School-based Consultation to Promote Generalization of Early Childhood Educators' Evidence-based Practices: A Meta-analysis

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Abstract

Early childhood educators are tasked with supporting young children's academic, behavioral, and social-emotional through the use of evidence-based practices (EBPs). Unfortunately, early childhood educators may struggle with consistent implementation of EBPs. When this occurs, school-based consultation may be beneficial in promoting early childhood educators' use of effective classroom management practices and interventions. A critical aspect of school-based consultation is ensuring that early childhood educators generalize strategies they have been trained to use through consultation. However, the extent to which early childhood educators generalize skills trained through consultation across settings, children, and other evidence-based practices is unclear. Therefore, the purpose of this meta-analysis was to synthesize the existing school-based consultation literature in early childhood settings to determine the extent to which early childhood educators generalize skills trained through consultation. A total of 12 studies including 39 educator consultees and 171 effects comprised our final sample. Three-level hierarchical models with robust variance estimation were used to pool both Log Response Ratios and Tau effect sizes for analyses. Overall results indicated school-based consultation had a positive and significant impact on educator generalization of EBPs (LRRi = 0.95; Tau = 0.79). Further, particular implementation supports (e.g., in situ training) significantly contributed to EBP generalization. These results suggest school-based consultation to be an effective means

for promoting early childhood educator generalization of EBPs. Implications for research and practice and future research directions are discussed.

Introduction

The National Center for Education Statistics estimates between 40% to and 86% of young children enroll in early childhood education programs (Hussar et al., 2020). As much as 30% of these children encounter difficulties, such as poverty, family discord, exposure to violence, and low parental education that place them at risk for developing long-term internalizing and externalizing difficulties (Wichstrom et al., 2012). Therefore, early childhood educators who have frequent contact with these children are in a unique position to play a vital role in buffering these risk factors. Specifically, early childhood educators' use of evidence-based practices (EBPs) has potential to enhance young children's social/emotional, behavioral, and cognitive development, leading to the prevention of problems and successful transition to elementary school (Carter et al., 2010).

Unfortunately, early childhood educators struggle to integrate EBPs into day-to-day classroom management practices (Floress et al., 2017; Odom et al., 1995). In fact, early childhood educators often report a significant need for professional development in EBP use with children who display challenging classroom behaviors (Reinke et al., 2011; Snell et al., 2012). This is concerning, as EBPs are only beneficial for promoting child outcomes if they are consistently implemented with high levels of treatment integrity (Gresham, 1989). As such, early childhood educators are clearly in need of supports to aid them in the adoption and implementation of EBPs in early education settings.

School-Based Consultation in Early Childhood Education

School-based consultation is an effective and preferred teacher training approach (Gutkin & Curtis, 2009) and can be used to improve early childhood educators' EBP implementation.

School-based consultation is an indirect service approach, in which a consultant with expertise in child behavior and development provides recommendations to aid educators in EBP delivery (Erchul & Sheridan, 2014). Unlike time-limited professional development trainings, school- based consultation is an ongoing support process aimed at addressing educators' needs (e.g., managing disruptive classroom behavior). If educators are unable to implement recommended practices and interventions, school-based consultants may provide various implementation supports (e.g., prompts, in situ training, performance feedback) to aid educators in EBP implementation.

Research consistently demonstrates that school-based consultation is effective for improving early childhood educators' EBP implementation, such as increasing behavior-specific praise (LaBrot et al., 2020, 2021), improving effective instruction delivery (Dufrene et al., 2012), promoting social interactions (Gomez et al., 2021), and implementing strategies to promote children's social-emotional competence (Hemmeter et al., 2015), among several others. School- based consultation plays a critical role in addressing deficits in early childhood educators' training and professional development, and promotes EBP delivery. Despite the importance and identified benefits of consultation, the extent to which early childhood educators generalize skills trained through consultation across settings, children, and other EBPs is unclear.

Generalization of Early Childhood Educators' Evidence-Based Practice Use

Generalization is the extent to which a trained behavior occurs in conditions where training did not occur. The success of behavioral training and interventions often depends on whether a learner generalizes what they have learned across time, settings, behaviors, and individuals (Cooper et al., 2020; Stokes & Baer, 1977). School-based consultation may be conceptualized in the same manner, in which success is determined by the extent to which educators

generalize EBPs trained through consultation. In a school-based context, generalization of EBPs can be demonstrated through their implementation throughout the school year (i.e., time), across different activities or locations (i.e., setting), across other EBPs (i.e., behaviors), and with children who were not targeted in consultation (i.e., individuals).

However, many school-based consultation studies conducted in early childhood education settings fail to collect data on educators' generalized outcomes. This is problematic, as the collection of generalization data is important to determine the long-term effects (i.e., EBPs are sustained) and efficiency (i.e., EBPs spontaneously generalize across contexts) of school- based consultation techniques. Although some research has examined the extent to which early childhood educators generalize their use of EBPs trained through school-based consultation (e.g., Barton et al., 2018; LaBrot et al., 2021), there are no studies that have synthesized the school-based consultation generalization literature for early childhood educators. Therefore, research that synthesizes the literature and evaluates the extent to which early childhood educators generalize their use of EBPs trained through school-based consultation is needed.

The need to collect generalization data in school-based consultation research is not novel, as other scholars have acknowledged the importance of collecting these data. For example, Robinson and Swanton (1980) conducted a systematic review of the school-based consultation (termed "teacher training") literature to determine the extent to which this literature base collected generalization data and identified factors that lead to teachers' generalized outcomes. Only six single-case design studies published in the *Journal of Applied Behavior Analysis* between 1970 and 1978 were identified. Of note, only one study included early childhood educators as participants, while the remainder included elementary and secondary educators.

Across all six studies, only three demonstrated educators' generalization of intervention implementation following consultation.

Robinson and Swanton (1980) also noted that only half of the studies included sufficient data to determine whether teacher participants generalized intervention use. Notably, the only study that included early childhood educators did not contain sufficient data (i.e., at least three per study phase) or reliability data, and therefore could not experimentally demonstrate generalization. In general, results of this literature review highlight the need for experimentally rigorous studies that measure and promote educators' generalized use of EBPs following school-based consultation.

However, it is important to interpret the results of this systematic literature review in light of some limitations. Most notably, this review included studies that were published over 40 years ago. Since the time this review was published, many other school-based consultation studies have collected data on educators' generalized outcomes (e.g., Barton et al., 2018; LaBrot et al., 2021). Second, Robinson and Swanton (1980) only included published studies, which likely biased their research sample (sometimes referred to as the "file drawer effect"). As such, an updated review should make efforts to include unpublished literature such as theses and dissertations. Finally, the small sample size included in the Robinson and Swanton (1980) review did not allow for consultation outcomes to be systematically combined and analyzed across studies (i.e., meta- analysis). Beyond what is known from individual studies alone, evidence from a meta-analysis synthesizing data across multiple studies will help to determine if school-based consultation is an effective means of promoting educators' generalization of EBPs. Further, school-based consultation can also involve various components or strategies to foster educator use of EBPs (e.g., performance feedback, in situ training). Using meta-analytic methods, it is imperative to determine which specific components of consultation may be responsible for promoting educator use of EBPs.

Empirically determining effective consultation components is necessary to direct efficient and impactful school-based consultation efforts in the future.

Purpose

　　School-based consultation is likely influential in promoting early childhood educators' generalization of EBPs. However, the extent to which early childhood educators' EBP use generalizes across time, settings, other EBPs, and children is often overlooked in research and not well understood. Given the widespread use of school-based consultation (Gutkin & Curtis, 2009), limitations of past reviews in this area, and increased efforts focusing on education generalization, an updated synthesis of the literature is vital. Thus, the current meta-analysis aims to (a) provide novel insights into the effectiveness of school-based consultation for promoting early childhood educators' generalized use of EBPs, (b) serve as an updated evaluation of the effects of consultation for improving educator target outcomes, and (c) uncover which specific consultation components promote educator use of EBPs. In particular, the current meta-analysis was guided by the following research questions:

　　What are the effects of school-based consultation on (a) the generalization of early childhood educator EBPs (overall) and (b) educator generalization EBP subtypes (i.e., behavior specific praise, behavior analytic procedures, individual support plan, and instructional practices)?

　　What are the effects of school-based consultation on (a) educator target EBPs (overall) and (b) educator target EBP subtypes?

　　Which consultation components are most effective at promoting educator use of EBPs?

Method
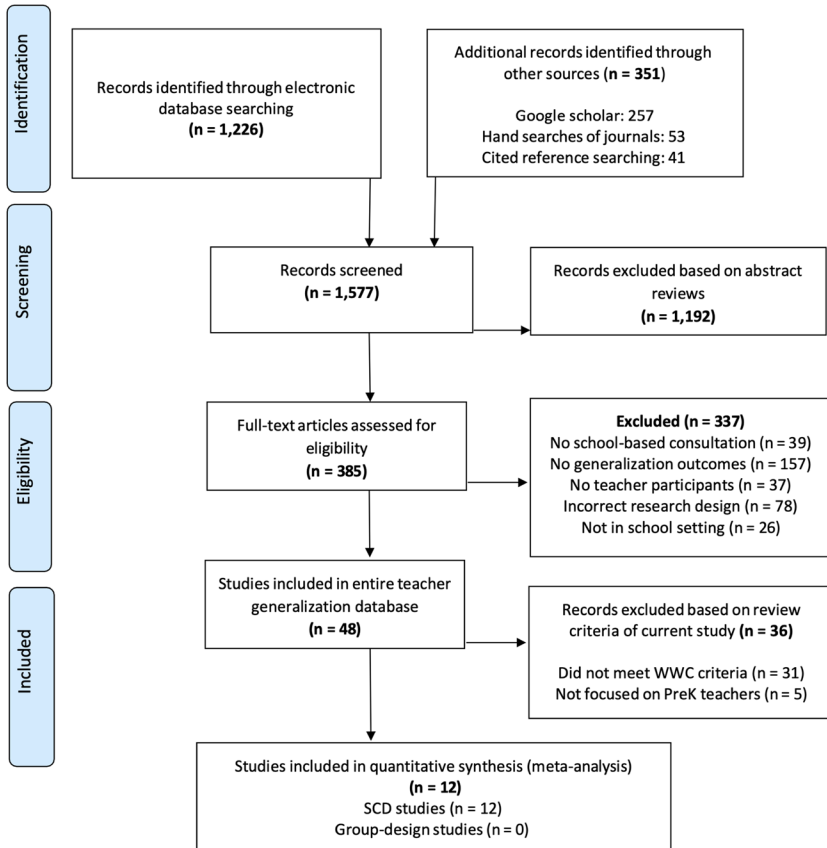
　　The present study was part of a larger meta-analysis focused on the effects of school-based consultation for promoting educator use of EBPs. For purposes of the current meta-analysis, all included studies focused on *early childhood educators* and were identified and analyzed to answer our research questions. In the following section, we first describe methods and procedures from our larger

meta-analysis, followed by selection and analyses of studies that focused on early childhood educators. Compilation of the current meta-analytic database included three steps: (1) literature search, (2) identification of studies, and (3) study coding. Further, between two and three individuals (i.e., study authors and trained graduate students) were involved at each stage of the process.

Literature Search Procedures

We used three central procedures in order to comprehensively search the relevant literature: electronic database searching, hand searching of journals, and reference list searching of previous relevant reviews. First, four electronic databases (*Academic Search Premiere, ERIC, APA PsychInfo, and APA PsychArticles*) were searched using multiple search term parameters and combinations. Specific search terms included a combination of search strings ("teacher*," "educator*," "school* staff," "school*, "consult*," "coach*," "behavior* manage*," strategy," "class* discipline," "generalization," "generalize," "maintenance," "maintain," and "fidelity"). Search parameters were limited to studies reported in English and those conducted from 1980 to 2020. The year 1980 was chosen as a starting point to build off the seminal work in this area by Robinson and Swanton (1980). In an attempt to capture grey literature, we also conducted searches through the online database *ProQuest: Dissertation & Theses* and Google Scholar. Second, we conducted hand searches of 15 different relevant journals focused on mental and behavioral health services in schools (e.g., *Journal of Behavioral Education, School Psychology Review, School Psychology*), teacher education and training (e.g., *Journal of Teacher Education*, *Teaching and Teacher Education*), and behavioral psychology (e.g., *Behavioral Interventions, Journal of Applied Behavior Analysis*). Third, as a secondary approach to identifying potential studies for inclusion, we searched reference lists of previously published relevant meta-analyses and large-scale reviews (e.g., Collier-Meek et al., 2018; Reddy et al., 2000).

Figure 1
Flowchart of Search and Screening Processes

Identification

Records identified through electronic database searching
(n = 1,226)

Additional records identified through other sources **(n = 351)**

Google scholar: 257
Hand searches of journals: 53
Cited reference searching: 41

Screening

Records screened
(n = 1,577)

Records excluded based on abstract reviews
(n = 1,192)

Eligibility

Full-text articles assessed for eligibility
(n = 385)

Excluded (n = 337)
No school-based consultation (n = 39)
No generalization outcomes (n = 157)
No teacher participants (n = 37)
Incorrect research design (n = 78)
Not in school setting (n = 26)

Studies included in entire teacher generalization database
(n = 48)

Records excluded based on review criteria of current study **(n = 36)**

Did not meet WWC criteria (n = 31)
Not focused on PreK teachers (n = 5)

Included

Studies included in quantitative synthesis (meta-analysis)
(n = 12)
SCD studies (n = 12)
Group-design studies (n = 0)

Study Identification

Search procedures yielded 1,577 journal articles, book chapters, and dissertations/theses to be reviewed (1,226 identified through electronic database searching and 351 records identified through other sources). See Figure 1 for an overview of search and screening processes at each stage of the study. Records located through our search procedures were then retained and reviewed for

potential inclusion following a three-step approach with increasing specificity– abstract screening, full-text reviews, and reviewing WWC design criteria (for SCD studies only). This approach has been utilized by previous reviews of school-based interventions (e.g., Smith et al., 2022) and aims to be more inclusive at the abstract screening stage, as abstracts often do not include enough detail to make inclusion/exclusion determinations based on all study inclusion criteria. Details of screening and reviewing performed at each step are described below.

Abstract screening. First, all abstracts were independently screened by study authors based on two broad inclusion criteria: (1) the study must have assessed educator outcomes and (2) the study must have involved school-based consultation. Approximately 30% of all abstracts were double-screened and compared for inconsistencies during weekly research team meetings. When disagreements occurred about inclusion and exclusion criteria, the research team discussed determinations until consensus was reached. Inclusion/exclusion agreement was 94% for abstracts that were double-screened. At this stage, based on the two criteria described above, 385 articles were retained.

Full-text reviews. The second step of the identification process involved independent review by two research team members of full-text articles identified as potentially relevant during the abstract screening stage. Specifically, research team members were trained to ensure studies met the following criteria:

The study must have included consultation/coaching or training/professional development of school personnel aimed at indirectly supporting children's behavioral or social-emotional development (e.g., behavioral consultation with a school psychologist to address child disruptive behavior, educator training in classroom management practices);

Recipients of consultation/coaching or training/professional development must have been school-based personnel (including teachers, pre-service teachers, teacher aides, preservice clinicians

[e.g., preservice behavior analysts], paraprofessionals, speech pathologists, before- and after-school staff, recess lunch monitors, classroom volunteers, or other school staff [e.g., secretaries]);

The study must have occurred in a school setting (e.g., hallways, classroom, playground, gym; Cole et al., 2000);

The study needed to include at least one outcome measurement assessing the generalization of school personnel practices (i.e., the ability to use and transfer practices across multiple participants [e.g., children], settings [e.g., different activities], and/or behaviors [e.g., praise, effective instruction];

The study must have included either a single-case experimental design (SCD) or group- design (i.e., experimental or quasi-experimental design) that compared groups receiving consultation/coaching or training/professional development with one or more control groups. At this stage, 48 SCD studies met our inclusion criteria.

Review based on WWC design criteria. Third, two research team members independently reviewed all 48 SCD studies for inclusion based on the Institute of Education Sciences What Works Clearinghouse (WWC) SCD standards (What Works Clearinghouse, 2020). Further, all studies were double-reviewed to ensure reliability. These standards were utilized to rule out threats to internal validity and included the following: (1) data are available in graphical display; (2) the independent variable was systematically manipulated with a researcher determining phase changes; (3) outcomes are measured by more than one observer for at least 20% of data points; (4) residual treatment effects are ruled out; and (5) each phase contained an adequate number of data points. Studies that did not *Meet Standards without Reservations* or *Meet Standards with Reservations* were excluded. At this stage, of the 48 SCD studies reviewed, 17 studies met inclusion criteria based on the WWC design standards.

Study Coding

    Variable coding. All studies were coded by study authors to extract information pertinent to answering research questions. Study authors created and developed a codebook that included multiple sections designed to focus on study-, participant-, and outcome-level variables. The codebook was developed by creating initial codes, testing said codes, and revising codes as necessary. Once the codebook was developed, coders independently reviewed studies and met weekly to discuss disagreements and reach a consensus. Specifically, articles were coded based on consultee type (e.g., teacher, teacher aid, preservice teacher), consultant type (e.g., school psychologist, graduate students), consultation and implementation support characteristics (e.g., in situ training, behavioral skills training), and the form of generalization outcome measured (e.g., across settings, across children). Additionally, articles were coded for consultee characteristics, such as race/ethnicity, gender, age, number of years teaching, and education level. Further, all studies were double-coded and percent agreement was revealed to be 97%, indicating high agreement among reviewers.

    Data extraction. Pertinent data were also extracted from each study in order to calculate effect size indices for meta-analysis. The data extraction tool, WebPlotDigitizer (Rohatgi, 2014) was used, as it has previously been shown to have high reliability and a high degree of usability (Moeyaert et al., 2016). Data were extracted for each baseline and intervention phase of relevant educator outcomes by uploading graphical images from studies into WebPlotDigitizer, calibrating axes, and manually clicking on data points to yield their XY coordinates. Two trained graduate students independently extracted data from included studies.

    Approximately 25% of graphs were then randomly selected and double-reviewed by the first author and compared for intercoder reliability using proportional agreement (i.e., both coders' values being within 1% of the y-axis range). Proportional agreement was 94.9%, indicating a high level of agreement consistent with similar

studies employing plot digitizing tools (e.g., Bruhn et al., 2022 Collins et al., 2020).

Once all studies were coded and relevant data were extracted to form our larger meta- analytic database, we selected and analyzed all studies focused on early childhood educators. This resulted in the final inclusion of 12 early childhood educator studies with 171 total effects (82 educator generalization outcomes, 89 educator target outcomes).

Data Analysis

Effect sizes. Selecting appropriate SCD effect sizes for application within meta-analytic methods continues to be a consistent challenge and widely debated topic (Zimmerman et al., 2018). For purposes of the current study, we chose to primarily use the Log Response Ratio (LRR; Pustejovsky, 2018) and supplement our main pooled effects with Tau (Parker et al., 2011) as a second effect size metric. These two indices were chosen given that LRR models change from baseline to intervention phases and Tau represents nonoverlap between baseline and intervention phases, both of which are key characteristics of single-case data (Kratochwill et al., 2010).

The LRR is particularly advantageous given that it is insensitive to how behavioral outcomes are measured and can be compared across different dimensional constructs (e.g., percentage durations, frequency counts). The LRR can also be translated directly to percentage change, which can provide a meaningful interpretation of treatment impacts for applied researchers and clinicians. Thus, the LRR served as the primary effect size index for the current study given these advantages and because the majority of our final sample included educator behavioral outcomes (e.g., observed classroom management practices) assessed through varying scoring procedures and on different dimensional characteristics. In particular, the increasing form of the LRR was calculated (i.e., LRRi), so that positive effect size values corresponded to improvement

in educator behaviors (e.g., increased use of behavior specific praise). Raw data extracted from each outcome graph were used to calculate both LRRi and Tau indices with the online single-case effect size calculator SingleCaseES (Pustejovsky & Swan, 2018).

Meta-analysis. Basic meta-analytic methods typically involve one effect size estimate per study and assume different studies are independent from one another. However, LRR effect size estimates capture results at the level of the individual case as opposed to the study level.

Thus, we followed recommendations by Pustejovsky (2018) based on a proposed three-level, hierarchical model when synthesizing our LRRi effect size indices for meta-analysis (Van den Noortgate & Onghena, 2008). We also utilized robust variance estimation (RVE) techniques (Hedges et al., 2010) and applied small sample bias corrections (Tipton & Pustejovsky, 2015) when computing pooled effect sizes to account for data dependency issues and multiple effects per study. All analyses were conducted in R using the metafor (Viechtbauer, 2010) and clubSandwich (Pustejovsky, 2017) packages. For pooled main effects of consultation, we also converted LRRi effects and their 95% CIs to percentage change to help support interpretation.

Results

Description of Included Studies

In total, 12 studies including 39 educator consultees and 171 effects (82 educator generalization outcomes, 89 educator target outcomes) comprised our final sample. Seven studies (58.33%) were published journal articles and five (41.67%) were dissertations/theses. All but one study (91.67%) took place in the United States, with the other occurring in Turkey (8.33%). Four studies (33.33%) took place in inclusive classrooms, with four (33.33%) in Head Start/Early Head Start settings, two (16.67%) in regular classroom settings, and two (16.67%) in special education settings. In terms of specific types of generalization outcomes, seven studies (58.33%)

assessed generalization across activities/periods, followed by four (33.33%) across children, and one (8.33%) assessed generalization across a non-classroom setting. Regarding consultants, six studies (50%) included graduate students (e.g., school psychology doctoral trainees) as consultants, three studies (25%) included trained research personnel, and three (25%) used other personnel (e.g., school-based behavioral health providers). Regarding educator consultees, the vast majority were female (92.30%) and White (48.23%), followed by African American (39.45%), Latinx (6.47%), and Other (e.g., Asian-American; 5.85%). Most educator participants (69.23%) were classroom teachers, followed by preservice educators (17.95%), and teacher aides/assistants (12.82%). Of studies reporting educator age, ages ranged from 20 to 59 with an average of 31.77 years of age. The majority of educators had a Bachelor's degree (66.67%), followed by those with an Associate's degree (18.52%), and Master's degree (14.81%).

Effects of Consultation on Early Childhood Educator Generalization and Target Practices

Generalization Outcomes

To assess the effects of school-based consultation on educator generalization practices, we conducted six separate multi-level meta-analysis models summarizing effect size estimates (two models for educator generalization outcomes [overall] and four models for each educator generalization outcome subtype). See Table 1 for pooled effect size estimates including both LRRi and Tau, and Table 2 for LRRi estimates of each educator generalization outcome subtype. Each table additionally includes 95% confidence intervals produced from the robust standard errors, study-level variation, case-level variation, and corresponding percentage change when applicable.

For educator generalization outcomes (overall), the average LRRi estimate was 0.95 (95% CI [0.72, 1.18]), which corresponds to a 159% change from baseline levels (95% CI [105%, 225%]). For

Tau, the overall pooled effect for educator generalization outcomes (overall) was 0.79 (95% CI [0.59, 0.97]), suggesting that 79% of data did not overlap between baseline and intervention phases (see Table 1).

Table 1
Consultation Effects on Educator Generalization Outcomes (Overall)

	k	n	Estimate (SE)	CIs	% change	Study-level SD	Case-level SD
LRRi	12	82	0.95 (0.11)	0.72, 1.18	158.57	0.04	0.11
Tau	12	82	0.79 (0.15)	0.59, 0.97	--	0.02	0.08

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

Regarding analyses for education generalization outcome subtypes, apart from individual support plans, all models revealed pooled effect size estimates significantly different from zero (see Table 2). For educator use of behavior specific praise, the average LRRi estimate was 0.82 (95% CI [0.34, 1.32]), which corresponds to an increase of 127% from baseline levels (95% CI [40%, 274%]). Regarding behavior analytic procedures, the average LRRi estimate was 1.22 (95% CI [0.84, 1.59]), which corresponds to an increase of 239% from baseline levels (95% CI [131%, 390%]). For instructional practices, the average LRRi estimate was 0.77 (95% CI [0.62, 0.92]), which corresponds to an increase of 116% from baseline levels (95% CI [86%, 150%]). With the exception of instructional practices which indicated nearly identical between-study and within-study variability, results for each of the other three behavior subtypes and for generalization outcomes (overall) indicate more within-study variability than between-study variability in effect sizes.
Target Outcomes
We additionally conducted six separate multi-level meta-analysis models summarizing effect size estimates to assess the impact of consultation on educator target outcomes. For educator target outcomes (overall), the average LRRi estimate was 0.99 (95% CI [0.73, 1.17]), which corresponds to a 169% change from baseline

levels (95% CI [107%, 227%]). For Tau, the overall pooled effect for educator target outcomes (overall) was 0.86 (95% CI [0.71, 1.00]), suggesting that 86% of data did not overlap between baseline and intervention phases (see Table 3).

Table 2
Consultation Effects (LRRi) on Educator Generalization Outcome Subtypes

	k	N	LRRi (SE)	CIs	%change	t	Study-level SD	Case-level SD
Behavior specific praise	3	9	0.82 (0.21)	0.34, 1.32	127.05	3.94**	0.08	0.28
Behavior analytic procedures	4	23	1.22 (0.18)	0.84, 1.59	238.72	6.73***	0.06	0.10
Individual support plan	3	27	0.62 (0.28)	0.24, 1.19	85.89	3.30	0.16	0.41
Instructional practices	5	17	0.77 (0.07)	0.62, 0.92	115.98	11.02***	0.00	0.00

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

Table 3
Consultation Effects on Educator Target Outcomes (Overall)

	k	n	Estimate (SE)	CIs	% change	Study-level SD	Case-level SD
LRRi	12	89	0.99 (0.10)	0.73, 1.17	169.12	0.06	0.16
Tau	12	89	0.86 (0.16)	0.71, 1.00	--	0.03	0.11

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

Consistent with educator generalization outcomes, all models that estimated pooled effect sizes for educator target outcome subtypes were significantly different from zero with the exception of individual support plans (see Table 4). For educator use of behavior specific praise, the average LRRi estimate was 0.68 (95% CI [0.57, 0.78]), which corresponds to an increase of 97% from baseline levels (95% CI [77%, 118%]). Regarding behavior analytic procedures, the average LRRi estimate was 1.13 (95% CI [0.95, 1.28]), which

corresponds to an increase of 210% from baseline levels (95% CI [158%, 259%]). For instructional practices, the average LRRi estimate was 0.81 (95% CI [0.63, 1.00]), which corresponds to an increase of 125% from baseline levels (95% CI [87%, 171%]). Results of all five models for educator target outcomes suggest more within-study variability than between-study variability in effect sizes.

Table 4
Consultation Effects (LRRi) on Educator Target Outcome Subtypes

	k	n	LRRi (SE)	CIs	%change	t	Study-level SD	Case-level SD
Behavior specific praise	3	10	0.68 (0.05)	0.57, 0.78	97.38	14.93***	0.00	0.01
Behavior analytic procedures	4	34	1.13 (0.09)	0.95, 1.28	209.56	10.90***	0.00	0.08
Individual support plan	3	19	0.49 (0.24)	0.30, 0.71	63.23	2.02	0.11	0.21
Instructional practices	5	33	0.81 (0.09)	0.63, 1.00	124.79	9.13***	0.03	0.17

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

School-Based Consultation Component Analysis

To better understand the relevant components that relate to the effectiveness of school consultation, we calculated pooled treatment effects for four different consultation components (in situ training, performance feedback, behavioral skills training, and self-monitoring) for both educator target and generalization outcomes. We additionally coded three other consultation components (professional development, use of a treatment protocol, and video modeling); however, each of these three components was

only used within one study, and thus could not be pooled for meta-analysis.

Results for the component analysis are provided in Table 3. Results indicated consistency among the components and their relationships to both educator target and generalization outcomes. That is, all four components were found to be significantly related to both educator target and generalization outcomes. Further, across both target and generalization outcomes, in situ training indicated the largest effects (i.e., 1.16; 1.05), whereas professional development indicated the smallest effects (i.e., 0.62; 0.72).

Table 5

Component Analysis for both Educator Target and Generalization Outcomes

Consultation component	k	n	LRRi (SE)	CIs	t	Study-level SD	Case-level SD
Generalization Outcomes							
In Situ	5	18	1.16 (0.19)	0.76, 1.55	6.15***	0.11	0.33
PF	3	17	0.96 (0.30)	0.35, 1.58	3.20**	0.23	0.49
BST	4	28	1.07 (0.27)	0.52, 1.63	4.36***	0.20	0.10
PD	2	31	0.62 (0.05)	0.52, 0.71	13.55***	0.00	0.00
Target Outcomes							
In Situ	5	23	1.05 (0.17)	0.70, 1.39	6.24***	0.12	0.07
PF	3	33	0.95 (0.35)	0.21, 1.69	2.73*	0.34	0.58
BST	4	43	0.90 (0.13)	0.65, 1.16	7.08***	0.03	0.19
PD	2	10	0.72 (0.08)	0.53, 0.91	8.51***	0.01	0.00

Note: n = number of effect sizes; k = number of studies; SE = standard error; CIs = 95% confidence intervals; ** = p <0.01; *** = p <0.001; PF = performance feedback; BST = behavioral skills training; PD = professional development

Discussion

Early childhood educators play a key role in supporting child development and mitigating factors that may place children at risk for developing long-term internalizing and externalizing concerns. Early childhood educator use of EBPs fosters optimal behavioral,

social-emotional, and early learning for children during a vital period of development. School-based consultation has been shown to be a viable method to train educators to implement EBPs with fidelity. Unfortunately, less is known regarding how to train educators to generalize EBPs. This is problematic given that long-term, successful use of EBPs is dependent on educators' generalization of these skills. Individual studies have revealed that school-based consultation may be an important mechanism by which educators can be trained to generalize EBPs.

However, to our knowledge, no previous work has attempted to systematically combine and meta-analyze results across studies to determine the effects of school-based consultation in promoting educator use of EBPs. Thus, the current study offers a novel summary and quantitative synthesis regarding the available literature that included efforts to promote early childhood educator use of EBPs via school-based consultation. In particular, the current study both built from and aimed to address shortcomings previously discussed based on seminal work in this area (i.e., Robinson & Swanton, 1980).

Results revealed school-based consultation to be an effective means of promoting early childhood educator generalization of EBPs. This was found for early childhood educator outcomes (overall) along with three of the four early childhood educator generalization outcome subtypes (behavior specific praise, behavior analytic procedures, and instructional practices). This is an important finding, given that each of the three EBP subtypes are key educator practices that are imperative to supporting children's school outcomes. That said, the current study is part of a larger meta-analysis that is the first of its kind to link school-based consultation to the generalization of these practices through meta-analysis. Moving forward, future trainings and consultation practices should consider prioritizing these EBPs as areas of focus. Unexpectedly, the only early childhood educator outcome subtype found not to be significantly improved by school-based consultation was individual support plans. Individual support plans are often tailored to a specific student/classroom of

interest, and thus can include a range of recommended EBPs that vary in intensity and resources required for implementation. This variability within individual support plans may account for the lack of significant impact across included studies.

The current study also explored the relative contributions of various components used within school-based consultation to support teacher use and generalization of EBPs. All four components (in situ training, performance feedback, behavioral skills training, and self- monitoring) were found to significantly drive the effects of school-based consultation for both educator target use and generalization of EBPs. Previous individual studies (e.g., LaBrot et al., 2021) have revealed consultation using specific components (e.g., in situ training) as effective for promoting educator generalization of EBPs; however, to our knowledge, this is the first study to evaluate these components on a larger scale via meta-analysis.

Implications for Practice and Research

The overall results of this meta-analysis indicate that implementation supports delivered via school-based consultation are effective for improving both target and generalization outcomes for early childhood educators. This finding is important, as many early childhood educators are not adequately prepared to integrate EBPs into day-to-day interactions with young children (Odom et al., 1995; Reinke et al., 2011; Snell et al., 2012). As such, school-based consultants can feel confident that implementation supports delivered via consultation often result in generalized EBP implementation.

This appears to be especially true when consultation involves in situ training and behavioral skills training, as these training techniques yielded the strongest effects for promoting target and generalized outcomes. These training practices may have the strongest benefits as they are often delivered in contexts in which early childhood educators are expected to deliver EBPs, and therefore may be more beneficial in promoting generalization (see Stokes &

Baer, 1977 for a more thorough description of promoting generalized outcomes). Therefore, consultants for early childhood education program should consider utilizing these training techniques when an EBP practice is clearly needed across multiple contexts (e.g., children exhibit disruptive behaviors throughout the day, multiple children would benefit from an intervention).

Conversely, professional development yielded the weakest effects for promoting early childhood educators' generalized use of EBPs. This is commensurate with previous research demonstrating that professional development is not as effective for promoting early childhood educators' use of EBPs in contexts in which trainings occurred (Dufrene et al., 2012), let alone promoting generalized outcomes. Given these effects, professional development should not be used as a standalone implementation support delivered through consultation, as it is not as likely to promote early childhood educators' target or generalized outcomes. Alternatively, if professional development trainings are utilized, they should be utilized as part of a continuum of consultation supports. That is, diligent data collection on early childhood educator and child outcomes should be collected to inform whether additional implementation supports (e.g., performance feedback, behavioral skills training, in situ training) should be delivered to bolster the effectiveness of professional development.

Regarding EBPs that were trained, results of this meta-analysis indicated that school- based consultation is not as effective for promoting early childhood educators' generalization of children's individual support plans when compared to other EBPs (e.g., behavior specific praise, effective instructions). This may be due to the fact that individual support plans often contain several different intervention components that are context specific, and therefore are not as easy to generalize. Conversely, other EBPs, such as behavior specific praise, are not as complex to learn as they contain fewer steps and may therefore be simpler to implement and generalize. Future research examining generalized outcomes for early childhood educators' implementation of individualized support plans should specifically program to

promote generalization (see Stokes & Baer, 1977). Furthermore, future research should also examine the extent to which early childhood educators implement the individual components of individualized support plans, to determine if perhaps certain aspects of individualized support plans are more or less likely to generalize following school-based consultation.

Finally, only 12 experimentally rigorous studies that collected data on early childhood educators' generalized outcomes were identified. Given the wide range of school-based consultation studies that have been conducted in early childhood education settings, it is surprising that such a low number of educator generalization studies have been conducted. This is somewhat concerning, as there is currently limited evidenced that supports the effectiveness of school-based consultation for promoting early childhood educators' generalized use of EBPs.

Therefore, future research examining school-based consultation in early childhood settings should seek to collect data on educators' generalized outcomes.

Limitations and Future Directions

Although the results of this meta-analysis indicate that school-based consultation is effective for promoting early childhood educators' generalized use of EBPs, it is not without limitations. First, this meta-analysis was limited to early childhood educators. As such, the extent to which school-based consultation is beneficial for promoting these outcomes with other educators (e.g., elementary teachers, secondary teachers) is unclear. Moving forward, other meta-analyses should investigate the effects of school-based consultation across levels of child development, including exploring whether said effects may vary based on grade/developmental level.

Second, although we took made extensive efforts to search the available literature, we cannot say for certain that a truly exhaustive search of the literature was conducted. Thus, it is possible we may have missed some relevant studies. For one, it is worth

reiterating that the current study represents a subsample of a larger meta-analysis project that is inclusive of PreK- 12th grade school populations. Throughout the larger study, our search procedures were meant to be exclusive to a broader school-based population, and thus we did not use search terms specific to early childhood populations. Additionally, studies were limited to those reported in English, which may systematically bias results by reducing findings to a particular region based on language (Smith & Sheridan, 2019). Finally, although we took some efforts to locate unpublished grey literature (i.e., searching *Google Scholar* and *ProQuest: Dissertations & Theses)*, we did not contact prominent authors in this area to locate any unpublished relevant data. This is a recommended practice that can sometimes help to successfully locate relevant findings (e.g., Polanin et al., 2020). Future research in this area should consider efforts to use more targeted search terms, expand inclusion criteria beyond English only, and make additional efforts to locate grey literature by contacting authors.

Further, although we chose a primary effect size index (i.e., LRR) consistent with the structure of our data and used Tau as a secondary index, these choices are not without limitations. Neither LRR nor Tau account for possible trends in modeling SCD data. In cases in which time trends may have been present in our data, it is possible that some effect size may have produced biased estimates. Based on the current analyses, it is unknown whether trend issues impacted results. Additional research in this area should yield greater consideration to time trends and incorporate additional effect size indices meant to account for these issues (e.g., Tau-U).

Additionally, results of the current study are solely reliant on SCD experimental studies. Surprisingly, no group-design studies investigating the effects of school-based consultation on educator generalization outcomes were located. It is possible that our search procedures were not comprehensive enough to locate group-design studies; however, it seems more likely that educator generalization outcomes simply are yet to be investigated using rigorous large-

scale research methodology (e.g., randomized controlled trials). Findings from the current study can hopefully provide a foundation to inform future school-based consultation practices that can be used to support educator delivery and generalization of EBPs within group-design research that is currently lacking. Finally, this study only examined rigorous single-case experimental designs that demonstrated strong effects. Additionally, researchers in these studies were often behavioral consultants or related personnel that likely had previously established relationships with participants. Given these factors, it is possible that our results were biased in favor of studies that were likely to obtain strong generalization effects. Therefore, future research should seek to address these limitations by examining the consultation literature more broadly (e.g., across other applied settings) and include research that does not necessarily meet rigorous research standards (e.g., What Works Clearinghouse).

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