preferably for 20% of each condition), (d) the reported IOA agreement in the study must meet the minimum threshold (greater or equal to 80%, or at least 0.60 with a kappa index), € the

study provides at least three attempts to demonstrate the effects of the intervention at three different points in time, (f) the study provides sufficient data points per phase to qualify as reliably demonstrating an effect. The studies were coded using a dichotomous scale as present (yes) or not present (no). The presence of the following additional criteria was evaluated for multiple-probe and multiple-baseline designs as guided by the WWC Single-Case Design Standards (U.S. Department of Education, Institute of Education Sciences, & What Works Clearinghouse, 2017): (a) baseline data provided before introduction of intervention phase (overlapping baselines) (b) the number of consecutive probe points before intervention phase, and (c) data points were collected in subsequent levels when the previous level began intervention phase. After each of the cases were appraised using the WWC Single-Case Design Standards, and overall design quality rating was assigned. Each case was rated on a three-point scale: (a) *meets standards without reservations=2*, (b) *meets standards with reservations=1*, or (c) *does not meet standards=0.* Multiple baseline designs (MBL) needed to consist of five data points per phase to meet standards without reservations. If MBL consisted of three data points in each condition, it was rated as meeting standards with reservations, and if a case had less than 2 data points per condition, it would not meet standards.

Next, individual cases within each study, which met the standards with or without reservations, were evaluated using visual analysis to determine effectiveness. Each case is evaluated within and between each phase, using the traditional features used to assess the effects of single-case research designs: (a) level, (b) trend, (c) variability, (d) immediacy of effect, € overlap, and (f) consistency of data in a similar phase. Based

on the visual analysis, studies were classified as providing *Strong Evidence, Moderate Evidence,* or *No Evidence*, of demonstrating a causal relationship between the intervention and the outcome.

Using the WWC recommendations, a coaching intervention was deemed as an EBP if the findings adhered to the "5-3-20" rule (Kratochwill et al., 2010), which means there were at least 5 different studies conducted by three research teams, and included no less than 20 individual cases indicating evidence of effectiveness.

Reliability

Reliability was conducted for the initial inclusion process, the screening process, as well as the WWC coding process. A second evaluator (doctoral student) who was familiar with conducting systematic literature reviews replicated the initial search using procedures provided in the methods section. Training was provided for the second evaluator on the inclusion criteria and screening process. 125 studies were screened for inclusion reliability. For each article, inter-rater agreement was calculated by dividing the number of agreements but the number of agreements plus disagreements between both raters, and multiplying by 100%. There was 96% agreement between both raters. Disagreements regarding the inclusion of a study were discussed by both raters until they came to an agreement. The final agreement for inclusion of studies reached 100%.

Four of the included studies were selected randomly and coded for reliability for the WWC design and evidence standards. One doctoral student received training on how to code for WWC standards. Reliability was calculated by dividing the number of agreements by the total number of agreements and disagreements. Reliability was 96%

agreement for WWC design standards, and 91% for WWC evidence standards. If disagreements arose, they were resolved through discussion between the first author and doctoral students until agreement was reached.

Results

Study, Participant, and Setting Characteristics

The purpose of the first research question is to provide descriptive characteristics of the included studies. A total of 56 participants were included across the 14 studies. Table 3 provides an overview of the study features. Over half of the studies were published in the last decade (n=10). About 20% of the studies were published in the journal Topics in Early Childhood Special Education (n=3). The only other journals publishing multiple studies were Teacher Education and Special Education (n=2) and the Journal of Early Intervention (n=2). The 14 studies were conducted across 5 different research teams. The most commonly used study design was the multiple probe (MP) across participants (n=6; 42.8%). Other study designs included multiple baseline (MBL) across participants (n=3; 21.4%) and behaviors (n=3; 21.4%), a nonconcurrent multi-component MBL across participants (n=1; 7%), and an ABA design (n=1; 7%).

Table 3

Overview of Study Features

SID	Study	Design	# of participants (n)	Gender (m/f)	# of cases (k)	Participant Role	Setting	# of Coaches	Coaching Experience	Coach Title
1	Barton et al. (2013) study 1	MBL x participants	5	(0,5)	15	PT	UBC	4	NS	GRAD
2	Barton et al. (2013) study 2	MBL x participants	4	(3,1)	12	PT	UBC	4	NS	GRAD
3	Barton et al. (2016)	MBL x behaviors	3	(0,3)	9	PT	UBC	1	NS	GRAD
4	Barton et al., (2018)	MBL x behaviors	3	(0,3)	9	PT	UBC	1	NS	PHD
5	Brock & Beaman-Diglia, (2018)	MBL x behaviors	1	(0,2)	3	T	PRE	1	YES	PHD
6	Chazin et al., (2018)	MP x participants	4	(0,4)	4	AT, T, SI	UBC	1	NS	GRAD
7	Fox et al., (2011)	MP x participants	3	(0,3)	3	T	PRE	1	YES	TA
8	Hemmeter et al., (2011)	MP x participants	4	(0,4)	8	T	PRE	NS	NS	NS

(continued)

Table 3 *Continued*

SID	Study	Design	# of participants (n)	Gender (m/f)	# of cases (k)	Participant Role	Setting	# of Coaches	Coaching Experience	Coach Title
9	Hemmeter et al., (2015)	MP x participants	3	(0,3)	9	T	HS & DC	NS	NS	GRAD
10	Hendrickson et al., (1993)	MBL x participants	3	(0,3)	3	T	DC	1*	YES	PEER
11	Kohler et al., (1995)	ABA	5	(0,4)	6	T, PARA	PRE	NS	NO	PEER
12	Ledford et al., (2011)	MP x participants	3	(0,3)	3	PARA	PRE	2	YES	GRAD
13	Lyon et al., (2009)	nonconcurrent MC-MBL x participants	12	(0,12)	8	T	DC	3	NS	GRAD, CP
14	Tschantz & Vail, (2000)	MP x participants	3	(0,3)	3	T, AT	HS	1*	NO	PEER

Note. AT= assistant teacher, CP= Clinical Psychologist, DC= day care/child care program, GRAD= doctoral/graduate student, HS= Head Start, MBL= multiple baselines, MC= multi-component, MP= Multiple Probe, NS=Not Specified, PARA=paraprofessional/aide, PRE= Preschool, PT=preservice teacher, SI=Student Intern, SID= Study ID Number; T=teacher, TA=Technical Assistance Provider, UBC=university based classroom, *=indicates one coach trained peer coaches

Table 4 provides a summary of participant and study characteristics. The majority of the participants were female (n=53), and almost half were Caucasian (n=26). Roles of the participants included teachers (n=33), assistant teachers (n=5), preservice teachers (n=11), paraprofessionals/aides (n=5), and student interns (n=1). Teacher experience ranged from 0 to 34 years (12 of the 14 studies reported experience; Lyon et al., 2009; Ledford et al., 2017 reported means and ranges), with 18% of the participants having less than a year experience (n=10) and 29% between 1 and 5 years experience (n=16). Teacher ages ranged from 22 to 60 (9 studies reported age; 64%) and had earned high school diplomas through master's degrees (13 studies reported educational background; 93%). Six studies did not specify if participant's obtained a teacher's certification (47%), and 3 studies reported that teaching certifications were in progress at the time of the study (21%). Only 13% of participants across included studies held a teaching certificate (n=7).

Most of the studies took place in a university-based preschool classrooms (n=20; 41.7%) and preschools (n=14; 29.2%), but also included Head Start programs (n=6; 12.5%) and day care centers (n=8; 16.7%). The ages of children in the classrooms ranged from 18 months to 5 years old, with 64% of the studies taking place in classes with 3 to 5 year olds (n=9). All of the settings reported to take place in inclusive classrooms.

Table 4

Summary of Participant and Study Characteristics

	N	%
Gender		
Male	3	5
Female	53	95
Race		
African American	11	20
Asian	4	7
Caucasian	26	46
Hispanic	4	7
Not Specified	11	20
Teacher Role		
Teacher	33	59
Teacher Assistant	5	9
Paraprofessional	5	9
Preservice Teacher	12	21
Student Intern	1	2
Teacher Age		
20 to 30	17	30
31 to 40	12	21
41 to 50	2	4
Over 50	2	4
Not Reported	23	41
Teacher Experience		
1 year or less	10	18
1 to 5 years	16	29
6 to 10	8	14
More than 10	7	13
Not Specified (range provided)	15	27
Teacher Education		
High school diploma	4	7
Some College	6	11
Associate Degree	7	13
Bachelor's Degree	14	25
Master's Degree	8	14
Pursuing graduate and teaching certification	12	21
Not Specified	5	9

(continued)

Table 4 *Continued*

	N	%
Setting		
Day Care	3*	21
Head Start	2*	14
Preschool	5*	36
University-based school	5*	36
Student Ages in Setting		
18 to 24 months	1	2
2 to 3 years	4	8
2 to 4 years	7	15
3 to 4 years	2	4
3 to 5 years	28	58
Not Specified	6	13
Intervention Target		
Social Skills	2*	14
Social and Emotional	7*	50
Challenging Behaviors	2*	14
Social, Emotional, and Challenging Behaviors	3*	21
Coach Title		
Clinical Psychologist	1	6
Faculty	3	19
Graduate/Doctoral Student	10	63
Technical Assistance Provider	2	13
Coaching Experience		
Yes	5	
No	1	
Not Specified	15	
Experimental Design		
MBL x participants	3*	21
MBL x behaviors	3*	21
MP x participants	6*	43
ABA	1*	7
Nonconcurrent MBL x participants	1*	7

Note. N=number of participants; * refers to number of studies.

Coach Characteristics

There were a total of 16 coaches across 11 studies, as 3 studies did not specify how many coaches were used. Coaching was mostly conducted by experts, including graduate/doctoral students (n=10), faculty members in higher education (n=3), technical assistance providers (n=2), and a clinical psychologist (n=1). Three of the studies investigated the use of peer coaching, where a coach trained teachers to coach each other. More than half of the studies did not specify if coaches had experience in coaching teachers (n=8; 57%), but 64% did report that coaches had experience in early childhood settings (n=9). Less than a third of studies reported the coach having any coaching experience (n=4; 29%).

Half of the studies did not report providing the coaches with any training prior to the coaching sessions beginning (n=7, 50%). Four studies did provide training to coaches on coaching techniques (29%), and 3 studies used an email protocol to coach participants. Coaching implementation fidelity was collected for 79% of the included studies (n=11).

Coaching Components

The second research question focused on identifying components of the coaching interventions implemented to improve the social, emotional, and behavioral outcomes of young children in preschool settings. Table 5 provides a summary of the 15 coaching components implemented across studies. All of the included studies conducted focused observations, and provided performance feedback as part of the coaching process. Focused observations are defined as an agreed upon time between the coach and coachee

where the targeted behaviors will be practiced and observed. Study 1 and Study 2 from Barton et al. (2013) used the same nine components (didactic training, use of intervention manual, video clips, focused observations, in-vivo support/prompting, action/practice, role playing, performance based feedback, and sharing data) as their coaching intervention. Kohler et al. (1995) and Hendrickson et al. (1993) used the same six components in their coaching intervention process (joint planning, goal setting, focused observations, performance based feedback, sharing data, and opportunities for reflection).

The majority of the studies conducted training prior to any coaching sessions (79%; n=11). Of those, 72% reported using didactic training ranging from 30 min to a total of 18 hours (n=8). Intervention manuals were provided in 29% of the included studies (n=4). Over half of the studies used joint planning (n=9, 64%), goal setting (n=8; 57%), in-vivo support/prompting (n=7, 50%), modeling (n=8, 57%), and provided opportunities to practice (n=7; 50%). Half of the studies shared data (forms/checklists) with the participants to inform their progress (n=7, 50%), and two studies shared graphs (14%). Other components found included video clips (n=5; 36%), role-playing (n=4; 29%), and reflection activities/exercises (n=5; 36%). Coaching 'booster sessions' were only used in two studies (14%). Four studies implemented 6 coaching components (29%), and the average number of coaching components used across studies was 7 (range = 4 to 14).

Table 5

Summary of Coaching Components Included Within and Across Studies

Coaching Components Incorporated Within and Across Studies	Didactic Training	Intervention Manual	Video Clips	Joint Planning	Goal Setting	Observations	In Vivo Support/	Modeling	Action/ Practice	Role Play	Performance Feedback	Sharing Data	Sharing Graphs	Reflection	Booster Sessions	Total Components
Barton et al. 2013 study 1	√	√	√			√	√		√	√	√	√				9
Barton et al. 2013 study 2	√	√	√			√	√		√	√	√	√				9
Barton et al. 2016				√		√					√	√				4
Barton et al., 2018				√*	√*	√					√					4
Brock & Beaman- Diglia, 2018						√		√		√	√		√			5
Chazin et al., 2018	√					√	√	√	√		√					6
Fox et al., 2011	√	√	√	√	√	√	√	√	√		√			√		11
Hemmeter et al., 2015	√	√	√	√	√	√	√	√	√		√	√	√	√	√	14
Hemmeter et al., 2011	√		√	√		√		√			√				√	7
Hendrickson et al., 1993				√	√	√					√	√		√		6
Kohler et al.1995				√	√	√					√	√		√		6
Ledford et al., 2011	√				√	√	√	√	√		√			√		8
Lyon et al., 2009	√			√	√	√	√	√	√	√	√					9
Tschantz & Vail, 2000				√	√	√		√			√	√				6
Percentage of Studies	57	29	36	64	57	100	50	57	50	29	100	50	14	36	14	

Note. * indicates component was used for only one participant due to lack of change in teacher behavior.

Coaching Duration, Dosage, and Intensity

A summary of the coaching process characteristics is provided in Table 6. It includes if efforts were made by the coach to establish a relationship with the coachee prior to the intervention occurring, the observation format, duration of the observation, the timing of when coaching took place, the coaching delivery method, the duration of coaching (total time of coaching), the coaching dosage (how many coaching sessions took place), the coaching intensity (how often coaching occurred), and if procedural fidelity of the coaching process was reported. Five studies reported attempts to establish a relationship between the coach and coachee before the intervention began (36%). Before coaching sessions occurred, observations were conducted. Twelve studies conducted observations in person (86%), one study reviewed video recordings of the participant, and one study used both. Coaching occurred before (n=1; 7%), during (n=3; 21%), and immediately after (n=2; 14%) observations. The second research question focused on identifying components. Four studies reported coaching took place the day of the observation (29%), and one study reported coaching took place within 24 hours of the observation (7%). Coaching took place both during and after observations for 2 studies (14%).

Table 6

Summary of Coaching Duration and Dosage

	Established Relationship	Observation Format	Observation Duration	Time of Coaching	Delivery	Duration (# of sessions per teacher)	Dosage	Intensity (how often coaching sessions occurred)	Procedural Fidelity
Barton et al. 2013 study 1	NS	IP, video	5 min	Immediately after session	Face to face	6,7, 4, 3, 4	NS over 5 weeks	NS	Y
Barton et al. 2013 study 2	NS	IP	5 min	5 times during session,	Face to face	9,10,6,5	NS over 5 weeks	Provided PF at least 5 times during coaching session	Y
Barton et al. 2016	Y	IP	20 min initial, 15 min.	Evening of observation	Distance (Email)	Range 25-42 emails	3-5 per week over summer session	Range 25-42 emails	Y
Barton et al., 2018	Y	IP,C	20 min initial, 15	Evening of observation	Distance (email) (1 participant required Face to face)	Range 26-44	3-5 per week	Range 26-44 emails	Y
Brock & Beaman-Diglia, 2018	NS	IP	30 min initial, 15	NS	Face to face	10	3-4 times per week for 6 weeks	1.5 hrs.	N
Chazin et al., 2018	NS	IP	15 min	During observation	Face to face	Range 9-15 sessions	Daily	2.25 hrs. – 3.75 hours	Y
Fox et al., 2011	NS	IP	30-90 min	30 min debriefing day of observation	Face to face	Until criterion met (range 8-14 sessions)	2 times/ week	4-hrs.	Y

(continued)

Table 6 *Continued*

	Established Relationship	Observation Format	Observation Duration	Time of Coaching	Delivery	Duration (# of sessions per teacher)	Dosage	Intensity (how often coaching sessions occurred)	Procedural Fidelity
Hemmeter et al., 2015	Y	IP,A	45-120min	During observation, and debriefing session	Face to face with email	Range 8-13 per practice until criterion met	2-3 times per week	26 live, 10 emails; 16 live, 8 emails; 21 live 9 emails	Y
Hemmeter et al., 2011	Y	IP	~14 min	W/in 24 hours of observation	Distance (email)	~8 (range 5-10)	2-3 times per week	7 sessions-3 weeks; 5 sessions, 1.5 weeks; 8 sessions, 2.5 weeks; 10 sessions	Y
Hendrickson et al., 1993	N	IP	10 min	Before observation	Face to face	~13 (range 9-19)	2-3 times per week	3.5-5.8 hrs.	Y
Kohler et al.1995	N	IP	8-11 min	After observation	Face to face	5 to 6	2-3 times per week	1.7-3 hrs.	Y

(continued)

Table 6 *Continued*

	Established Relationship	Observation Format	Observation Duration	Time of Coaching	Delivery	Duration (# of sessions per teacher)	Dosage	Intensity (how often coaching sessions occurred)	Procedural Fidelity
Ledford et al., 2011	NS	IP	5 min	During and after observation	Face to face	4 to 6	NS	~8 min per session (range 48-66 min); prompts every min during observation; >15 min for all components; (25-30 min in situ; >1 hr post observation)	Y
Lyon et al., 2009	NS	IP	~30 min	During observation	Face to face	4 to 9	1-3 times per week for 11-13 weeks	20 min/session	N
Tschantz & Vail, 2000	Y	IP	15-25 min	After school day of observations	Face to face	4 to 5	2 times/ week	35-45 min/session; 2.3 hrs.-3.75 hrs.	Y

Note. ~ denotes average. A=alternate, C= covert, IP= In person, N= No, NS= not specified, Y= Yes

Coaching Delivery

Table 7 provides an overview of the coaching delivery methods across the included studies. More than half of the studies conducted coaching session in person (n=11; 73%), one study coached via email (7%), and 3 studies incorporated both onsite coaching with email feedback (20%). The time of delivery when coaching occurred varied across studies. In three studies, coaching occurred during the observation period (21%), two studies reported coaching occurring both during and after the observation period (14%), and six studies reported the coaching sessions took place at least within 24 hours of the observation (43%). One study did not specify when coaching took place (7%). An expert coach delivered the coaching interventions for the majority of the studies (n=11; 79%). Two studies used peer coaching (14%), and one study combined peer and self-coaching to implement the intervention.

Outcome Characteristics

Table 8 provides a summary of the dependent variable and outcome characteristics. All of the studies aimed to increase the use of targeted practices among the participants. Over half of the interventions focused on targeted practices that promoted social and/or emotional development in young children (n=9; 64%). Two of the studies' interventions addressed challenging behaviors in children, and included the increased implementation of behavior support plans (14%). Three of the studies included interventions that addressed social, emotional, and behavioral outcomes (e.g. teachers' implementation of the Teaching Pyramid Model to promote social emotional development and decrease challenging behaviors; 21%). In six studies, participants self-

selected the target behaviors to be used during the intervention (43%), and two studies the participants were able to select the activity in which the intervention was to take place (14%). Almost half of the studies reported child outcomes in addition to teacher outcomes (43%).

Table 7

Summary of Coaching Delivery

	n	%
Delivery		
Onsite/ face to face	11	73
Email	1	7
Both	3	20
Time of Delivery		
Before observation	1	7
During observation	3	21
During and after	2	14
Immediately after observation	1	7
Within 24 hours of observation	6	43
Not Specified	1	7
Coach		
Expert	11	79
Peer	2	14
Peer and Self	1	7

Table 8

Outcome Characteristics

Study	Measurement of DV	Practices/Behaviors targeted	Student Outcomes Reported
Barton et al. (2013) study 1	Use of intervention package	Play behaviors: Contingent imitations, correct prompts, errors	No
Barton et al. (2013) study 2	Use of intervention package	Play behaviors: Contingent imitations, correct prompts, errors	Yes
Barton et al. (2016)	Use of targeted behaviors*	Choices, emotion labeling, descriptive praise, promoting social interactions, language expansion	No
Barton et al., (2018)	Use of targeted behaviors*	Reminders of expectations, promoting social interactions, redirections, descriptive praise, emotion labeling, choices	No
Brock & Beaman-Diglia, (2018)	Use of targeted behaviors	Referencing visual supports, contingent positive reinforcement, promoting self-management	Yes
Chazin et al., (2018)	Implementation of BIP	Behavior support implementation	Yes
Fox et al., (2011)	Implementation of Teaching Pyramid Model practices	Overall practices for nurturing and responsive relationships, high quality supportive environments, and social emotional teaching strategies	No
Hemmeter et al., (2015)	Implementation of Teaching Pyramid Model practices*	General praise, descriptive praise	Yes

(continued)

Table 8 *Continued*

Study	Measurement of DV	Practices/Behaviors targeted	Student Outcomes Reported
Hemmeter et al., (2011)	Implementation on targeted practices (descriptive praise and general praise)	Schedules and routines, behavior expectations, problem solving, emotional literacy	Yes
Hendrickson et al., (1993)	use of teacher behavioral supports*	providing verbal/nonverbal cues, modeling, or instruction to promote social interactions)	Yes
Kohler et al., (1995)	teacher behaviors	use of activity changes and refinements	No
Ledford et al., (2011)	use of targeted behaviors	Steps implemented correctly	Yes
Lyon et al., (2009)	implementation of targeted behaviors*	Teacher-child interaction skills and positive teacher behavior	No
Tschantz & Vail, (2000)	use of targeted behaviors (responsive statements)*	Responsive statements, specific praise, choices,	No

Note. *indicates target practices/behaviors were selected by the participant.

Additional Study Features

Social validity was measured in 100% of the studies, with two studies (14%) reporting social validity after didactic training in addition to the conclusion of the study. Procedural fidelity on the coaching process was measured in nine of the studies (64%). Seven of these studies reported IOA on the procedural fidelity. Eleven studies reported maintenance (79%) data, however only three studies provided information on when data was collected, which ranged from one month after intervention took place (Barton et al., 2016) to one year (Barton et al., 2018). Of these eleven studies, five also reported generalization data in addition to collecting maintenance data.

WWC Standards

The third research question focused on the quality of single-case design literature on implementing coaching interventions in preschool settings as evaluated by the What Works Clearinghouse (WWC) Standards The dependent variables from 95 cases across the 14 included studies were evaluated according to the WWC Pilot Single-Case Design Standards (U.S. Department of Education, Institute of Education Sciences, & What Works Clearinghouse, 2017) as depicted in Figure 2. Each study was evaluated at the case level using the WWC design standards. A case was defined as one or more participants with a single dependent variable and a single independent variable. For example, Barton et al. (2018) conducted a single-case research design using a multiple baseline across behaviors replicated across three participants. Each participant had three dependent variables, and each unique combination of the single independent variable and dependent variable was defined as a case. Therefore, nine cases were appraised in

Barton et al. (2018) article. Table 9 provides a summary of the applications of the WWC Design Standards. Thirty-two cases met the design standards (34%), 40 met the application standards with reservations (42%), and 23 did not meet the design standards (24%). Of the 40 cases that met design standards with reservations, over half (68%) had less than 5 data points across all phases.

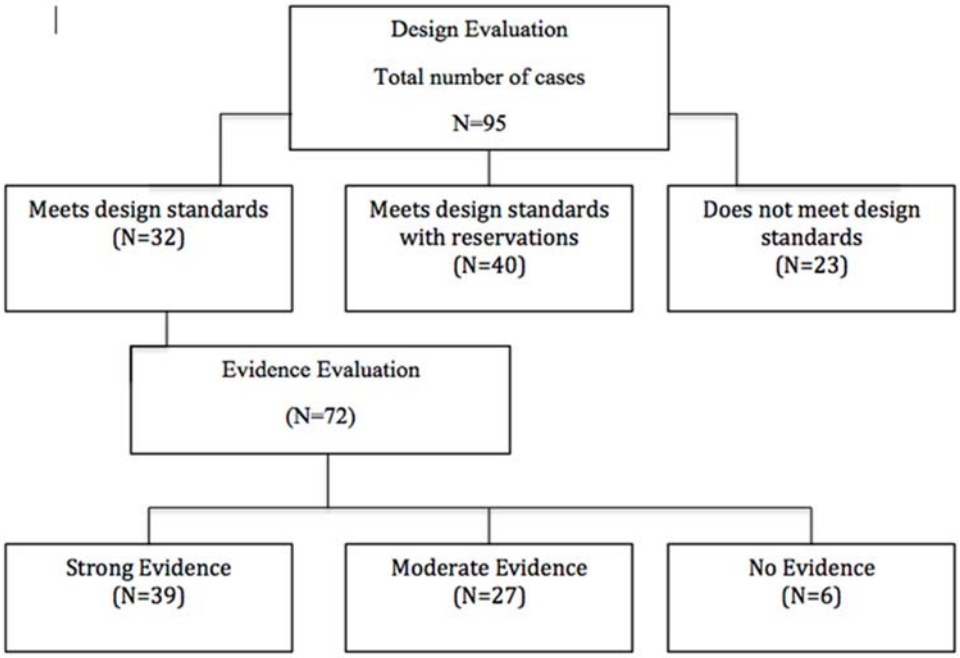


Figure 2. Schematic overview of the What Works Clearinghouse design and evidence standards.

The purpose of the fourth research question is to determine the evidence of effects of coaching interventions using visual analysis. Seventy-two cases met the design standards and were evaluated at the case-level for evidence of effect. Six cases

did not demonstrate effects (8%). Twenty-seven cases demonstrated moderate evidence (38%). Thirty-nine cases, representing 10 studies and 23 participants, demonstrated strong evidence (54%).

Table 9

WWC Design Standard Summary by Case-Level

Study/ design	Participant	1	2A	2A WITHIN	2B	3	4A	4B	Overall
Barton et al. (2013) study 1/ MBL x Participants	Lucy- contingent imitation	Y	Y	Y	Y	Y	Y	Y	1
	Annie- contingent imitation	Y	Y	Y	Y	Y	N	N	0
	Briana-contingent imitation	Y	Y	Y	Y	Y	N	N	0
	Patty- contingent imitation	Y	Y	Y	Y	Y	N	N	0
	Betty-contingent imitation	Y	Y	Y	Y	Y	Y	Y	1
	Lucy- correct prompts	Y	Y	Y	Y	Y	Y	Y	1
	Annie- correct prompts	Y	Y	Y	Y	Y	N	N	0
	Briana- correct prompts	Y	Y	Y	Y	Y	N	N	0
	Patty-correct prompts	Y	Y	Y	Y	Y	N	N	0
	Betty- correct prompts	Y	Y	Y	Y	Y	Y	Y	1
	Lucy- errors	Y	Y	Y	Y	Y	Y	Y	1
	Annie- errors	Y	Y	Y	Y	Y	N	N	0
	Briana- errors	Y	Y	Y	Y	Y	N	N	0
	Patty- errors	Y	Y	Y	Y	Y	N	N	0
	Betty-errors	Y	Y	Y	Y	Y	Y	Y	1
Barton et al. (2013) study 2/ MBL x Participants	Carrie- contingent imitation	Y	Y	Y	Y	Y	Y	Y	1
	David- contingent imitation	Y	Y	Y	Y	Y	Y	Y	2
	Mike- contingent imitation	Y	Y	Y	Y	Y	Y	Y	2
	Brody- contingent imitation	Y	Y	Y	Y	Y	Y	Y	2
	Carrie-correct prompts	Y	Y	Y	Y	Y	Y	Y	1
	David- correct prompts	Y	Y	Y	Y	Y	Y	Y	2
	Mike- correct prompts	Y	Y	Y	Y	Y	Y	Y	2
	Brody- correct prompts	Y	Y	Y	Y	Y	Y	Y	2
	Carrie- errors	Y	Y	Y	Y	Y	Y	Y	1
	David- errors	Y	Y	Y	Y	Y	Y	Y	2
	Mike- errors	Y	Y	Y	Y	Y	Y	Y	2
	Brody- errors	Y	Y	Y	Y	Y	Y	Y	2

(continued)

Table 9 *Continued*

Study/ design	Participant	1	2A	2A WITHIN	2B	3	4A	4B	Overall
Barton et al. (2016)/ MBL x Behaviors	Katie- choices	Y	Y	Y	Y	Y	Y	Y	1
	Katie- emotion labeling	Y	Y	Y	Y	Y	Y	Y	1
	Katie- descriptive praise	Y	Y	Y	Y	Y	Y	Y	1
	Jasmine- emotion labeling	Y	Y	Y	Y	Y	Y	Y	2
	Jasmine- choices	Y	Y	Y	Y	Y	Y	Y	2
	Jasmine- promoting social interactions	Y	Y	Y	Y	Y	Y	Y	2
	Beatrice- promoting social interactions	Y	Y	Y	Y	Y	Y	Y	1
	Beatrice- language expansions	Y	Y	Y	Y	Y	Y	Y	2
	Beatrice- choices	Y	Y	Y	Y	Y	Y	Y	1
Barton et al. (2018)/ MBL x Behaviors	Sonia- reminders of expectations	Y	Y	Y	Y	Y	Y	Y	2
	Sonia- promoting social interactions	Y	Y	Y	Y	Y	Y	Y	2
	Sonia- redirections	Y	Y	Y	Y	Y	Y	Y	2
	Ruth- descriptive praise	Y	Y	Y	Y	Y	Y	Y	2
	Ruth- promoting social interactions	Y	Y	Y	Y	Y	Y	Y	2
	Ruth- redirections	Y	Y	Y	Y	Y	Y	Y	2
	Elena- emotion labeling	Y	Y	Y	Y	Y	Y	Y	1
	Elena- choices	Y	Y	Y	Y	Y	Y	Y	1
	Elena- promoting social interactions	Y	Y	Y	Y	Y	Y	Y	1
Brock & Beaman-Diglia (2018)/ MBL x Behaviors	(Stephanie & Jayla) ref visual supports	Y	Y	Y	Y	Y	Y	Y	2
	(Stephanie & Jayla) contingent pos reinforcement	Y	Y	Y	Y	Y	Y	Y	2
	(Stephanie & Jayla) promoting self 47gmt..	Y	Y	Y	Y	Y	Y	Y	1
Chazin et al. (2018) study 1/ MP x Participants	Andrea	Y	Y	Y	Y	Y	Y	n/a	1
	Beverly	Y	Y	Y	Y	Y	Y	n/a	1
	Claire	Y	Y	Y	Y	Y	Y	n/a	1
	Daphne	Y	Y	Y	Y	Y	Y	n/a	1
Fox et al. (2011)/ MP x Participants	Teacher a	Y	Y	Y	Y	Y	Y	n/a	2
	Teacher b	Y	Y	Y	Y	Y	Y	n/a	2
	Teacher c	Y	Y	Y	Y	Y	Y	n/a	2

(continued)

Table 9 *Continued*

Study/ design	Participant	1	2A	2A WITHIN	2B	3	4A	4B	Overall
Hemmeter et al. (2015)/ MP x Participants	Bianca- schedules and routines	Y	Y	Y	Y	Y	Y	n/a	1
	Bianca- behavior expectations	Y	Y	Y	Y	Y	Y	n/a	2
	Bianca- problem solving	Y	Y	Y	Y	Y	Y	n/a	2
	Kendra- behavior expectations	Y	Y	Y	Y	Y	Y	n/a	1
	Kendra- schedules and routines	Y	Y	Y	Y	Y	Y	n/a	2
	Kendra- emotional literacy	Y	Y	Y	Y	Y	Y	n/a	2
	Susan- behavior expectations	Y	Y	Y	Y	Y	Y	n/a	1
	Susan- schedules and routines	Y	Y	Y	Y	Y	Y	n/a	2
	Susan- problem solving	Y	Y	Y	Y	Y	Y	n/a	2
Hemmeter et al. (2011)/ MP x Participants	Teacher A-descriptive praise	Y	Y	N	Y	Y	Y	n/a	1
	Teacher B-descriptive praise	Y	Y	Y	Y	Y	Y	n/a	1
	Teacher C-descriptive praise	Y	Y	Y	Y	Y	Y	n/a	1
	Teacher D-descriptive praise	Y	Y	Y	Y	Y	Y	n/a	1
	Teacher A- gen praise	Y	Y	Y	Y	Y	Y	n/a	1
	Teacher B- gen praise	Y	Y	Y	Y	Y	Y	n/a	1
	Teacher C- gen praise	Y	Y	Y	Y	Y	Y	n/a	1
	Teacher D- gen praise	Y	Y	Y	Y	Y	Y	n/a	1
Hendrickson et al. (1993)/ MBL x Participants	Teacher 1	Y	Y	Y	Y	Y	Y	Y	1
	Teacher 2	Y	Y	Y	Y	Y	Y	Y	1
	Teacher 3	Y	Y	Y	Y	Y	Y	Y	1
Kohler et al.(1995) / ABA	Meg graph 1	Y	Y	Y	Y	Y	N	n/a	0
	Meg graph 2	Y	Y	Y	Y	N	N	n/a	0
	Maggie graph 3	Y	Y	Y	Y	N	N	n/a	0
	Maggie graph 4	Y	Y	Y	Y	N	N	n/a	0
	Angie graph 5	Y	Y	Y	Y	Y	N	n/a	0
	Deb graph 6	Y	Y	Y	Y	Y	N	n/a	0
Ledford et al. (2011)/ MP x Participants	Carlie	Y	Y	Y	Y	Y	Y	Y	1
	Kristen	Y	Y	Y	Y	Y	Y	Y	2
	Vikki	Y	Y	Y	Y	Y	Y	Y	2

(continued)

Table 9 *Continued*

Study/ design	Participant	1	2A	2A WITHIN	2B	3	4A	4B	Overall
Lyon et al. (2009)/ NC MBL x Participants (classrooms)	class a BL -CDI	Y	Y	Y	Y	Y	Y	N	0
	class b BL -CDI	Y	Y	Y	Y	Y	N	N	0
	class c BL -CDI	Y	Y	Y	Y	Y	Y	N	0
	class d BL -CDI	Y	Y	Y	Y	Y	Y	N	0
	class a- BL-TDI	Y	Y	Y	Y	Y	Y	N	0
	class b BL-TDI	Y	Y	Y	Y	Y	Y	N	0
	class c BL -TDI	Y	Y	Y	Y	Y	Y	N	0
	class d BL -TDI	Y	Y	Y	Y	Y	Y	N	0
Tschantz & Vail (2000)/ MP x P	Susan	Y	Y	Y	Y	Y	Y	n/a	1
	Jane	Y	Y	Y	Y	Y	Y	n/a	1
	Ruth	Y	Y	Y	Y	Y	Y	n/a	1

Note. N=No; Yes, n/a= not applicable; 4A applies to Multiple probe design guidelines, 4B applies to multiple-baseline design

Characteristics of Studies Demonstrating Evidence

Table 10 provides a summary of the key characteristics of studies demonstrating evidence at the participant-level and case- level. There were more female participants (n=34) than males (n=3). Most of the studies took place in a university-based preschool setting (n=5). Twenty-four percent of the studies did not report teacher age. Of the studies that did report age. Ten of the teacher participants were between 21 and 25 years old (27%), four were between 26 and 30 (11%), seven were between 31 and 35 (19%), and seven were 36 and older (19%). Half of the participants were lead teachers in their classrooms (n= 19; 51%). Fifty-four percent of the participants have been teaching in the classroom for five years or less (n=20). The majority of participants held a bachelor's degree or higher (n=27; 73%). Over half of the studies did not provide information as to whether the coach held any previous coaching experience (n=23; 77%). The coaching interventions implemented in studies demonstrating evidence of effects targeted social skills (n=1), social and emotional behaviors (n=6), challenging behaviors (n=2), or a combination of social, emotional, and challenging behaviors (n=3). Specifically, these targeted behaviors/practices were individualized based on teacher needs and therefore varied across the studies. The two targeted behaviors occurring most frequently were implementing correct prompts (n=9; 12%) and promoting social interaction (n=8; 11%). As for the method of coaching delivery, 68% were delivered face to face (n=24), 14% were provided via email (n=5), and 22% incorporated face to face and email (n=8).

Table 10

Summary of Studies Demonstrating Evidence at the Participant-Level and Case-Level

Level	No. of Participants	% of Participants	No. of cases	% of cases
Gender				
Male	3	8%	3	8%
Female	34	92%	33	92%
Setting				
Daycare	2	15%	4	11%
Head Start	2	15%	6	17%
Preschool	4	31%	9	25%
University-based center	5	38%	17	47%
Teacher Age				
21-25	10	27%	10	28%
26-30	4	11%	4	11%
31-35	7	19%	7	19%
36-40	3	8%	3	8%
41+	4	11%	4	11%
Not Specified	9	24%	8	22%
Teacher Role				
Teacher	19	51%	18	50%
Teacher Assistant	5	14%	5	14%
Paraprofessional	3	8%	3	8%
Preservice Teacher	9	24%	9	25%
Student Intern	1	3%	1	3%
Teacher Experience				
Less than 1 year	6	16%	6	17%
1 to 5 years	14	38%	14	39%
6 to 10	7	19%	6	17%
11-20	5	14%	5	14%
21+	2	5%	2	6%
Not Specified (range provided)	3	8%	3	8%
Teacher Education				
High School Diploma	4	11%	4	11%
Some College	5	14%	5	14%
Bachelor's Degree	11	30%	10	28%
Master's Degree	7	19%	7	19%
Pursuing graduate degree & certificate	9	24%	9	25%
Not Specified	1	3%	1	3%

(continued)

Table 10 *Continued*

Level	No. of Participants	% of Participants	No. of cases	% of cases
Coaching Experience				
Yes	11	30%	10	28%
No	3	10%	3	8%
Not Specified	23	77%	23	64%
Teacher Targeted Behaviors				
Behavior Plan Fidelity	4	5%	4	6%
Choices	4	5%	4	6%
Contingent Imitation	6	8%	6	8%
Contingent Positive Reinforcement	2	3%	1	1%
Correct Prompts	9	12%	9	13%
Descriptive Praise	6	8%	6	8%
Emotion Labeling	4	5%	4	6%
No. of Errors	6	8%	6	8%
Language Expansions	1	1%	1	1%
Praise	4	5%	4	6%
Problem Solving	2	3%	2	3%
Promoting Self-Management	2	3%	1	1%
Promoting Social Interaction	8	11%	8	11%
Redirections	2	3%	2	3%
Referencing Visual Supports	2	3%	1	1%
Reminders of Expectations	4	5%	4	6%
Responsive Statements	3	4%	3	4%
Schedules and Routines	3	4%	3	4%
Teaching Pyramid Model Practices (overall)	3	4%	3	4%
Coaching Delivery				
Face to Face	24	68%	23	64%
Distance (Email)	5	14%	5	14%
Both	8	22%	8	22%

Table 11 provides additional information of studies demonstrating evidence at the study-level. Three of the studies implemented less than five components in their coaching intervention (25%). Over half of the studies implemented between six and ten components (58%), and two studies implemented between 11 and 14 components (17%). Coaching took place before observations (n=1), during observations (n=2), immediately after observation (n=1), within 24 hours of the observation, or a combination (n=2). The length of time in which the coaching intervention took place ranged from three weeks or less (n=1), three to five weeks (n=4), and more than five weeks (n=2). Five of the studies did not specify the span of time in which the coaching intervention took place. As for the intensity of the coaching, 58% of the studies reported coaching sessions taking place between one and three times per week (n=7). Twenty-five percent of the studies reported coaching sessions occurring three to five times per week. One study reported conducting daily coaching sessions (8%) and another study did not specify how often coaching sessions occurred (8%).

Table 11

Coaching Intervention Characteristics of Studies Demonstrating Evidence of Effect

Level	**# of Studies**	**% of Studies**
No. Of Intervention Components Implemented		
5 or less	3	25%
6-10	7	58%
11-14	2	17%
Intervention Target Outcomes		
Social Skills	1	8%
Social and Emotional	6	50%
Challenging Behaviors	2	17%
Social, Emotional, and Challenging Behaviors	3	25%
Coaching Delivery		
Before Observation	1	8%
During Observation	2	17%
Immediately After Observation	1	8%
Within 24 hrs. of Observation	5	42%
Combination	2	17%
Not Specified	1	8%
Length of Coaching Intervention		
3 weeks or less	1	8%
3 to 5 weeks	4	33%
More than 5 weeks	2	17%
Not Specified	5	42%
Coaching Intensity		
1-3 times/week	7	58%
3-5 times/week	3	25%
Daily	1	8%
Not Specified	1	8%

Discussion

The purpose of this review was to identify single-case research studies that examine coaching interventions implemented in preschool settings to improve teacher practices related to social, emotional, and/or behavioral outcomes in young children, and evaluate the quality of the studies by applying the WWC Standards 4.0 (U.S. Department of Education, Institute of Education Sciences, & What Works Clearinghouse, 2017). The WWC design standards were applied to 14 studies which met the inclusion criteria. The following research questions were posed: (a) what are the descriptive characteristics of each study (participant and setting, coaching components of intervention, coaching dosage, outcome characteristics)?, (b) What are the components of coaching interventions being implemented to improve the social, emotional, and behavioral outcomes of young children in preschool settings? (c) What is the quality of the studies as evaluated by the WWC standards? (d) What is the evidence of the effects of coaching teachers using visual analysis?, and € What coaching interventions qualify an EBP classification based on the WWC standards?

The purpose of the first research question was to identify descriptive characteristics of studies examining coaching interventions that address social, emotional, and/or behavioral outcomes in young children. Overall, the included studies provided sufficient descriptive data on their participants and settings. Unsurprisingly, the majority of the teacher participants were female. The studies that took place in university-based preschools used pre-service teachers as participants, likely because the university had access to these classrooms. These participants were pursuing their

graduate degree in early childhood special education, and may have had access to resources such as fellow graduate students, relevant coursework, and knowledgeable mentors/professors that the participants in other studies did not have. In early childhood settings, there is often an assumption that teachers lack the education in comparison to certified elementary and secondary educators. The findings across the 14 included studies show that 73% of the participants held at least a Bachelor's degree. This is a trend that will likely continue, as many preschool programs, such as head start, are raising their teacher education standards in order to better serve their students' needs.

Reporting information about the coaches was inconsistent across the studies. Three of the studies (21%) did not specify the number of coaches used during the intervention, eight of the studies (57%) did not specify if coaches had any previous coaching experience, and six studies (43%) did not specify if coaches had any experience working in early childhood settings. More concerning is only half of the studies reported an attempt to establish a relationship between the coach and participant. The development of the alliance, or positive coach and teacher relationship, is a critical piece of the coaching process which should not go overlooked (Snyder et al., 2015; Mraz et al., 2008; Wehby et al., 2012). The efforts by the coach to establish a relationship with their coachee lays the foundation for a collaborative partnership, which is a cornerstone for productive and effective coaching (Pierce & Buyssee, 2014).

The included studies did provide information on coaching delivery, dosage, duration, and intensity, however the data and/or descriptions provided were not always clear due to averages or ranges being reported as opposed to raw data per teacher

participant. Although coaching dosage (how often coaching sessions occurred) was provided by all the studies, six of the studies did not specify the span of time in which coaching occurred. This piece of information is necessary, especially for replication purposes. Most of the coaching was delivered face to face, but two studies provided coaching via email. In the Barton et al., (2018) study, one of the participants required face to face coaching as feedback via email was not sufficient to improve her targeted teacher practices.

The majority of the studies targeted behaviors that focused on social and emotional outcomes in young children, with only two studies focusing on decreasing challenging behaviors through the implementation of a behavior intervention plan. All of the studies reported an increase in teacher targeted behaviors after coaching intervention packages were implemented. This is promising, as there were 19 different targeted teacher behaviors across the 14 studies, which demonstrates the potential impact coaching can have on changing teacher's behaviors. Unfortunately, only half of the studies also reported student outcomes along with teacher outcomes. This is similar to the findings from Snyder et al. (2015), which revealed although more studies are emerging to examine coaching young children, there is still little known about how coaching practices impact student outcomes.

The purpose of the second research question was to identify the individual components of the coaching interventions implemented across all included studies. Given the study designs were single-case research design studies, the interventions examined across the included studies were tailored to meet the individual needs of the

teachers. Although the coaching interventions sought to increase targeted teacher practices, the coaching approaches used as the intervention varied across all studies. Study 1 and 2 from Barton et al. (2013) used the same nine components in their coaching intervention, and Hendrickson et al. (1993) and Kohler et al. (1995) used the same six components in their studies. Due to the diverse approaches and combinations of coaching practices, it is challenging to identify which pieces are the driving force behind intervention. All of the studies included focused observations and performance feedback. Two of the studies delivered performance feedback via email. This is similar to the findings in the Artman-Meeker et al. (2015) review, as the most frequently used component was also performance feedback. Given that performance feedback has been found to be an evidence-based practice in accordance with the WWC standards (Fallon et al., 2015), it could be beneficial to evaluate the effects of one or two components partnered with PF.

The third research question evaluates the quality of the interventions through the application of WWC standards. After applying the WWC standards across 95 cases found across the 14 included studies, 76% of the cases either met design standards, or met with reservations. In reviewing the methodology of the studies with cases who met design standards with reservations, one case did not report IOA for 20% across all conditions, and others did not provide three demonstrations of effects due to the SCR study design (ABA).

The purpose of the fourth research question is to determine the effectiveness of the evidence of studies meeting WWC design standards. This review found that 92% of

the cases evaluated for evidence provided either moderate or strong effects. In the review conducted by Kretlow and Bartholomew (2010), their findings also demonstrated that coaching provided strong evidence in changing teacher's behavior, although their focus was on improving teacher's fidelity of implementation of EBPs.

Lastly, the focus of the fifth research question is to determine what coaching interventions qualify as an EBP based on the WWC standards. This review of single-case design studies found sufficient empirical evidence to recommend coaching as an evidence-based practice to improve teacher's targeted practices to address social, emotional, and behavioral outcomes in preschool settings.

Limitations

It is necessary to evaluate the findings of this literature review within the context of the following limitations. Although a systematic literature search was conducted, it is possible that potentially eligible studies were omitted due to terminology used in the studies, as the terms coaching, consultation, training have often been used interchangeably. Studies were only included in this review if they specifically referred to "coaching" as the independent variable. This review only included studies that were published in peer-reviewed journals, and therefore may have provided findings with publication bias. Additionally, four of the studies were led by the same researcher (e.g., Barton), and three of the studies included members from the same research team (e.g., Hemmeter and Fox) which may be of concern regarding the overall evaluation when using the WWC recommendations regarding evidence-based practices. This review also revealed how coaching interventions vary across studies, and often are more

individualized to meet the needs of the teacher. This limits the ability to draw conclusions about which individual component, or combinations of components, lead to improved teacher practices. Lastly, by applying the WWC standards to evaluate the methodological quality of a study we are able to identify the level of rigor in the design and evidence. Although 92% of the cases which met design standards demonstrated moderate to strong evidence, these results do not constitute the magnitude of evidence, and should be interpreted with caution.

Implications for Research in Coaching

This systematic literature review of single-case research design studies is the first to examine the effectiveness of coaching interventions on preschool teachers to impact social, emotional, and behavioral outcomes in young children, however additional research is still needed. Coaching with performance feedback can be effective to change teacher's behavior, however future studies need to evaluate what other components (in-vivo coaching, sharing data, video examples, etc.) lead to greater improvements in teacher outcomes. For example, one critical piece to the coaching process relies on the establishment of a relationship between the coach and coachee. And therefore, future studies should identify the specific strategies used to build this partnership. Only half of the studies in this review included both teacher and student outcomes. Future research should report both outcomes in order to demonstrate the utility of coaching. In addition, replication studies are necessary to evaluate the same coaching interventions packages, and they need to provide explicit coaching dosage, duration, and intensity data.

Coaching is widely embraced as a professional development approach in educational settings, and this study demonstrates how it can support and improve teacher practices to address social, emotional, and behavioral outcomes in preschools. These findings provide insight on what coaching practices are currently being implemented, and sheds light for future researchers on gaps across the literature base. As of 2017, Head Start now requires coaching as part of their Head Start Program Performance Standards [45 CFR § 1302.92€(1)–(5)], and therefore more research will be necessary to inform the field on effective and efficient coaching practices.

CHAPTER III

THE EFFECTS OF COACHING INTERVENTIONS ON TARGETED TEACHER PRACTICES TO IMPROVE SOCIAL, EMOTIONAL, AND BEHAVIORAL OUTCOMES IN PRESCHOOL SETTINGS: A META-ANALYSIS OF THE SINGLE-CASE RESEARCH

Introduction

Research has shown how social and emotional development can fundamentally impact young children's school adjustment and school readiness in their early years (Fox et al., 2011; La Paro & Pianta, 2000; McClelland et al., 2000; Raver & Knitzer, 2002). For children living in poverty, developing school readiness may help prevent the cascade of negative outcomes of aca `1demic and behavioral problems in school, such as delinquency, dropping out school, unemployment, and psychological and physical problems into adolescents and adulthood (Anderson et al., 2003). Early childhood teachers have reported children who lack social, emotional, and behavioral competence have a significant disadvantage inside their classrooms (Denham & Brown, 2010; Markowitz et al., 2006).

The social and emotional development in young children consists of several interrelated areas of development, such as social interaction, emotional awareness, self-regulation, problem solving, and social emotional competence. Kindergarten teachers have indicated that students entering their classrooms do not have the basic learning behaviors or social emotional competence to transition successfully into elementary

school (Rimm-Kaufman et al., 2000). Early childhood teachers do expect to encounter challenging behaviors, as children are in the early stages of their development, however they feel ill prepared to manage these behaviors in their classrooms (Fox & Binder, 2015; Hemmeter, Corso, et al., 2006). Challenging behaviors can include any behaviors that interfere with learning or social interactions, such as the inability to express emotions appropriately or engage in problem solving (Brock & Beaman-Diglia, 2018; Smith & Fox, 2003). Persistent challenging behaviors that occur in the early years are associated with problems in student's academic success, socialization, and can lead to poor social outcomes in adulthood (Campbell, 1995; Powell et al., 2006). Findings from interviews, focus groups, and surveys have identified that addressing challenging behavior as the top training need for early childhood teachers, followed by promoting social and emotional development (Fox & Smith, 2007; Smith, 2006).

To address these issues, early childhood programs have adopted more comprehensive prevention and intervention frameworks like The Pyramid Model which promotes children's social emotional competence and aims to prevent challenging behaviors (Fettig & Artman-Meeker, 2016; Fox et al., 2003; Fox & Hemmeter, 2009). The Pyramid Model is grounded in positive behavior interventions and supports (PBIS), and includes tiered supports to create nurturing and responsive relationships and high-quality supportive environments (universal supports), targeted social emotional supports (secondary supports), and intensive interventions (tertiary supports) (Fox & Hemmeter, 2009; Fox et al., 2003). Although training materials for the Pyramid models are easily accessible and promoted by the Center on the Social and Emotional Foundations of

Early Learning (CSEFEL; http://csefel.vanderbilt.edu/), there is not much research on how to support early childhood teachers on how to implement these strategies (Artman-Meeker & Hemmeter, 2013).

Teachers have reported they need help identifying evidence-based practices, and additional support to implement interventions with fidelity that address social, emotional, and behavioral outcomes (Reinke et al., 2011). Evidence shows that one-time professional development (PD) workshops are not sufficient to sustain a change in teacher practices and student learning (Yoon et al., 2007). Coaching is as a professional development approach that can support teachers in implementing new practices, however there is little evidence to support the use of specific coaching models in early childhood settings (Gupta & Daniels, 2012; Wilson et al., 2012). Research is needed to evaluate what coaching models are most effective, and under what conditions, in improving teacher practices that target social, emotional, and behavioral outcomes in young children.

Previous Quantitative Reviews

Two previous meta-analyses have examined the impact of early childhood intervention programs. Werner et al. (2015) conducted a meta-analysis to evaluate the effectiveness of intervention programs in childcare settings which focus on improving childcare quality, interaction between caregivers and young children and children's social emotional development. Studies included in this meta-analysis employed group designs (RCTs). Moderator analysis was investigated on the following: (a) program characteristics, (b) program duration, (c) intensity of training, (d) treatment for the

control group (d) type of training session, € focus of intervention, (f) type of childcare. Moderator analysis results found that programs that provided individual training sessions for their caregivers had higher effect sizes (Hedges' g=0.41 (SE0.07), CI 0.27-0.5. p<0.001) than programs who did not provide individual training sessions (Hedges' g=0.09 (SE=0.14), CI =-0.18-0.36, p=0.52). Another moderator identified was the treatment for control group, which revealed programs with a placebo training during the control group were more effective (Hedges' g=0.75 (SE=0.15), CI=0.46–1.05, p<0.001) than those without (Hedges' g=0.25 (SE=0.06), CI=0.12–0.37, p<0.001). The other moderators produced no effects.

The overall combined effect of the 19 RCT studies was Hedges' g=0.35 (SE=0.07), CI = 0.21-0.48, p<0.001. Results of the meta-analysis show interventions that focused on interactions between the child and caregiver were moderately effective in improving the quality of childcare at the classroom level (*k*=11; Hedges' *g*=0.39), the caregiver level/interactions (*k*=10; Hedges' *g*=0.44), and the child level/behaviors (*k*=6; Hedges' *g*=0.26). Interventions were moderately effective in improving the interactions between the caregiver and the child (*k*=19; Hedges' *g*=0.35). The overall findings from this meta-analysis show that targeted interventions can lead to high-quality childcare, and ultimately better social and emotional development for young children under 5 years old.

Kraft et al. (2018) conducted a meta-analysis on the effects of teacher coaching on instruction and achievement. Defining coaching was a challenge, as many studies had such broad interpretations of the term. For the purposes of their meta-analysis, they

defined the coaching process as instructional experts who collaborate with teachers and discuss classroom practices in a way that is "(a) *individualized*- coaching sessions are one-on one; (b) *intensive*- coaches and teachers interact at least every couple of weeks; (c) *sustained*- teachers receive coaching over an extended period of time; (d) *context-specific*- teachers are coached on their practices within the context of their own classroom; € *focused*- coaches work with teachers to engage in deliberate practice of specific skills" (p. 9). Their meta-analysis included 60 studies, mostly involving literacy coaching programs for pre-k and elementary teachers, and pooled Ess of 0.49 standard deviations (SD) on instruction and 0.18 SD on achievement. Overall, the study results revealed that teacher coaching has a positive impact on student achievement.

Both of these meta-analyses have evaluated studies that employ group designs. Kraft et al. (2018) did examine the effects of coaching, however their focus was on instructional practice and students' academic achievements. There has been no meta-analysis of single-case research studies examining the effects of coaching interventions on targeted teacher practices that address social, emotional, and/or behavioral outcomes in preschool settings.

Single-Case Research Meta-Analysis

Single-case research design methods allow for researchers to isolate the effects of an independent variable on a dependent variable, and infer if there is a causal relationship between the two (Maggin et al., 2017). A meta-analysis of single-case design research provides a systematic way to draw generalizations about causal inferences and determine under what conditions is the intervention effective or

ineffective (Maggin, 2015). Although traditionally, visual analyses have been conducted in single-case research designs to evaluate the effectiveness of an intervention, it can also be supplemented with an effect size (ES) to provide a more standardized result that can contribute to EBPs (Vannest & Ninci, 2015). Some of the most commonly reported non-parametric statistics found across the single-case research design literature include percentage of non-overlapping data (PND; Maggin et al., 2011; Parker et al., 2011a), non-overlap of all pairs (NAP; Parker & Vannest, 2009), percentage of all non-overlapping data (PAND; Parker et al., 2007), and improvement rate difference (IRD; Parker et al., 2009). Parametric statistical approaches, such as Hedges G and Cohen's D, do not meet the assumptions on time series single-case research design data, and may be overly sensitive to autocorrelation. Parametric statistics also tend to inflate single-case research design effect sizes, which is why non-parametric statistics are more commonly used in SCDs.

Tau-U is a non-parametric effect size that has grown in popularity in single-case design as it has good statistical power, assesses within phase trend and between phase differences, makes few distributional assumptions, is robust to autocorrelation, and is easily accessible to researchers because a free, user-friendly web-based calculator is available online (Tarlow, 2016; Vannest et al., 2011; http://www.singlecaseresearch.org/calculators/Tau-U). Despite its strengths, Tau-U has considerable limitations, which have not been critically examined (Tarlow, 2017a). The Tau-U method cannot be graphically visualized, its values are inflated and are not bound between -1 and +1, and the control for baseline trend can be affected by the experimental

phase length (Tarlow, 2017a). To address these issues, Tarlow (2017a) has proposed an improved method known as Baseline Corrected Tau. This effect size statistic is based on rank correlation methods, and uses Kendall's tau and possible baseline trend to calculate an estimated effect size (Tarlow, 2017a).

Purpose and Research Questions

The purpose of this study is to evaluate the magnitude of effectiveness of coaching interventions on targeted teacher practices which address social, emotional, and/or behavioral outcomes in preschool settings. Based on the single-case design studies that meet inclusion criteria, the goal will be to provide an estimate of the effect sizes coaching interventions have on improving teacher practices. Specifically, this study aims to answer the following research questions:

RQ1: What are the effects of coaching interventions at the study-level, and case-level?

RQ2: What are the characteristics of studies demonstrating evidence at the participant-level and case-level?

RQ3: What is the overall effect of coaching interventions at both the study-level, and case-level?

Method

This study extends on the systematic literature review reported in Chapter II. The procedures and inclusion criteria to identify studies for this meta-analysis are the same procedures used in Chapter II. Only cases that met the WWC design standards were included in this meta-analysis. This study was conducted in two stages: (a) data extraction, and (b) analysis of effects.

Data Extraction

In order to calculate effect sizes, data points were extracted from the time-series graphs in the included publications, and digitized using Plot Digitizer software. Images of the graphs were collected using the snipping tool, and then converted from a PNG file to a JPEG file. The JPEG file was opened in Plot Digitizer, and the X and Y axes were calibrated. After each data point was manually clicked on in the baseline and intervention phases, the software generated the corresponding X and Y values which were copied and pasted into an Excel spreadsheet, and inputted into a web-based calculator to calculate effect sizes. Some studies included more than one baseline phase, or more than one phase of the coaching intervention. For example, in the Barton et al. (2013) study one, their multiple baseline design across participants included a pre-training baseline phase, a post-training/no coaching phase, and a coaching phase. For the purposes of this meta-analysis, only the phase preceding the coaching intervention was included.

Quantitative Synthesis

Baseline corrected tau. The Baseline Corrected Tau (Tarlow, 2017a) was used to calculate effect sizes for this meta-analysis. This improved method shares the strengths of Tau-U (Parker et al., 2011a) while addressing and improving on its limitations (Tarlow, 2017a). The Baseline corrected Tau employs a two-step process to determine the effect size for a single-case research design study. The first step estimates the monotonic baseline trend, and if necessary, corrects it using Kendall's Tau rank correlation coefficient (Tarlow, 2017a). If the baseline trend is found to be statistically

significant, it may be corrected across both A and B phases of the study using a Theil-Sen estimator (Tarlow, 2017a). Next, the effect size is calculated as a Tau correlation by comparing the original or corrected data to a dummy code variable, where the A phase = 0 and the B phase = 1. The data from the each study was inputted into the web-based Baseline Corrected Tau calculator, available at www.ktarlow.com/stats/tau/, and decisions to correct the baseline were made following the decision tree found on the website. Effect sizes were calculated for all cases which met the WWC design standards, and inputted into an Excel spreadsheet. The following Tau-*U* guidelines created by Parker and Vannest (2009) will be used as a qualitative interpretation for the Baseline Corrected Tau scores: 0.65 or lower: weak or small; 0.66 to 0.92: medium or high; 0.93 and above: large or strong.

R Studio, a free integrated development environment software for R, was downloaded and used to calculate study level effect sizes (https://www.r-project.org/). If a study reported more than one dependent variable for a participant, only one dependent variable was selected to represent the study. The Rcode used to conduct effect size calculations was provided on http://ktarlow.com/stats. To calculate an omnibus effect size with a standard error and confidence interval (CI), the Excel spreadsheet containing the mean Baseline corrected Tau and standard errors were imported into R, and run using the R functions for meta-analysis provided by Tarlow (2017b). Q statistics were used to evaluate the heterogeneity of the results. To calculate the omnibus effect size across studies, the following formula was used:

$$Weight = 1/variance$$

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

Standard error was calculated using the following formula:

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

Results

Mean effect size estimates by case level as measured by Baseline Corrected Tau are summarized in Table 12. An overall estimate effect size was calculated using data collected from 72 cases across 12 studies. Only those cases which met the WWC design standards from Chapter II were included in this meta-analysis. The mean estimated effect size at the case-level was .72, which indicates a medium to high effect.

Coaching interventions addressed 23 different teacher targeted practices, including: implementation of pyramid model practices (n=3), support behavior (n=3), contingent imitation (n=6), positive social interactions (n=3), contingent positive reinforcement (n=1), behavior expectations (n=3), emotion labeling (n=3), emotional literacy (n=1), language expansions (n=1), problem solving (n=2), promoting self-management (n=1), referencing visual supports (n=1), reminders (n=1), number of responsive statements (n=2), percent of steps implemented correctly (n=3), behavior plan fidelity (n=4), choices (n=4), correct prompts (n=6), descriptive praise (n=6), errors (n=6), general praise (n=4), 42schedules and routines (n=3), promoting social interactions (n=2), and redirection (n=2). Only one case which targeted teacher practices to promote children's self-management skills, indicated a large effect size (0.95). The majority of the cases had effect size estimates with medium to high effects (n=48; 68%).

Twenty-two cases yielded effect size estimates less than .65, which are considered to be weak or small effects.

Table 12

Summary of Effect Size by Case-Level

SID	Dependent Variable (targeted practice)	BC Tau	p-value	SE	Variance	Tau-U Effect
5	Promoting self-management	0.96	0.000	0.101	0.01	L
5	Contingent positive reinforcement	0.91	0.000	0.156	0.02	M
10	Number of intervals of support behavior	0.90	0.000	0.107	0.01	M
14	# of responsive statements per min	0.89	0.010	0.211	0.04	M
9	Problem solving	0.87	0.000	0.142	0.02	M
9	Problem solving	0.86	0.000	0.172	0.03	M
9	Behavior expectations	0.83	0.001	0.206	0.04	M
10	Number of intervals of support behavior	0.82	0.000	0.157	0.02	M
14	# of responsive statements per min	0.78	0.008	0.267	0.07	M
3	Emotion labeling	0.78	0.000	0.165	0.03	M
9	Behavior expectations	0.78	0.023	0.298	0.09	M
9	Behavior expectations	0.78	0.023	0.298	0.09	M
12	% of steps implemented correctly	0.77	0.011	0.285	0.08	M
2	% of intervals of contingent imitation	0.77	0.002	0.241	0.06	M
3	Language expansions	0.76	0.000	0.215	0.05	M
8	Descriptive Praise	0.76	0.005	0.264	0.07	M
2	Correct prompts	0.76	0.003	0.256	0.07	M
9	Schedule & routines	0.75	0.005	0.269	0.07	M
12	% of steps implemented correctly	0.75	0.003	0.260	0.07	M
2	Errors	0.75	0.003	0.252	0.06	M
9	Schedules & routines	0.75	0.036	0.333	0.11	M

(continued)

Table 12 *Continued*

SID	Dependent Variable (targeted practice)	BC Tau	p-value	SE	Variance	Tau-U Effect
2	% of intervals of contingent imitation	0.74	0.003	0.262	0.07	M
5	Referencing visual supports	0.74	0.002	0.245	0.06	M
8	Descriptive Praise	0.73	0.017	0.304	0.09	M
3	Promoting social interactions	0.73	0.000	0.201	0.04	M
9	Schedules & routines	0.73	0.006	0.280	0.08	M
3	Choices	0.73*	0.000	0.203	0.04	M
6	Behavior Plan Fidelity	0.73*	0.001	0.244	0.06	M
4	Positive social interactions	0.72	0.000	0.140	0.02	M
7	Implementation of TPOT practices	0.72	0.000	0.209	0.04	M
2	Correct prompts	0.72	0.006	0.273	0.07	M
2	Correct prompts	0.72	0.005	0.273	0.07	M
12	% of steps implemented correctly	0.72	0.028	0.329	0.11	M
2	% of intervals of contingent imitation	0.71	0.002	0.256	0.07	M
6	Behavior Plan Fidelity	0.71	0.001	0.248	0.06	M
4	Positive social interactions	0.71	0.000	0.162	0.03	M
2	Correct prompts	0.71	0.003	0.258	0.07	M
6	Behavior Plan Fidelity	0.71	0.001	0.243	0.06	M
1	Errors	0.70	0.005	0.269	0.07	M
1	Correct prompts	0.70	0.006	0.279	0.08	M
1	Errors	0.70	0.006	0.279	0.08	M
7	Implementation of TPOT practices	0.70	0.001	0.245	0.06	M
1	% of intervals of contingent imitation	0.70	0.007	0.281	0.08	M
2	Errors	0.70	0.006	0.282	0.08	M

(continued)

Table 12 *Continued*

SID	Dependent Variable (targeted practice)	BC Tau	p-value	SE	Variance	Tau-U Effect
2	% of intervals of contingent imitation	0.68	0.007	0.286	0.08	M
8	General Praise	0.68	0.014	0.300	0.09	M
2	Errors	0.68	0.004	0.269	0.07	M
4	Positive social interactions	0.67	0.000	0.189	0.04	M
8	Descriptive Praise	0.65	0.024	0.324	0.10	S
3	Descriptive praise	0.64	0.000	0.202	0.04	S
2	Errors	0.64	0.015	0.302	0.09	S
	Behavior Plan Fidelity	0.63	0.014	0.305	0.09	S
4	Choices	0.60	0.001	0.222	0.05	S
10	Number of intervals of support behavior	0.60	0.006	0.268	0.07	S
3	Promoting social interactions	0.59	0.006	0.269	0.07	S
4	Redirection	0.59*	0.000	0.161	0.03	S
1	Correct prompts	0.59	0.019	0.306	0.09	S
3	Targeted Practices: choices	0.57*	0.007	0.274	0.08	S
8	Descriptive Praise	0.57	0.009	0.275	0.08	S
4	Redirection	0.56	0.001	0.210	0.04	S
3	Emotion labeling	0.55	0.002	0.246	0.06	S
4	Reminders	0.55	0.001	0.210	0.04	S
4	Emotion labeling	0.55	0.040	0.317	0.10	S
3	Choices	0.50	0.003	0.228	0.05	S
4	Descriptive praise	0.49	0.000	0.175	0.03	S
7	Implementation of TPOT practices	0.42	0.065	0.321	0.10	S

(continued)

Table 12 *Continued*

SID	Dependent Variable (targeted practice)	BC Tau	p-value	SE	Variance	Tau-U Effect
8	General Praise	0.31	0.306	0.406	0.16	S
8	General Praise	0.23	0.382	0.368	0.14	S
1	% of intervals of contingent imitation	-0.11	0.689	0.376	0.14	S
8	General Praise	-0.29	0.185	0.319	0.10	S
	Overall Estimate	**0.72**	**-**	**0.03**	**-**	**M**

Note. BC Tau= Baseline Corrected Tau; CI= confidence interval; S= weak or small; M=medium or high; L=large or strong, *indicates the baseline was corrected

An aggregate of effect sizes at the study level as measured by the Baseline Corrected Tau statistic are found in Table 13. Of the 12 studies included in this analysis, only one study reported an estimated effect size of .96, indicating a large or strong effect. Nine of the studies reported effect sizes with medium to high effects (75%). Three studies reported effect sizes with scores less than .65, indicating a small or weak effect. The omnibus effect size estimate aggregated from the 12 included studies was calculated using the Rcode software, resulting in an ES of .76, which can be considered a medium to high effect. This Table 13 also provides the target outcome categories that the coaching intervention focused on: social skills, social and emotional, behavioral, and social, emotional, and behavioral. The study with the greatest effect size was related to improving teacher practices that addressed challenging behaviors (Brock & Beaman-Digila, 2018). Eight of the studies reported mean effect size estimates with medium or high effects, and targeted social outcomes (n=1), social and emotional outcomes (n=4), behavioral outcomes (n=1), and social, emotional, and behavioral outcomes (n=2). Three of the studies yielded mean effect size estimates with small or weak effects. These studies targeted social and emotional outcomes (n=2) and social, emotional, and behavioral outcomes (n=1).

Table 13

Coaching Intervention Targeted Outcomes and Effect Sizes- Study Level

SID	**No. of cases included**	**No. of total possible cases**	**Target Outcome**	**BC Tau**	**95% CI**	***p***	***Q***	**Tau-U effect**
5	3	3	B	0.96	[0.76, 1.16]	< .001	*0.000*	L
14	3	3	SE	0.85	[0.53, 1.17]	< .001	*0.1122*	M
10	3	3	SE	0.84	[0.68, 1.01]	< .001	*1.1109*	M
8	3	9	SEB	0.80	[0.51,1.09]	< .001	*0.0300*	M
12	3	3	S	0.75	[0.42, 1.07]	< .001	*0.016*	M
2	4	12	SE	0.73	[0.48, 0.99]	< .001	0.0584	M
4	3	9	SE	0.70	[0.52,0.89]	< .001	*0.046*	M
6	4	4	B	0.70	[0.45, 0.95]	< .001	*0.0698*	M
9	4	8	SEB	0.68	[0.40, 0.96]	< .001	*0.3145*	M
7	3	3	SEB	0.65	[0.37, 0.93]	< .001	*0.6603*	S
3	3	9	SE	0.61	[0.35, 0.87]	< .001	*0.6066*	S
1	6	15	SE	0.41	[-0.03,0.85]	0.07	2.9557	S
All studies combined	**42**	**71**	**-**	**0.76**	**[0.69,0.83]**	**< .001**	***16.507***	**M**

Note. SID= Study ID number; BC Tau= Baseline Corrected Tau; CI= confidence interval S= weak or small; M=medium or high; L=large or strong

Discussion

The primary research question posed in this meta-analysis was to determine an overall magnitude of effect for coaching interventions to improve targeted teacher practices that address social, emotional, and/or behavioral outcomes in preschool settings. This study found that coaching interventions currently implemented in single-case research to address social, emotional, and behavioral outcomes yield medium to high effects based on the Baseline Corrected Tau metric. The omnibus effect size estimate aggregated from the 12 included studies was .76, which indicate the studies demonstrated a medium or high effect improvement from the baseline to the intervention phase. Given that this is the first meta-analysis to examine coaching interventions that target teacher practices, there are no studies available to compare the findings.

The second research question sought to identify differential effects based on the outcome targeted (social, social emotional, behavioral, or social, emotional, and behavioral). If reviewing results at the study level, it would appear as though there were no identifiable differential effects based on the four outcomes. However, there is some valuable information to be discussed when examining the effects based on targeted outcomes at the case level. Six cases across three studies focused on increasing the use of descriptive praise (Barton et al., 2016; Barton et al., 2018; and Hemmeter et al., 2011), of which four cases demonstrated weak to small effects. The number of coaching components implemented across these studies were four to fourteen. Results from cases focusing on general praise yielded the weakest effects, though all cases came from the same study (Hemmeter et al., 2011). All three of these studies coached teachers via

email. These preliminary findings indicate that distance coaching may not be the most effective method to increase teacher's use of general or descriptive praise. This result is similar/diverges from previous reviews that found…

The case producing an effect size with large or strong effects targeted teacher practices to promote self-management skills (Brock & Beaman-Diglia, 2018). The coaching components used in this study included focused observations, modeling, role play, performance feedback, and sharing graphs. The second to largest effect size also came from this study. One difference between the Brock and Beaman-Diglia (2018) study compared to the others included in the meta-analysis is this is the only one to incorporate a team of teachers (teacher and teacher's assistant) as the participant. Overall, the preliminary findings of this meta-analysis indicate that coaching interventions are effective to improve targeted teacher practices related to social, emotional, and behavioral outcomes in preschools.

Limitations

The present study contributes to the early childhood professional development literature base, however there are several limitations. First, given that the term coaching has been used interchangeably with training and consultation over the years, it is possible that the inclusion criteria may have omitted potential studies. There is also the possibility of potential publication bias as studies with no significant effects seldom are published, and only studies meeting the WWC quality design standards were included in this meta-analysis. Although the coaching interventions demonstrated mostly medium to high effects, it is premature to identify which coaching practices have greater impacts on

social, emotional, or behavioral outcomes as there were over 20 targeted practices implemented across the 12 studies included in the meta-analysis. This study did not conduct a moderator analysis, as the components of the coaching interventions varied greatly across studies, and identifying potential moderators could be misleading. Lastly, there are no agreed upon standards for interpreting effect size estimates for single-case research designs in meta-analyses. The interpretations provided by Parker and Vannest (2009) are merely guidelines on how one can interpret Tau estimate effect sizes.

Implications for Coaching Research and Practice

The purpose of this study was to quantitatively analyze the effects coaching interventions have on teacher practices that target social emotional and behavioral outcomes for young children in preschool settings. There are several implications for future research and practice. First, future research needs to be more explicit in reporting coaching dosage and intensity in their methods and procedures. This is an area where a moderator analysis would be beneficial to stakeholders responsible for providing coaching to teachers in preschool settings.

Preliminary findings from this study indicate coaching interventions have mixed effects on increasing the use of descriptive praise and general praise. This may be due to the coaching delivery method, as all studies targeting descriptive and general praise conducted coaching via email. Descriptive praise is a useful strategy to acknowledge appropriate behaviors and prevent problem behaviors in preschool classrooms, but perhaps a different coaching method is warranted to improve these targeted teacher practices, like role-playing how to provide praise. None of the three studies examining

descriptive praise incorporated role play in the coaching process. Future studies should examine if coaching interventions with performance feedback and role play activities yield positive results or examine if provided coaching face to face produces positive effects in changing teachers' behavior.

Overall, more replication studies are needed to further evaluate coaching interventions that address social, emotional, and behavioral outcomes. The current single-case design literature consists of coaching interventions that are individualized based on teacher needs. Although this is ideal, more investigations are needed to attempt to identify minimum thresholds (coaching sessions) necessary to create sustainable changes in teacher's behaviors.

As for the coaching interventions, the number of components implemented across studies varied greatly, with 75% of the studies implementing between 6 and 14 components. Given that all the studies included focused observations and performance feedback, future research may want to investigate how the number of components implemented impact teaching practices as well as student outcomes.

Findings from interviews and focus groups of early childhood teachers reported that addressing challenging behavior is the top priority need, followed by promoting social and emotional development (Fox & Smith, 2007; Smith, 2006). With the passing of the new Head Start standards (2017), which require coaching as part of their Head Start Program Performance Standards professional development for their teachers, research will be necessary to guide efficient and effective coaching practices, especially in these areas. This study specifically focused on coaching interventions that target

social emotional and behavioral outcomes for this reason. Coaching is an effective approach implemented across educational settings, and this study contributes to the early childhood literature base on the potential impact coaching interventions can have on targeted teacher practices. As more studies emerge on this topic, it will important for future research to report student outcomes along teacher outcomes to provide a better, contextual understanding on how coaching can impact the social emotional development in preschool classrooms.

CHAPTER IV

CONCLUSION

One-time professional development workshops are not sufficient to sustain a change in teacher practices and student learning (Yoon et al., 2007). Coaching is a professional development approach that can support teachers in implementing new practices and improve classroom instruction. This dissertation conducted two studies to: (a) systematically identify single-case research design studies examining the effects of coaching interventions to improve targeted teacher practices, (b) evaluate the studies using the WWC design and evidence standards developed by WWC Single-Case Design Standards (U.S. Department of Education, Institute of Education Sciences, & What Works Clearinghouse, 2017), and (c) estimate the magnitude of effect coaching has on targeted teacher practices related to social, emotional, and behavioral outcomes for young children in preschool settings.

The results from the systematic literature review provided a summary of coaching components currently implemented across the literature. Using the WWC single-case research 5-3-20 standard, the findings indicate there is sufficient empirical evidence to support the use of coaching to improve targeted teacher practices addressing social, emotional, and behavioral outcomes of young children in preschool settings. Results from the meta-analysis examined the overall estimated effects of coaching interventions, and indicated the studies demonstrated medium or high effects.

Additionally, the meta-analysis provided valuable information to identify gaps in research, and inform practice for future studies.

Overall, these preliminary findings indicate how effective coaching interventions can be to improve teacher practices in the classroom. As of 2017, Head Start programs in the United States, which employ over 259,000 staff members, are required to provide coaching as part of their Head Start Program Performance Standards [45 CFR § 1302.92(c)(1)–(5)] (https://eclkc.ohs.acf.hhs.gov). More research will be necessary to inform the field on effective and efficient coaching practices.

REFERENCES

Anderson, L. M., Shinn, C., Fullilove, M. T., Scrimshaw, S. C., Fielding, J. E., Normand, J., ... & Task Force on Community Preventive Services. (2003). The effectiveness of early childhood development programs: A systematic review. *American Journal of Preventive Medicine*, *24*(3), 32-46.

Artman-Meeker, K. M., & Hemmeter, M. L. (2013). Effects of training and feedback on teachers' use of classroom preventive practices. *Topics in Early Childhood Special Education, 33*(2), 112-123.

Artman-Meeker, K., Fettig, A., Barton, E. E., Penney, A., & Zeng, S. (2015). Applying an evidence-based framework to the early childhood coaching literature. *Topics in Early Childhood Special Education*, *35*(3), 183-196.

Barton, E. E., Chen, C. I., Pribble, L., Pomes, M., & Kim, Y. A. (2013). Coaching preservice teachers to teach play skills to children with disabilities. *Teacher Education and Special Education*, *36*(4), 330-349.

Barton, E. E., Fuller, E. A., & Schnitz, A. (2016). The use of email to coach preservice early childhood teachers. *Topics in Early Childhood Special Education*, *36*(2), 78-90.

Barton, E. E., Pokorski, E. A., Gossett, S., Sweeney, E., Qiu, J., & Choi, G. (2018). The Use of email to coach early childhood teachers. *Journal of Early Intervention, 40*(3), 212–228.

Bishop, C. D., Snyder, P. A., & Crow, R. E. (2015). Impact of video self-monitoring

with graduated training on implementation of embedded instructional learning trials. *Topics in Early Childhood Special Education*, *35*(3), 170-182.

Brock, M. E., & Beaman-Diglia, L. E. (2018). Efficacy of coaching preschool teachers to manage challenging behavior. *Education and Treatment of Children*, *41*(1), 31-48.

Campbell, S. B., (1995). Behavior problems in preschool children: A review of recent research. *Journal of Child Psychology and Psychiatry, 36* (1), 113-149.

Campbell, S. B. & Ewing L. J. (1990) Adjustment at age nine and predictors of continuing symptoms. *Journal of Child Psychology, 31*, 871-89 https://doi.org/10.1177/1053815118760314

Casey, A. M., & McWilliam, R. A. (2011). The impact of checklist-based training on teachers' use of the zone defense schedule. *Journal of Applied Behavior Analysis, 44*(2), 397–401.

Damon, W., Lerner, R. M., & Eisenberg, N. (Eds.). (2006). *Handbook of child psychology, social, emotional, and personality development*. John Wiley & Sons.

Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional learning in the learning profession: *A status report on teacher development in the United States and abroad*. Washington, DC: National Staff Development Council.

Denham, S. A., & Brown, C. (2010). Plays nice with others: Social emotional learning and academic success. *Early Education & Development, 21*(5), 652–680.

Every Student Succeeds Act of 2015, Pub. L. No. 114-95 Stat2096.

https://www.congress.gov/114/plaws/publ95/PLAW-114publ95.pdf

Diamond, K.E.& Powell, D.R., 2011. An iterative approach to the development of a professional development intervention for Head Start teachers. *Journal of Early Intervention, 33* (1), 75–93.

Fabes, R. A., Gaertner, B. M., & Popp, T. K. (2006). Getting along with others: social competence in early childhood. In K. McCartney, & D. Phillips (Eds.), Blackwell handbook of early childhood development (pp. 297–316). Malden, MA: Blackwell.

Fallon, L. M., Collier-Meek, M. A., Maggin, D. M., Sanetti, L. M., & Johnson, A. H. (2015). Is performance feedback for educators an evidence-based practice? A systematic review and evaluation based on single-case research. *Exceptional Children*, *81*(2), 227-246.

Fettig, A., & Artman-Meeker, K. (2016). Group coaching on pre-school teachers' implementation of pyramid model strategies: A program description. *Topics in Early Childhood Special Education*, *36*(3), 147-158.

Filcheck, H. A., McNeil, C. B., Greco, L. A., & Bernard, R. S. (2004). Using a whole-class token economy and coaching of teacher skills in a preschool classroom to manage disruptive behavior. *Psychology in the Schools, 41*(3), 351-361.

Fox, L, & Binder, D. (2015). Getting Preschool Classrooms on Board with School-Wide Positive Behavioral Intervention and Supports (SW-PBIS). Retrieved from: http://challengingbehavior.cbcs.usf.edu/TACSEI/do/resources/documents/Get%20on%20board-SW-PBIS.pdf

Fox, L., Dunlap, G., Hemmeter, M. L., Joseph, G. E., & Strain, P. S. (2003). The teaching pyramid: A model for supporting social competence and preventing challenging behavior in young children. *Young Children, 58*(4), 48–52.

Fox, L., & Hemmeter, M. L. (2009). A program-wide model for supporting social emotional development and addressing challenging behavior in early childhood settings. In W. Sailor, G. Dunlap, G. Sugai, & R. Horner (Eds.), Handbook of positive behavior support (pp. 177–202). New York, NY: Springer.

Fox, L., Hemmeter, M. L., Snyder, P., Binder, D. P., & Clarke, S. (2011). Coaching early childhood special educators to implement a comprehensive model for promoting young children's social competence. *Topics in Early Childhood Special Education, 31*(3), 178-192.

Fox, L., & Smith, B. J. (2007). Promoting social, emotional and behavioral outcomes of young children served under IDEA. Issue Brief. *Technical Assistance Center on Social Emotional Intervention for Young Children*.

Gupta, S. S., & Daniels, J. (2012). Coaching and professional development in early childhood classrooms: Current practices and recommendations for the future. *NHSA Dialog*, *15*(2), 206-220.

Halle, T. G., Whittaker, J. V., Zepeda, M., Rothenberg, L., Anderson, R., Daneri, P., … Buysse, V. (2014). The social–emotional development of dual language learners: Looking back at existing research and moving forward with purpose. *Early Childhood Research Quarterly*, *29*(4), 734–749. https://doi-org.srv-proxy1.library.tamu.edu/10.1016/j.ecresq.2013.12.002

Hasbrouck, J. E. (1997). Mediated peer coaching for training preservice teachers. *Journal of Special Education Teachers, 31*(2), 251-271.

Hemmeter, M. L., Ostrosky, M., & Fox, L. (2006). Social and emotional foundations for early learning: A conceptual model for intervention. *School Psychology Review*, *35*(4), 583.

Hemmeter, M. L., Snyder, P., Kinder, K., & Artman, K. (2011). Impact of performance feedback delivered via electronic mail on preschool teachers' use of descriptive praise. *Early Childhood Research Quarterly*, *26*(1), 96-109.

Hemmeter, M. L., Corso, R., & Cheatham, G. (2006). Issues in addressing challenging behaviors in young children: A national survey of early childhood educators. *Conference on Research Innovations in Early Intervention, San Diego, CA.*

Hemmeter, M. L., Hardy, J. K., Schnitz, A. G., Adams, J. M., & Kinder, K. A. (2015). Effects of training and coaching with performance feedback on teachers' use of Pyramid Model practices. *Topics in Early Childhood Special Education*, *35*(3), 144-156.

Hendrickson, J. M., Gardner, N., Kaiser, A., & Riley, A. (1993). Evaluation of a social interaction coaching program in an integrated daycare setting. *Journal of Applied Behavior Analysis*, *26*(2), 213-225.

Hitchcock, J. H., Kratochwill, T. R., & Chezan, L. C. (2015). What Works Clearinghouse standards and generalization of single-case design evidence. *Journal of Behavioral Education*, *24*(4), 459-469.

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.

Individuals with Disabilities Education Act, 20 U.S.C. §§ 1400 et seq. (2006 & Supp. V. 2011)

Ingvarsson, E. T., & Hanley, G. P. (2006). An evaluation of computer-based programmed instruction for promoting teachers' greetings of parents by name. *Journal of Applied Behavior Analysis, 39*(2), 203–214

Jacob, A., & McGovern, K. (2015). The Mirage: Confronting the Hard Truth about Our Quest for Teacher Development. TNTP.

Johnson, S. R., Finlon, K. J., Kobak, R., & Izard, C. E. (2017). Promoting student-teacher interactions: exploring a peer coaching model for teachers in a preschool setting. *Early Childhood Education Journal, 45*(4), 461–470.

Joyce, B., & Showers, B. (1982). The coaching of teaching. *Educational Leadership*, *40*(1), 4-10.

Joyce, B. R., & Showers, B. (2002). Student achievement through staff development.

Kohler, F. W., McCullough, K. M., & Buchan, K. A. (1995). Using peer coaching to enhance preschool teachers' development and refinement of classroom activities. *Early Education and Development*, *6*(3), 215-239.

Kohler, F. W., Crilley, K. M., Shearer, D. D., & Good, G. (1997). Effects of peer coaching on teacher and student outcomes. *The Journal of Educational Research, 90*(4), 240-250.

Kohler, F. W., Ezell, H. K., & Paluselli, M. (1999). Promoting changes in teachers' conduct of student pair activities: An examination of reciprocal peer coaching. *The Journal of Special Education, 33*(3), 154-165.

Kraft, M. A., Blazar, D., & Hogan, D. (2018). The effect of teacher coaching on instruction and achievement: A meta-analysis of the causal evidence. *Review of Educational Research*, *88*(4), 547-588.

Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2010). Single-case designs technical documentation. Retrieved from What Works Clearinghouse web site: http:// ies.ed.gov/ncee/wwc/pdf/wwc_scd.pdf

Kratochwill, T. R., Hitchcock, J. H., 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*(1), 26-38.

Kretlow, A. G., Wood, C. L., & Cooke, N. L. (2009). Using in-service and coaching to increase kindergarten teachers' accurate delivery of group instructional units. *Journal of Special Education*. Advance online publication. doi: 10.1177/0022466909341333

Kretlow, A. G., & Bartholomew, C. C. (2010). Using coaching to improve the fidelity of evidence-based practices: A review of studies. *Teacher Education and Special Education*, *33*(4), 279-299.

La Paro, K. M., & Pianta, R. C. (2000). Predicting children's competence in the early

school years: A meta-analytic review. *Review of Educational Research, 70,* 443–484.

Ledford, J. R., Zimmerman, K. N., Chazin, K. T., Patel, N. M., Morales, V. A., & Bennett, B. P. (2017). Coaching paraprofessionals to promote engagement and social interactions during small group activities. *Journal of Behavioral Education*, *26*(4), 410-432.

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

Lignugaris/Kraft, B., & Marchand-Martella, N. (1993). Evaluation of preservice teachers' interactive teaching skills in a Direct Instruction practicum using student teachers as supervisors. *Teacher Education and Special Education*, *16*(4), 309-318.

Lyon, A. R., Gershenson, R. A., Farahmand, F. K., Thaxter, P. J., Behling, S., & Budd, K. S. (2009). Effectiveness of Teacher-Child Interaction Training (TCIT) in a preschool setting. *Behavior Modification, 33*(6), 855-884.

Maggin, D. M. (2015). Considering generality in the systematic review and meta-analysis of single-case research: A response to Hitchcock et al. Journal of Behavioral Education, 24, 470–482.

Maggin, D. M., O'Keeffe, B. V., & Johnson, A. H. (2011). A quantitative synthesis of methodology in the meta-analysis of single-subject research for students with disabilities: 1985–2009. *Exceptionality*, *19*(2), 109-135.

Maggin, D. M., Lane, K. L., & Pustejovsky, J. E. (2017). Introduction to the Special

Issue on Single-Case Systematic Reviews and Meta-Analyses. *Remedial and Special Education*, *38*(6), 323-330.

Maheady, L., Harper, G. F., Mallette, B., & Karnes, M. (2004). Preparing preservice teachers to implement class wide peer tutoring. *Teacher Education and Special Education, 27*(4), 408-418.

Markowitz, J., Carlson, E., Frey, W., Riley, J., Shimshak, A., Heinzen, H., ... & Hyunshik, L. (2006). Preschoolers with Disabilities: Characteristics, Services, and Results. Wave 1 Overview Report from the Pre-Elementary Education Longitudinal Study (PEELS). NCSER 2006-3003. *National Center for Special Education Research*.

McClelland, M. M., Morrison, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: The role of learning related social skills. *Early Childhood Research Quarterly, 15*(3), 307–329.

McLeod, R. H., Kim, S., & Resua, K. A. (2019). The effects of coaching with video and email feedback on preservice teachers' use of recommended practices. *Topics in Early Childhood Special Education, 38*(4), 192–203. https://doi.org/10.1177/0271121418763531

Mechling, L., Gast, D. L., & Lane, J. D. (2018). Ethical Principles and Practices in Research. In *Single-case Research Methodology* (pp. 27-42). Routledge.

Miller, S. P., Harris, C., & Watanabe, A. (1991). Professional coaching: A method for increasing effective and decreasing ineffective teacher behaviors. *Teacher Education and Special Education, 14*(3), 183-191.

Morgan, R. L., Menlove, R., Salzberg, C. L., & Hudson, P. (1994). Effects of peer coaching on the acquisition of direct instruction skills by low-performing preservice teachers. *The Journal of Special Education*, *28*(1), 59-76.

Mraz, M., Algozzine, B., & Watson, P. (2008). Perceptions and expectations of roles and responsibilities of literacy coaching. *Literacy Research and Instruction, 47*(3), 141–157.

NAEYC & NACCRRA (National Association of Child Care Resource and Referral Agencies). 2011. Early Childhood Education Professional Development: Training and Technical Assistance Glossary. Washington, DC: Authors. https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/our-work/public-policy-advocacy/glossarytraining_ta.pdf

National Center on Quality Teaching and Learning . (2012). Practice-based coaching. Retrieved from http://eclkc.ohs.acf.hhs.gov/hslc/tta-system/teaching/development/coaching.html

Neuman, S. B., Cunningham, L. (2009). The impact of professional development and coaching on early language and literacy instructional practices. *American Educational Research Journal, 46*, 532–566. doi:10.3102/0002831208328088

Office of Head Start. (2016). Head Start program performance standards, 45 CFR Chapter XIII. Retrieved from: https://eclkc.ohs.acf.hhs.gov/sites/default/files/.pdf

Ottley, J. R., & Hanline, M. F. (2014). Bug-in-ear coaching: Impacts on early childhood educators' practices and associations with toddlers' expressive communication. *Journal of Early Intervention*, *36*(2), 90-110.

Parker, R. I., Vannest, K. J., & Davis, J. L. (2011a). Effect size in single-case research: A review of nine nonoverlap techniques. Behavior Modification, 35, 303-322. doi:10.1177/0145445511399147

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., 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.

Peck, C. A., Killen, C. C., & Baumgart, D. (1989). Increasing implementation of special education instruction in mainstream preschools: Direct and generalized effects of nondirective consultation. *Journal of Applied Behavior Analysis, 22*(2), 197-210.

Phillips, D., Austin, L. J., & Whitebook, M. (2016). The early care and education workforce. *The Future of Children, 26*(2), 139-158.

Pianta, R., Hamre, B., Downer, J., Burchinal, M., Williford, A., LoCasale-Crouch, J., ... & Scott-Little, C. (2017). Early childhood professional development: coaching and coursework effects on indicators of children's school readiness. *Early Education and Development, 28*(8), 956-975.

Pierce, T., & Peterson Miller, S. (1994). Using peer coaching in preservice practica. *Teacher Education and Special Education*, *17*(4), 215-223.

Pierce, J., & Buyssee, V. (2014). Effective coaching: improving teacher practice and

outcomes for all learners. *National Center for Systemic Improvement Brief, Nov*. Retrieved from https://ncsi-library.wested.org/resources/57

Powell, D., Dunlap, G., & Fox, L. (2006). Prevention and intervention for the challenging behaviors of toddlers and preschoolers. *Infants & Young Children*, *19*(1), 25-35.

Raver, C. C., & Knitzer, J. (2002). *Ready to enter: What research tells policymakers about strategies to promote social and emotional school readiness among three- and four-year-olds*. National Center for Children in Poverty. Retrieved from http://www.nccp.org/publications/pdf/text_485.pdf

Rimm-Kaufman, S. E., Pianta, R. C, & Cox, M. J. (2000). Teachers' judgments of problems in the transition to kindergarten. *Early Childhood Research Quarterly. 15*(2), 147-166.

Rudd, L. C., Lambert, M. C., Satterwhite, M., Smith, C. H. (2009). Professional development + coaching = enhanced teaching: Increasing usage of math mediated language in preschool classrooms. *Early Childhood Education Journal, 37,* 63–69. doi:10.1007/s10643-009-0320-5

Rush, D. D., & Shelden, M. L. (2011). The early childhood coaching handbook. Baltimore, MD: Brookes.

Shadish, W. R., Hedges, L. V., Horner, R. H., & Odom, S. L. (2015). The Role of Between-Case Effect Size in Conducting, Interpreting, and Summarizing Single-Case Research. NCER 2015-002. *National Center for Education Research*.

Showers, B. (1984). Peer Coaching: A Strategy for Facilitating Transfer of Training. A

CEPM R&D Report.

Showers, B. (1985). Teachers coaching teachers. *Educational Leadership*, *42*(7), 43-48.

Showers, B., & Joyce, B. (1996). The evolution of peer coaching. *Educational Leadership*, *53*, 12-16.

Shonkoff, J. P., & Philips, D. A. (Eds.). (2000). From neurons to neighborhoods: The science of early childhood development. Washington, DC: National Academy Press.

Simonsen, B., Fairbanks, S., Briesch, A., Myers, D., & Sugai, G. (2008). Evidence-based practices in classroom management: Considerations for research to practice. *Education and treatment of children, 31*(3) 351-380.

Smith, B., & Fox, L. (2003). Systems of service delivery: A synthesis of evidence relevant to young children at risk of or who have challenging behavior. *Center for Evidence-based Practice: Young Children with Challenging Behavior. Available: www.challengingbehavior.org*.

Smith, B. J. (2006). Policies and procedures: Issues for implementation, policy and scaling up. Presentation, Annual Policy Maker's Summit, Center on Evidence-based Practices: Young Children with Challenging Behavior, Washington, DC, November, 2006. www.challengingbehavior.org

Snyder, P., Hemmeter, M. L., Meeker, K. A., Kinder, K., Pasia, C., & McLaughlin, T. (2012). Characterizing key features of the early childhood professional development literature. *Infants & Young Children, 25*(3), 188-212.

Snyder, P.A., Hemmeter, M.L., & Fox, L. (2015). Supporting implementation of

evidence-based practices through practice-based coaching. *Topics in Early Childhood Special Education, 35(*3), 133-143.

Strain, P. S., & Timm, M. A. (2001). Remediation and prevention of aggression: An evaluation of the Regional Intervention Program over a quarter century. *Behavioral Disorders*, *26*(4), 297-313.

Reinke, W. M., Stormont, M., Herman, K. C., Puri, R., & Goel, N. (2011). Supporting children's mental health in schools: Teacher perceptions of needs, roles, and barriers. *School Psychology Quarterly, 26*(1), 1–13.

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

Tarlow, K. R. (2017a). An improved rank correlation effect size statistic for single-case designs: Baseline Corrected Tau. *Behavior Modification, 41*(4), 427-467. http://dx.doi.org/10.1177/0145445516676750

Tarlow, K. R. (2017b, June). Baseline Corrected Tau for single-case research (R code). Retrieved from http://ktarlow.com/stats

U.S. Department of Education, Institute of Education Sciences, What Works Clearinghouse. (2017). What Works Clearinghouse: Standards Handbook (Version 4.0). Retrieved from https://ies.ed.gov/ncee/wwc/Docs/referenceresources/wwc_procedures_handbook_v4.pdf

Vannest, K. J., & Ninci, J. (2015). Evaluating intervention effects in single-case research designs. *Journal of Counseling & Development*, *93*(4), 403-411.

Vannest, K.J., Parker, R.I., Gonen, O., & Adiguzel, T. (2016). Single Case Research: web based calculators for SCR analysis. (Version 2.0) [Web-based application]. College Station, TX: Texas A&M University. Retrieved Tuesday 11th February 2020. Available from singlecaseresearch.org

Wayne, A. J., Yoon, K. S., Zhu, P., Cronen, S., & Garet, M. S. (2008). Experimenting with teacher professional development: Motives and methods. *Educational Researcher*, *37*(8), 469-479.

Wehby, J. H., Maggin, D. M., Partin, T. C. M., & Robertson, R. (2012). The impact of working alliance, social validity, and teacher burnout on implementation fidelity of the good behavior game. *School Mental Health, 4*(1), 22–33.

Werner, C. D., Linting, M., Vermeer, H. J., & Van IJzendoorn, M. H. (2016). Do intervention programs in child care promote the quality of caregiver-child interactions? A meta-analysis of randomized controlled trials. *Prevention Science*, *17*(2), 259-273.

Wilson, K. P., Dykstra, J. R., Watson, L. R., Boyd, B. A., & Crais, E. R. (2012). Coaching in early education classrooms serving children with autism: A pilot study. *Early Childhood Education Journal*, *40*(2), 97-105.

Yates, T., Ostrosky, M. M., Cheatham, G. A., Fettig, A., Shaffer, L., & Santos, R. M. (2008). Research synthesis on screening and assessing social-emotional competence. *The Center on the Social and Emotional Foundations for Early Learning.* http://csefel.vanderbilt.edu/

Yoshikawa, H., & Zigler, E. (2000). Mental health in Head Start: New directions for the

twenty-first century. *Early Education and Development, 11*(3), 247–264.

Yoon, K. S., Duncan, T., Lee, S. W. Y., Scarloss, B., & Shapley, K. L. (2007). Reviewing the evidence on how teacher professional development affects student achievement. issues & answers. REL 2007-No. 033. *Regional Educational Laboratory Southwest (NJ1).*

Zaslow, M., Tout, K., Halle, T., Whittaker, J. V., & Lavelle, B. (2010). *Toward the Identification of Features of Effective Professional Development for Early Childhood Educators*. Washington, DC: Office of Planning, Evaluation, and Policy Development.