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Social-Emotional Interventions for Young Children in Rural Areas: A Single-Case Design Meta-Analysis

Tyler E. Smith, Melissa Stormont, Marina Antonova, Emily Singell, Wendy M. Reinke

Abstract

For young children with early social-emotional difficulties, early intervention is imperative. A number of interventions are available for young children to promote social-emotional competencies. Yet, little is known regarding the impact of early childhood interventions among rural children. Rural communities have several barriers which impede access to early intervention, and rural children often are at increased risk for social-emotional difficulties. Thus, the purpose of this article is to conduct a meta-analysis of single case design studies of social-emotional interventions that have been implemented within rural settings with young children, in an effort to determine the effects and types of early interventions specific to young children in rural areas. A total of 7 studies with 26 participants and 53 effects comprised the final sample. Findings indicated that all interventions, representing three different component types (i.e., teacher/parent behavior management training, social-emotional competency training, parent involvement/enhancement), produced positive social-emotional outcomes (i.e., improved prosocial behavior and decreased disruptive behavior). Moderating variables (e.g., child characteristics, intervention implementer) that may impact intervention effectiveness were also studied and one variable was significant; specifically, studies published in journals had more impact on outcomes than those which were not published. Implications for future research and policy are provided.

Keywords: *rural settings; early childhood; social-emotional interventions; single-case design*

Introduction

Research consistently demonstrates that social-emotional development is a critical predictor of school success (e.g., Denham, 2006; Stormont, 2021). Specifically, social-emotional skills during preschool predict an array of critical short- and long-term child outcomes (Curby et al., 2015; Raver, 2004). The need to develop specific social-emotional skills and competencies in early childhood is also reflected in kindergarten readiness research and skills needed for success in elementary school (Stormont, 2021). Unfortunately, many children struggle in their social-emotional development for a variety of reasons and need support to learn and use social-emotional skills (Sheridan et al., 2019). For young children with early social-emotional difficulties, early intervention is imperative to support the development of key competencies and skills (Robinson et al., 2017).

Fortunately, a wide range of interventions are available for young children to promote social-emotional competencies (Blewitt et al., 2018; Smith et al., 2020). However, the effectiveness of specific interventions with specific groups is an understudied area. One factor that may affect the availability and use of social emotional interventions and supports is the geographical area where children live (Miller et al., 2013). The impact of where children reside is important, as children may be at greater risk for both needing and not having access to social emotional services due to their geographic location. When compared to urban areas, rural children are more likely to exhibit school-based adjustment problems (Rimm-Kaufman et al., 2000) and to be diagnosed with a behavioral or developmental disorder (Robinson et al., 2017). In addition, young children with social-emotional needs who live in rural areas often face additional challenges (e.g., lack of qualified providers, poverty) that also impact development (Morales et al., 2020; Robinson et al., 2017). To address these issues, the purpose of this article is to conduct a meta-analysis of social-emotional interventions that have been implemented within rural settings with young children.

In the following sections, systemic issues and barriers within rural communities are presented, followed by evidence of the need to systematically review and utilize data from single-case designs.

Barriers to Rural Early Intervention

There are multiple systemic issues that affect the provision of early childhood interventions and services at the community, family, and professional level (Bailey et al., 2018; Morales et al., 2020; Robinson et al., 2017). Young children acquire social-emotional skills and competencies through their interactions with others, including their caregivers, who can seek support on behalf of their children if they struggle in their development of specific competencies and skills. However, caregivers within rural communities often have less access to resources to address their own mental health, and may also face significant issues related to food insecurity and poverty. In fact, approximately one in four rural children in the U.S. live in poverty, as compared to one in five children nationally (Farrigan & Hertz, 2016). These factors contribute to parents' ability to support their children's development and need for services (Morales et al., 2020). Furthermore, when families are willing to seek and participate in interventions, the lack of qualified professionals can present another barrier. In some communities, qualified professionals are scarce or nonexistent compared to urban areas, which leads to gaps between needs and interventions (Sheridan et al., 2019). Finally, within rural communities there may be logistical barriers (e.g., lack of transportation) or an underutilization of available services due to stigma.

Given the inequity and vulnerability that exists in rural communities, and the impact it has on young children's social emotional development, it is imperative that the professionals who do deliver intervention in rural communities understand cultural factors and barriers to seeking and sustaining services and interventions (Morales et al., 2020). According to research with professionals who work in rural communities, it is essential that

professionals implementing services and targeted interventions consider and understand the cultural aspects of such communities (Morales et al., 2020). This understanding is important given that these aspects may contribute to stigmas related to seeking services (e.g., the belief that "I should be able to handle this independently").

Addressing Barriers in Rural Areas with Effective Intervention

In order to address barriers and target increased risk for young children with social-emotional needs in rural areas, research must continue to uncover and assess the effects of interventions for rural samples. Available intervention literature has provided key findings concerning the impact of social-emotional interventions on developmental outcomes in early childhood. For instance, large-scale reviews and meta-analyses have broadly demonstrated the importance of early childhood interventions in promoting children's behavioral and social-emotional development (e.g., Blewitt et al., 2018; Luo et al., 2020; Yang et al., 2019). These findings indicate promise for addressing barriers within rural communities; however, these results are inclusive of studies across all geographical regions. More work which focuses on assessing effects for rural early childhood populations is necessary.

Beyond determining intervention effects, it is important to recognize and consider the varying practices and approaches used within early childhood interventions. Schindler and colleagues (2015), for instance, found that early childhood programs with a clear and intensive focus on social-emotional development included child social-emotional skill training (e.g., teaching basic cognitive skills necessary for social problem-solving) as well as parent and/or teacher behavior management training (e.g., teaching effective reward/discipline strategies, limit setting). The importance of parent involvement in supporting children's behavior and social-emotional competencies across all levels of development has also been consistently highlighted across the literature (e.g., Reinke et al., 2019; Smith et al., 2019; Smith & Sheridan, 2019). Within early childhood,

in particular, targeted parent involvement interventions have been shown to improve child social-emotional competencies (Sheridan et al., 2010; Smith et al., 2021). Social-emotional interventions within rural areas are also likely to demonstrate varying practices, and uncovering the core components that contribute to intervention effects may yield highly relevant information that is essential to addressing barriers and informing future research and practice.

The body of empirical literature to date showcasing the effects of early childhood interventions and highlighting key intervention components has been vital for the field of early childhood education. That said, these findings are based solely on meta-analyses or large-scale studies of group-design research, and may not be entirely representative of high-quality experimental research conducted in this area. Synthesizing single-case design (SCD) studies may provide further support for group-design findings, and offer unique insights into important systematic factors, intervention characteristics, and child or study-level variables that influence social-emotional interventions for young children in rural areas.

The Need for SCD Meta-Analyses

SCDs make up a substantial and important part of the literature base in the fields of education and psychology. Given their feasibility and small number of needed participants, SCDs play prominent roles in clinical and applied intervention research. This may be especially true for research on social-emotional interventions used for students with emotional and behavioral disorders (Lane et al., 2009) and other low-incidence disabilities (Pustejovsky & Ferron, 2017). For instance, one comprehensive review of interventions for children with autism found that 89% of the 456 included studies used SCDs (Wong et al., 2015). Another review of positive behavior interventions for children with behavior problems located 62 SCD studies and only one group-design study (Conroy et al., 2005). The size and breadth of research employing SCDs appears to have increased over the past three decades, as evidenced by increased

frequency of publications in prominent special education journals (Hammond & Gast, 2010). Given this increase, it is also likely that SCD studies specifically focused on social-emotional interventions in rural areas comprise a significant portion of research in this area. However, to our knowledge, no meta-analyses or large-scale reviews to date have focused on this population.

The prominence of SCD studies in particular fields, their feasibility in applied settings, and their increased prevalence in reported research underscore the need for syntheses and systematic reviews. Visual analysis methods typically used to evaluate findings from SCDs do not create a single summary measure or numerical index to quantify magnitude of behavior change (Pustejovsky, 2018). This makes it difficult to compare outcomes quantitatively across multiple SCD studies. In contrast, meta-analysis procedures allow the average magnitude and distribution of effects to be estimated via combined results (Borenstein et al., 2009). Within group-design research, meta-analyses are often considered to be the highest standard of evaluating intervention effectiveness (Hoffman et al., 2013). Meta-analytic approaches for SCD research, however, have not yet reached the same degree of consensus. Thankfully, recent methodological advances over the last 15 years continue to expand upon the ways in which meta-analyses of SCDs are conducted. Especially in areas of significant need for evidence given a gap in the literature, SCD studies represent a resource that could be utilized to inform intervention and practice.

Study Purpose

Effectively supporting children during early childhood is critical to a myriad of child outcomes, as social-emotional competencies are predictive of both short- and long-term child success. Unfortunately, many children, families, and schools in rural communities face barriers to accessing social-emotional interventions (e.g., lack of qualified professionals, existing stigma towards services, food insecurity and poverty). Research to date has demonstrated the

positive effects of interventions on children's behavioral and social-emotional development. Components of social-emotional interventions have varied widely. Unfortunately, much of the current knowledge regarding intervention effects and specific intervention components is based solely on group-design research that is inclusive of contexts beyond rural settings. More research specific to the types and effects of early childhood intervention specific to rural areas is needed. Given the prominence of SCD studies and recent methodological advancements in SCD meta-analytic practices, a meta-analysis of SCD studies may further support group-design work and provide unique insights regarding the context, usage, and effects of social-emotional interventions in early childhood settings in rural areas. Thus, the current study presents findings of a comprehensive SCD meta-analysis to address these issues and extend research in this area. The following questions guided the current study:

1. What are the effects of Pre-K social-emotional interventions used in rural areas on children's social-emotional functioning (overall), challenging behavior, and prosocial behavior?

2. What components within Pre-K social-emotional interventions used in rural areas are the most effective at improving children's social-emotional functioning?

3. To what degree do characteristics of the child (i.e., race/ethnicity, gender), study (i.e., study type), and intervention (i.e., intervention implementer) moderate the effects of interventions on children's social-emotional functioning?

Method

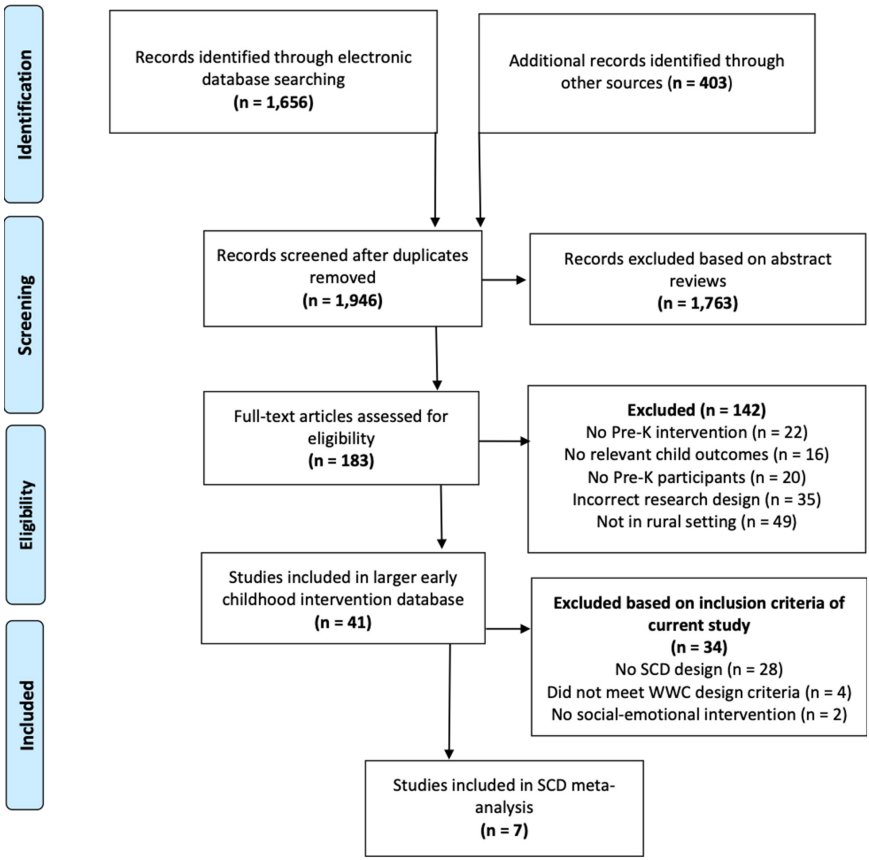
The present study is part of a larger, comprehensive meta-analysis focused on the effects of early childhood interventions on children's academic, behavioral, and social-emotional development in rural areas. For purposes of the current study, we were particularly interested in studies which employed SCD methodology in rural settings and examined the effects of early childhood interventions on children's social-emotional and behavioral outcomes. Thus, the

following section first describes methods and procedures from our larger, comprehensive meta-analysis, followed by details on the selection, coding, and analyses of studies that met criteria for the current study. Construction of the larger, comprehensive meta-analysis involved two processes: (1) literature search and (2) study identification.

Literature Search

Efforts to locate relevant studies involved three central approaches. First, five electronic databases (i.e., Academic Search Premier, APA PsycINFO, APA PsycARTICLES, ERIC, and MEDLINE) were searched using multiple search term parameters and combinations (e.g., "rural," "pre-k," "intervention," "social-emotional," etc.) to identify relevant literature from the years 2000 to 2020. Second, in an attempt to capture grey literature, we conducted searches through Google Scholar and through the online database ProQuest: Dissertation & Theses. Third, we conducted hand searches of nine relevant journals focused on rural education and/or mental health (e.g., Rural Special Education Quarterly, Journal of Rural Mental Health) and early education (e.g., Early Childhood Research Quarterly, Early Education and Development). Search procedures resulted in 1,946 potential studies. See Figure 1 for an overview of search and screening processes at each stage of the study.

FIGURE 1 – Flowchart of Search and Screening Processes



Study Identification

After search procedures were completed, identification of relevant studies involved a two-step process – abstract screening and full-text article reviews. First, our research team initially screened abstracts in an attempt to exclude any studies that were clearly irrelevant (e.g., did not focus on Pre-K populations, was not a quantitative research study). Approximately 30% of all study abstracts were double-screened and compared for inconsistencies during bi-weekly team meetings. As disagreements occurred about inclusion/exclusion, the first and second author discussed determinations with the research team until consensus was reached. Overall, inclusion/exclusion agreement was 92.76% for abstracts that were double-reviewed, indicating high agreement. At this stage, all but 163 studies were excluded.

The second step of the identification process involved reviewing the full-text version of each of the 183 studies identified as potentially relevant during our abstract screening process. All research team members were trained in the review process to ensure studies met the following criteria: (1) rural setting/sample: included a rural sample/setting in the United States (i.e., at least 50% of the study population being defined as rural), (2) Pre-K population: focused on pre-Kindergarten child populations (i.e., students aged 3-5 years), (3) intervention practices: included an intervention aimed at promoting children's academic/cognitive, language, behavioral, and/or social-emotional development, (4) child outcomes: presented child outcomes (i.e., measured effects of intervention practices on children's academic/cognitive, language, behavioral, and/or social-emotional development), and (5) used any of the following research designs: [a] an experimental or quasi-experimental design that compared groups receiving one or more interventions promoting Pre-K child development with one or more control groups, or [b]: a single case design (SCD) that utilized repeated measurement on at least one direct assessment of a qualifying child outcome measure assessed before (baseline

phase) and during the intervention. Based on abstract screening followed by full-text article reviews, 41 total Pre-K intervention studies were included in the final sample of the larger database.

Final Inclusion Criteria and Coding for the Current Study

The current study specifically focused on SCD studies that assessed the impacts of Pre-K interventions on children's behavioral and/or social-emotional outcomes. Final inclusion criteria for SCD studies were guided by the Institute of Education Sciences What Works Clearinghouse (IES-WWC) design standards (WWC, 2014). These standards were chosen as an aid in ruling out threats to internal validity. The IES-WWC standards include the following: (a) the independent variable (IV) is systematically manipulated, with the researcher determining when and how IV conditions change, (b) each study variable is measured systematically over time by more than one assessor, with at least 20% of data points in each condition measured, and inter-rater agreement meeting minimal thresholds, (c) the study includes at least three phases to demonstrate an intervention effect at different points in time, and (d) each phase must have an adequate number of data points. Studies that did not meet evidence standards or meet evidence standards with reservations were excluded.

After review of SCD studies based on IES-WWC standards, 7 studies with 26 participants and 53 effects were chosen for the final sample. Included studies were then coded using a codebook developed by the research team. This codebook includes multiple sections designed to focus on a number of study-, participant-, and outcome-level variables. The codebook was developed using an iterative process in which we created initial codes, tested initial codes through pilot coding, and then revised codes as necessary based on piloting. For purposes of the current study, we coded articles based on iteratively developed codes that included social-emotional intervention components (i.e., parent involvement/enhancement, teacher/parent behavior management training, social-emotional

competency training), children's social-emotional functioning outcomes (i.e., disruptive behavior or prosocial behavior), study type (i.e., published/unpublished), and intervention implementer (i.e., teacher, parent, interventionist/researcher). We additionally coded articles for child characteristics, including child race/ethnicity (i.e., White, African-American, Latinx, Multi-racial, American Indian, Asian/Asian-American, Native Hawaiian/Pacific Islander, or Other) and gender (i.e., male or female). All seven articles were double-coded to assess reliability. Overall percent agreement was 90.47% indicating high agreement for study codes among coders.

Data Analysis

Effect size calculation. A recently developed effect size index, the log response ratio (LRR; Pustejovsky, 2018), was used in the current study. The LRR accounts for issues in frequently used effect size indices (e.g., Tau-U, Percentage of Non-overlapping Data) that have unknown sampling distributions and are difficult to compare across studies using different measurement procedures. LRR effect sizes were calculated based on extracting raw data from digitized versions of graphs using the data extraction tool WebPlotDigitizer (Rohatgi, 2014), which has previously yielded high reliability and a high degree of usability (Moeyaert et al., 2016). LRR indices were then calculated using an online single-case effect size calculator (i.e., Pustejovsky & Swan, 2018). We calculated the LRR-increasing form of the LRR (i.e., the LRRi), to consistently report results in a single direction (i.e., positive values of effects correspond to both improvement in prosocial behaviors and reductions in disruptive behaviors).

Meta-analysis. We followed guidelines recommended by Pustejovsky (2018) based on a proposed three-level, hierarchical model to synthesize and analyze LRRi indices from included studies. This approach allowed us to account for potential issues with multiple cases/effects per study and within study dependence. In particular, for each three-level model synthesizing effects, Robust

Variance Estimation (RVE) techniques (Hedges et al., 2010) were used to account for potentially inaccurate sampling variances. For moderation analyses, meta-regression models for each moderator were conducted. All meta-analysis and RVE procedures were analyzed in R using the metafor (Viechtbauer, 2010) and clubSandwich packages (Pustejovsky, 2021).

Results

Characteristics of Included Studies

In total, 7 studies with 26 participants and 53 outcomes were included in the final sample. Of the seven included articles, four (57%) were journal articles and three (43%) were dissertations/theses. Of studies reporting specific information about rural location, three (50%) were located in the Southeastern U.S., followed by two (33%) in the Western U.S., and one (17%) in the Midwest. Regarding the total included child population, 47% were White, followed by 21% Black/African-American, 16% Latinx, 11% multiracial, and 5% American Indian/Native American. Child participants were overwhelmingly male (i.e., 74%); 26% were female. Regarding specific child participant characteristics, 27% of participants had a developmental delay, 23% had a speech or language impairment, 15% had typical development, 12% had autism spectrum disorder, and 23% were considered "at risk" based on other study-specific categorizations (e.g., low SES, significant behavioral problems).

The studies focused on three types of intervention strategies to support child behavior and social-emotional development. The first type of intervention component was teacher and/or parent behavior management training. Dufrene and colleagues (2007), for instance, focused on training teachers in different behavior management strategies for target students based on functional behavioral assessments (FBA); for example, providing differential reinforcement through praise of appropriate behavior while ignoring unwanted behaviors). The second intervention type included efforts aimed at training students to develop specific social-emotional

competencies (e.g., social skills, emotion regulation). Stanton-Chapman and colleagues (2012) taught and modeled social communication strategies in order to improve verbal and nonverbal interactions between children (e.g., initiating play with a peer). Finally, parent involvement/enhancement activities were used in three studies, and varied in intensity and specific methods. That is, Wood et al. (2011) interviewed parents as part of FBA procedures used to inform interventions, Beale (2009) shared information and procedures with parents in hopes of generalizing intervention practices to the home setting, and Hoffman et al. (2013) taught parents strategies to support children's critical communication skills at home.

Intervention Effects on Social-Emotional Functioning

We synthesized 53 effects across 7 studies to estimate the overall effects of social-emotional interventions on children's social-emotional functioning. Additionally, we synthesized 34 prosocial behavior effects across 3 studies and 19 disruptive behavior effects across 4 studies. Table 1 contains the results of each of the three multi-level meta-analysis models summarizing the pooled effects (i.e., LRRi), robust standard errors, 95% confidence intervals, corresponding percentage change, between-study variance (i.e., study-level SD), and within-study (participant-level SD) variance.

Pooled effects for each of the three models were significantly different from zero. The average LRRi estimate was 0.93 (95% CI [0.45,1.41]) across all social-emotional functioning outcomes, which corresponds to a 153% increase from baseline levels (see Table 1). For prosocial behaviors, the average LRRi estimate was 0.94 (95% CI [0.24, 1.65]), which corresponds to an increase of 155% from baseline levels (95% CI [34%, 177%]). Regarding disruptive behaviors, the average LRRi estimate was 0.91 (95% CI [0.51, 1.39]), which corresponds to a decrease of 148% from baseline levels. Results of all three models of social-emotional functioning outcomes indicate more between-study variability than within-study variability in

terms of effect sizes. Between-study SDs were all 0.35 or higher, whereas all within-study variability ranged from 0.02 to 0.28. This indicates that effects were more likely to vary across studies than within studies.

Table 1

Social-Emotional Intervention Effects (LRRi) on Child Outcomes

	k	*n*	LRRi (SE)	*CIs*	*% change*	*t*	Study-level SD	Case-level SD
Social-emotional functioning (overall)	7	53	0.93 (0.24)	0.45, 1.41	153.45	3.79**	0.38	0.15
Prosocial behavior	3	34	0.94 (0.36)	0.24, 1.65	155.99	2.63**	0.35	0.28
Disruptive behavior	4	19	0.91 (0.27)	0.51, 1.39	148.43	2.49*	0.46	0.02

Note: *n = number of effect sizes; k = number of studies; SE = standard error; CIs = 95% confidence intervals; * = p<0.05; ** = p<0.01; *** = p <0.001*

Intervention Component Analyses

The effects of social-emotional interventions on children's social-emotional functioning (overall) were also analyzed based on intervention components used within social-emotional interventions (see Table 2). Results for our three models organized by each intervention component also revealed that all models were significantly different from zero. For studies utilizing teacher and/or parent behavior management training, the average LRRi estimate was 0.99 (0.55,1.32), which corresponds to a 169% increase from baseline levels. Studies using social-emotional competency training had an average LRRi estimate of 1.35 (0.77, 1.93) with a 285% change from baseline, and studies incorporating parent involvement/enhancement had an average LRRi estimate of 1.25 (0.51, 1.99) with a 249% change from baseline. Studies using teacher/parent behavior management training had substantially higher between-study variability, whereas within-study variability was greater across studies using social-emotional competency training and parent involvement/enhancement.

Table 2
Social-Emotional Intervention Effects by Intervention Component

	k	*n*	LRRi (SE)	*Cis*	*% change*	*t*	Study-level SD	Case-level SD
Teacher/parent behavior management training	5	33	0.99 (0.22)	0.55, 1.32	169.12	3.59**	0.61	0.06
Social-emotional competency training	4	35	1.35 (0.29)	0.77, 1.93	285.74	4.57***	0.28	0.31
Parent involvement/ Enhancement	3	23	1.25 (0.37)	0.51, 1.99	249.03	3.29***	0.34	0.37

Note: *n = number of effect sizes; k = number of studies; SE = standard error; CIs = 95% confidence intervals; * = p<0.05; ** = p<0.01; *** = p <0.001*

Moderation Effects Based on Child, Intervention, and Study Characteristics

Moderator analyses were also undertaken to determine if variability in social-emotional effects was due to child, intervention, or study characteristics (see Table 3). We investigated two child characteristics (i.e., race/ethnicity and gender), neither of which were found to explain a significant degree of variation in effect size estimates. Regarding study/intervention characteristics, we compared studies based on study type (i.e., published journal articles compared to unpublished dissertations/theses), and also explored whether results varied based on who was implementing the intervention (i.e., teacher/parent compared to researcher/interventionist). No moderation effects were revealed based on intervention implementer; however, study type was found to significantly moderate effects. In particular, the effects of social-emotional interventions were more pronounced in published compared to unpublished studies ($F = 7.61$, $p = 0.01$).

Table 3
Moderation Analyses for Child Social-Emotional Outcomes

	k	*n*	LRRi (SE)	*CIs*	Study-level SD	Case-level SD	Test of between-group differences
Child Characteristics							
Race/Ethnicity							$F = 1.02, p = 0.41$
African-Am.	3	4	0.92 (0.54)	0.13, 1.96	0.81	0.02	
White	3	17	1.30 (0.45)	0.43, 2.17	0.53	0.13	
Latinx	3	8	1.13 (0.42)	0.33, 1.85	0.40	0.10	
Other	2	11	0.71 (0.25)	0.21, 1.20	0.00	0.67	
Gender							
Female	3	14	0.91 (0.18)	0.55, 1.27	0.00	0.41	$F = 0.04, p = 0.94$
Male	6	30	1.06 (0.29)	0.48, 1.63	0.46	0.13	
Study/Intervention Characteristics							
Intervention Implementer							$F = 1.30, p = 0.28$
Teacher/Parent	5	25	0.87 (0.30)	0.14, 1.13	0.44	0.04	
Researcher/ Interventionist	2	28	1.13 (0.42)	0.39, 1.81	0.32	0.12	
Study Type							$F = 7.61, p = 0.01$*
Journal Article	4	18	1.30 (0.32)	0.85, 1.75	0.40	0.14	
Dissertation/Thesis	3	35	0.46 (0.08)	0.29, 0.62	0.00	0.14	

Note: *n = number of effect sizes; k = number of studies; SE = standard error; CIs = 95% confidence intervals; * = p<0.05; ** = p<0.01; *** = p <0.001; Race/ethnicity Other = Multi-racial or American-Indian/Native American*

Discussion

Young children with social emotional problems need access to evidence-based interventions. Nearly one in five children live in rural areas (U.S. Census Bureau, 2016), with many at risk for service gaps and less trained professionals. Understanding the type and effects of early childhood interventions being utilized in rural areas is important because rural settings have specific cultural contexts that are not present in suburban and urban areas (Morales et al., 2020). Thus, given the unique needs of young children in rural areas, the purpose of this study was to conduct a meta-analysis of SCD studies of social-emotional interventions that have been implemented within rural settings with young children. This purpose reflects an effort to determine the effects and types of early interventions specific to young children in rural areas. Three research questions were addressed.

Research Question 1

First, the meta-analysis investigated the effects of early childhood interventions on children's overall social-emotional functioning as well as their impacts on prosocial behaviors and disruptive behaviors. Overall, results indicate that Pre-K interventions implemented in rural areas are an effective means for improving children's social-emotional development. Significant and positive findings were consistently revealed across social-emotional functioning (overall) and for both prosocial behavior and disruptive behavior child outcomes. The greatest area of improvement was found for prosocial behavior, where a 156% increase in prosocial behavior was estimated between baseline and intervention phases. This is promising because teaching young children prosocial behaviors (e.g., social skills, problem-solving skills) will likely improve outcomes over time. Young children with prosocial skills enter kindergarten with greater school readiness and ability to meet teacher expectations at this early point in their academic careers (Stormont, 2021). Results for disruptive behaviors are also very promising, given that these behaviors can be harmful to everyone in schools – including students exhibiting disruptive behaviors, their peers, and their teachers (Smith et al., 2022).

Research Question 2

Secondly, social-emotional intervention effects were analyzed based on the type of intervention components used. Of the seven SCD studies that met inclusion criteria, three types of components emerged including interventions aimed at supporting teacher and parent behavior management practices, interventions incorporating child skill training, and interventions directed at increasing parent involvement. Overall, all of these intervention practices yielded positive and significant benefits for rural children's social-emotional functioning. The largest impact on child overall social-emotional outcomes came from skill-based child training, meaning that children were taught specific social-emotional skills (e.g., effective

communication, understanding emotions). Although adult-based behavior management interventions are evidence-based and highly recommended practices, it is not surprising that child training practices would have a slightly larger effect within SCD studies. The skills children were being directly taught were often the same skills being assessed within studies, thus it might be expected that the impact of these interventions on these outcomes would be more immediate and pronounced. In contrast, training teachers and parents in behavior management strategies is an indirect process intended to help decrease student disruptive behaviors over time, and therefore, these strategies may not have the same immediate impact. However, we expect over time that teacher and parent training may produce more generalizable, and sustained behavior change. For instance, one study that followed children with early onset behavior problems who received an early childhood parenting intervention into adolescence found that the majority of youth were in the well-adjusted range (Webster-Stratton et al., 2011). Findings regarding interventions incorporating parent involvement are also noteworthy, and provide further support consistent with past research demonstrating the importance of parent involvement strategies in promoting children's social-emotional development (e.g., Sheridan et al., 2019).

Research Question 3

Lastly, several indicators, including child race and gender, whether the study was published in a journal, and whether the implementer was a researcher or not, were evaluated to determine if they moderated the findings. Only whether the study was published in a journal versus being a dissertation/thesis study was significant. In this case, those studies published in journals had a greater impact on student outcomes. This is not unexpected as published studies tend to be those in which significant outcomes were found, whereas studies with null findings are less likely to be published. This phenomenon is known as publication bias and

research has demonstrated that effect size metrics are predictive of the difference between published and unpublished studies (see Chow & Ekholm, 2018).

Implications for Research and Practice

Importantly, the overall findings from this meta-analysis demonstrate that early childhood social-emotional interventions can positively impact key social-emotional and behavioral outcomes for young children in rural settings. The fact that only seven SCD studies met the criteria for inclusion is an indication that more research needs to be done in this area in the context of rural settings. Considering our larger meta-analytic database (i.e., including group-design and academic interventions) of 41 total intervention studies, we can estimate that SCD studies specific to social-emotional interventions account for roughly a quarter of studies in this area. This is a surprising finding given the increased use of SCD research in relevant applied areas, and may be due to the fact that many social-emotional interventions are manualized and targeted at the small-group or classroom level and assessed via group-design methodology. Further, much of the current literature focuses on a combination of contexts (e.g., suburban, rural, urban) and therefore findings may not be as relevant to rural settings given the unique features of living in rural America (Morales et al., 2020). Rural samples also tend to have fewer participants, making SCD an ideal method for understanding how intervention impact outcomes for young children in need of supports in rural settings. Thus, more SCD research in this area is warranted to address rural student concerns.

Another implication for research and practice is the need to focus on important findings from research directing interventions for young children in rural settings, while also considering the broader research literature to date. Important work from Webster-Stratton et al. (2011) found children at higher risk in early childhood (i.e., behavior problems in the top 10% of clinical range) had less

positive long-term outcomes, when compared with their peers who were not in the clinical range. This indicates that children with more significant problems may need more intensive early supports. Given the heightened risk for social-emotional problems among children in rural settings, additional research that investigates the long-term outcomes of the types of interventions rural children receive is warranted.

These results also point to the need to combine the use of interventions identified as effective for young children in rural settings with what is known about barriers and cultural fit, to maximize the likelihood of positive outcomes for interventionists and participants. In order to do this, increased attention should be focused on the implementation of processes and systemic needs that support the intervention. It is possible that some of these elements, such as barrier reducing strategies, need to be part of the intervention. For instance, one common barrier in rural areas is a lack of trained service providers to support children's social-emotional development. Although the intervention implementer (i.e., parent/teacher compared to researcher/interventionist) was not found to significantly moderate results, it was promising to see that the majority of studies (i.e., 71%) involved parents and/or teachers as the individuals implementing social-emotional interventions. Given the lack of availability of highly-trained practitioners in rural areas, it is important to recognize that parents and teachers within these communities can be the agents of change used to provide critical interventions. Moving forward, efforts should be made to continue to train individuals in effective practices to support children's social-emotional development.

Limitations

While this study yields important information regarding the overall effects of social-emotional interventions and different types of intervention components that contribute to positive outcomes for rural children, it is not without limitations. First, the overall

number of studies that met inclusion criteria were few. As noted earlier, this is indicative of the need for additional research in this area using SCD. Because there were so few studies that met inclusion criteria, the findings may be somewhat skewed. A larger number of studies may produce different findings.

Second, although the current study assessed various intervention components, our research team did not assess the fidelity with which those intervention components were implemented. Intervention fidelity plays a significant role in terms of intervention effectiveness for students in practice. With parents and teachers, in particular, higher intervention fidelity is associated with greater intervention efficacy (Sheridan et al., 2016). Intervention fidelity may also be especially challenging to ensure in rural areas where resources are scarce. Future reviews in this area should consider and assess how fidelity may affect the effectiveness of social-emotional interventions.

The current study is also limited in its approach to intervention component analysis. In particular, we looked at whether or not each component was used within an intervention. However, it is very rare that social-emotional intervention components are delivered in isolation. Future studies should consider ways to investigate combinations of intervention practices that are used within social-emotional interventions to help continue to inform practices. Such research would create a greater understanding of the critical components necessary for social-emotional interventions implemented to support young children in rural areas.

Additionally, although we believe the LRR effect size index to be the best fit for the current study based on our data, it is also limited in that it does not account for trends in modeling single-case data. It is unknown whether using different effect size indices would have yielded different findings within the context of the current study. However, future research in this area should consider assessing intervention effects based on additional effect size indices that do account for trend (e.g., Tau-U, baseline correct Tau).

Finally, we used some restrictions within our inclusion criteria and search procedures that may have prevented some informative studies from being included. For instance, the current study only focused on studies including rural populations within the United States and published since the year 2000. It is possible that international studies and/or studies published prior to 2000 may yield important information regarding Pre-K social-emotional interventions implemented in rural areas that were not found within the context of the current study. Future studies in this area should consider expanding search parameters to attempt to locate older studies, and consider including studies focused on rural populations outside the United States.

Conclusion

Overall, this meta-analysis found that social-emotional interventions were revealed to significantly and positively impact young children's social-emotional functioning (i.e., prosocial behavior, disruptive behavior) in rural areas. Additional research regarding the context of these interventions is important, given that rural settings bring unique challenges for young children. Young children in these settings are more likely to live in poverty with less access to needed services. As such, identifying the types of early childhood social-emotional interventions that produce positive effects can help guide the focus of rural mental health providers and potentially guide policies around training of providers. The meta-analysis identified three types of effective intervention components with young children in need of social-emotional supports (i.e., child skills training, teacher and parent behavior management training, and parent involvement/enhancement interventions). Further the interventions included in the analysis produced positive and significant effects for overall social-emotional functioning and for both prosocial behaviors and disruptive behaviors. The increase in prosocial behavior is particularly promising given its impact on school readiness. Continued research this area should

explore how best to overcome identified barriers to young children and families accessing needed services in rural communities, and innovative ways to either deliver these services (e.g., telehealth) or to train providers who can better meet the needs of children in rural settings.

References

NOTE: All references included in meta-analysis are denoted with an asterisk.

Bailey, R., Sharpe, D., Kwiatkowski, T., Watson, S., Dexter Samuels, A., & Hall, J. (2018). Mental health care disparities now and in the future. *Journal of Racial and Ethnic Health Disparities, 5*(2), 351–356. https://doi.org/10.1007/s40615-017-0377-6

*Beale, N. A. (2009). *Effects of utilizing educational TV shows and conversational recasting on language skills of preschoolers with specific language impairments* (Doctoral dissertation, Walden University).

Blewitt, C., Fuller-Tyszkiewicz, M., Nolan, A., Bergmeier, H., Vicary, D., Huang, T., ... & Skouteris, H. (2018). Social and emotional learning associated with universal curriculum-based interventions in early childhood education and care centers: a systematic review and meta-analysis. *JAMA network open, 1*(8), e185727-e185727.

Borenstein, M., Hedges, L. V, Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to Meta-Analysis*. Chichester, UK: John Wiley & Sons, Ltd. https://doi.org/10.1002/9780470743386

Chow, J.C., & Ekholm, E. (2018). Do published studies yield larger effect sizes than unpublished studies in education and special education? A meta-review. *Educational Psychology Review, 30,* 727–744. https://doi.org/10.1007/s10648-018-9437-71

Conroy, M. A., Dunlap, G., Clarke, S., & Alter, P. J. (2005). A descriptive analysis of positive behavioral intervention research with young children with challenging behavior. *Topics in Early Childhood Special Education, 25,* 157-166.

Curby, T. W., Brown, C. A., Bassett, H. H., & Denham, S. A. (2015). Associations between preschoolers' social-emotional competence and preliteracy skills. *Infant and Child Development, 24,* 549–570. http://dx.doi.org/10.1002/icd.1899

Denham, S. A. (2006). Social-emotional competence as support for school readiness: what is it and how do we assess it? *Early Education and Development, 17*, 57–89. http://dx.doi.org/10.1207/s15566935eed17014

*Dufrene, B. A., Doggett, R. A., Henington, C., & Watson, T. S. (2007). Functional assessment and intervention for disruptive classroom behaviors in preschool and head start classrooms. *Journal of Behavioral Education, 16*(4), 368-388.

Farrigan, T. & Hertz, T. (2016). Understanding the rise in rural child poverty, 2003–2014. Washington, DC: Department of Agriculture, Economic Research Service. (https://www.ers.usda.gov/publications/pub-details/?pubid=45543. opens in new tab).

Hammond, D., & Gast, D. L. (2010). Descriptive analysis of single subject research designs: 1983—2007. *Education and Training in Autism and Developmental Disabilities, 45,* 187-202.

Hedges, L. V., Tipton, E., & Johnson, M. C. (2010). Robust variance estimation in meta-regression with dependent effect size estimates. *Research Synthesis Methods, 1*(1), 39–65. doi:10.1002/jrsm.5

Hoffman, T., Bennett, S., & Del Mar, C. (2013). Evidence-based practice: Across the health professions (2nd ed.). Chatswood, NSW: Elsevier.

*Hoffmann, A. N., Bogoev, B. K., & Sellers, T. P. (2019). Using telehealth and expert coaching to support early childhood special education parent-implemented assessment and intervention procedures. *Rural Special Education Quarterly, 38*(2), 95-106.

Lane, K. L., Kalberg, J. R., & Shepcaro, J. C. (2009). An examination of the evidence base for function-based interventions for students with emotional and/or behavioral disorders attending middle and high schools. *Exceptional Children, 75*, 321–340. doi:10.1177/001440290907500304

Luo, L., Reichow, B., Snyder, P., Harrington, J., & Polignano, J. (2020). Systematic review and meta-analysis of classroom-wide social–emotional interventions for preschool children. *Topics in Early Childhood Special Education.* Advance online publication. https://doi.org/10.1177/0271121420935579

*Mendoza, G. I. (2016). *Exploring gesturing as a natural approach to impact stages of second language development: A multiple baseline, single case study of a head start child* (Doctoral dissertation, East Tennessee State University).

Miller, P., Votruba-Drzal, E., & Setodji, C. M. (2013). Family income and early achievement across the urban–rural continuum. *Developmental Psychology, 49*(8), 1452-1465.

Moeyaert, M., Maggin, D., & Verkuilen, J. (2016). Reliability, validity, and usability of data extraction programs for single-case research designs. *Behavior Modification, 40*(6), 874-900.

Morales, D. A., Barksdale, C. L., & Beckel-Mitchener, A. C. (2020). A call to action to address rural mental health disparities. *Journal of Clinical and Translational Science, 4*(5), 463-467.

*Pasqua, J. L. (2016). *Evaluating the independent group contingency:" Mystery Student" on improving behaviors in Head Start classrooms* (Doctoral Dissertation, The University of Southern Mississippi).

Pustejovsky, J. E. (2021). clubSandwich: Cluster-robust (sandwich) variance estimators with small-sample corrections. Retrieved from https://cran.r-project.org/package=clubSandwich

Pustejovsky, J. E. (2018). Using response ratios for meta-analyzing single-case designs with behavioral outcomes. *Journal of School Psychology, 68*, 99–112. https://doi.org/10.1016/j.jsp.2018.02.003

Pustejovsky, J. E., & Ferron, J. M. (2017). Research synthesis and meta-analysis of single-case designs. In J. M. Kaufmann, D. P. Hallahan, & P. C. Pullen (Eds.), *Handbook of special education, 2nd edition* (p. 168-186). New York, NY: Routledge.

Pustejovsky, J. E., & Swan, D. M. (2018). *Effect size definitions and mathematical details.* https://cran.r-project.org/web/packages/SingleCaseES/vignettes/Effect-size-definitions.html

Raver, C. C. (2004). Placing emotional self-regulation in sociocultural and socioeconomic contexts. *Child Development, 75,* 346–353. http://dx.doi.org/10.1111/j.1467-8624.2004.00676.x

Reinke, W. M., Smith, T. E., & Herman, K. C. (2019). Family-school engagement across child and adolescent development. *School Psychology, 34*(4), 346-349. https://doi.org/10.1037/spq0000322

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,* 147–166. http://dx.doi.org/10.1016/S0885-2006(00)00049-1

Robinson, L. R., Holbrook, J. R., Bitsko, R. H., Hartwig, S. A., Kaminski, J. W., Ghandour, R. M., ... & Boyle, C. A. (2017). Differences in health care, family, and community factors associated with mental, behavioral, and developmental disorders among children aged 2–8 years in rural and urban areas—United States, 2011–2012. *MMWR Surveillance Summaries, 66*(8), 1.

Rohatgi, A. (2014). *WebPlotDigitizer user manual version 3.4.* Retrieved from http://arohatgi.info/WebPlotDigitizer/userManual.pdf

Schindler, H. S., Kholoptseva, J., Oh, S. S., Yoshikawa, H., Duncan, G. J., Magnuson, K. A., & Shonkoff, J. P. (2015). Maximizing the potential of early childhood education to prevent externalizing behavior problems: A meta-analysis. *Journal of School Psychology, 53*(3), 243-263.

Sheridan, S. M., Knoche, L. L., Edwards, C. P., Bovaird, J. A., & Kupzyk, K. A. (2010). Parent engagement and school readiness: Effects of the Getting Ready intervention on preschool children's social–emotional competencies. *Early Education and Development, 21*(1), 125-156.

Sheridan, S. M., Holmes, S. R., Smith, T. E., & Moen, A. L. (2016). Complexities in field-based partnership research: Exemplars, challenges, and an agenda for the field. In S. M. Sheridan & E. M. Kim (Eds.), *Research on family-school partnerships: An interdisciplinary examination of state of the science and critical needs, Vol 3* (pp. 1–23). New York, NY: Springer.

Sheridan, S. M., Smith, T. E., Kim, E. M., Beretvas, S. N., & Park, S. (2019). A meta-analysis of family-school interventions and children's social-emotional functioning: Child and community influences and components of efficacy. *Review of Educational Research, 89*, 296-332.

Smith, T. E., Holmes, S. R., Sheridan, S. M., Cooper, J. M., Bloomfield, B. S., & Preast, J. L. (2021). The effects of consultation-based family-school engagement on student and parent outcomes: A meta-analysis. *Journal of Educational and Psychological Consultation, 31*(3), 278-306.

Smith, T. E., Reinke, W. M., Herman, K. C., & Huang, F. H. (2019). Understanding family–school engagement across and within elementary- and middle-school contexts. *School Psychology, 34*(4), 363-375. https://doi.org/10.1037/spq0000290

Smith, T. E., & Sheridan, S. M. (2019). The effects of teacher training on teachers' family engagement practices, attitudes, and knowledge: A meta-analysis. *Journal of Educational and Psychological Consultation, 29*, 128-157.

Smith, T. E., Sheridan, S. M., Kim, E. M., Park, S., & Beretvas, S. M. (2020). The effects of family-school partnership interventions on academic and social-emotional functioning: A meta-analysis exploring what works for whom. *Educational Psychology Review, 32*(2), 511-544. https://doi.org/10.1007/s10648-019-09509-w

Smith, T. E., Thompson, A. M., & Maynard, B. (2022). Self-management interventions for reducing challenging behaviors among school-age students: A systematic review. *Campbell Systematic Reviews, 18*(1), e1223. https://doi.org/10.1002/cl2.1223

*Stanton-Chapman, T. L., Denning, C. B., & Jamison, K. R. (2012). Communication skill building in young children with and without disabilities in a preschool classroom. *The Journal of Special Education, 46*(2), 78-93.

Stormont, M. (2021). *Kindergarten readiness for all: Strategies to support the transition to school.* Cambridge Scholars Publishing.

United States Census Bureau (2016). *New Census Data Show Differences Between Urban and Rural Populations*. Retrieved from United States Census Bureau: https://www.census.gov/newsroom/press-releases/2016/cb16-210. html.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software, 36*(3), 1-48.

Webster-Stratton, C., Rinaldi, J., & Jamila, M. R. (2011). Long-Term outcomes of Incredible Years Parenting Program: Predictors of adolescent adjustment. *Child and Adolescent Mental Health, 16*(1), 38–46. https://doi.org/10.1111/j.1475-3588.2010.00576.x

What Works Clearinghouse. (2014). *Procedures and standards handbook* (Version 3.0). Retrieved from http://ies.ed.gov/ncee/wwc/pdf/reference_resources/wwc_procedures_v3_0_draft_standards_handbook.pdf

Wong, C., Odom, S. L., Hume, K. A., Cox, A. W., Fettig, A., Kucharczyk, S., … Schultz, T. R. (2015). Evidence-based practices for children, youth, and young adults with autism spectrum disorder: A comprehensive review. *Journal of Autism and Developmental Disorders, 45*(7), 1951–1966. https://doi.org/10.1007/s10803-014-2351-z

*Wood, B. K., Ferro, J. B., Umbreit, J., & Liaupsin, C. J. (2011). Addressing the challenging behavior of young children through systematic function-based intervention. *Topics in Early Childhood Special Education, 30*(4), 221-232.

Yang, W., Datu, J. A. D., Lin, X., Lau, M. M., & Li, H. (2019). Can early childhood curriculum enhance social-emotional competence in low-income children? A meta-analysis of the educational effects. *Early Education & Development, 30* (1), 36–59. https://doi.org/10.1080/10409289.2018.1539557