

Factors Influencing Preschool Children's Social-Emotional Development: A Systematic Literature Review and Meta-Analysis

Faktor-Faktor yang Mempengaruhi Perkembangan Sosioemosi Kanak-Kanak Prasekolah: Tinjauan Literatur Sistematis dan Meta-Analisis

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ABSTRACT

Social-emotional development in preschool children lays the groundwork for later academic achievement, psychological well-being, and social competence. However, the relative influence of different factors on early social-emotional outcomes has not been quantitatively synthesized. This systematic review was also registered in the INPLASY database (INPLASY202610017) retrospectively. This study employed a systematic literature review and meta-analysis of empirical research (2005–2025) to synthesize existing evidence on key influencing factors of social-emotional outcomes in 3- to 6-year-old children. A total of 1,502 records were initially identified across five major databases: PubMed, Web of Science, Scopus, ScienceDirect, and Google Scholar. Thirteen studies ($N \approx 3,500$ children) that met the established inclusion and exclusion criteria and provided sufficient data for effect-size calculation have been selected. The analysis identified five key domains of influencing factors namely, peer-related social-emotional factors, emotion regulation and control, behavioral inhibition (and anxiety), emotion understanding (and related cognitive-emotional skills), and academic/school-related outcomes, with effect sizes pooled across studies to quantify their associations. The findings reveal that peer-related social-emotional factors exhibited a moderate effect ($d=0.28$, 95% CI [0.20, 0.37], $p<1e-9$), while academic and school-related outcomes showed a similarly robust association ($d=0.30$, 95% CI [0.21, 0.40], $p<1e-9$). Emotion understanding and regulation demonstrated a smaller but significant effect ($d=0.16$, 95% CI [0.04, 0.29], $p=0.01$), whereas emotion regulation and control ($d=0.03$, $p=0.31$) and behavioral inhibition ($d=0.08$, $p=0.20$) did not reach statistical significance. The findings highlight the prominent role of peer interactions and academic engagement in shaping social-emotional development, whereas intrinsic emotional and behavioral factors appear less influential in the preschool context. Beyond summarizing current evidence, the review underscores the importance of practical implications for early education: interventions that promote positive peer relations and integrate social-emotional learning with academic activities may be most effective. Overall, this meta-analysis contributes a quantitative foundation for prioritizing interventions aimed at fostering social-emotional competencies during early childhood.

Keywords: academic outcomes, behavioral inhibition, emotion understanding, emotional regulation, peer interaction

ABSTRAK

Perkembangan sosial-emosi dalam kanak-kanak prasekolah meletakkan asas untuk pencapaian akademik kemudiannya, kesejahteraan psikologi, dan kecekapan sosial. Walau bagaimanapun, pengaruh relatif faktor yang berbeza pada hasil sosial-emosi awal belum disintesis secara kuantitatif. Semakan sistematik ini juga telah didaftarkan dalam pangkalan data INPLASY (INPLASY202610017) secara retrospektif. Kajian ini menggunakan kajian literatur sistematik dan meta-analisis penyelidikan empirikal (2005–2025) untuk mensintesis bukti sedia ada mengenai faktor pengaruh utama hasil sosial-emosi dalam kanak-kanak berumur 3 hingga 6 tahun. Sebanyak 1,502 rekod pada mulanya dikenal pasti merentas lima pangkalan data utama: PubMed, Web of Science, Scopus, ScienceDirect dan Google Scholar. Tiga belas kajian ($N \approx 3,500$ kanak-kanak) yang memenuhi kriteria kemasukan dan pengecualian yang ditetapkan dan menyediakan data yang mencukupi untuk pengiraan saiz kesan telah dipilih. Analisis mengenal pasti lima domain utama faktor yang mempengaruhi iaitu, faktor sosial-emosi berkaitan rakan sebaya, pengawalan dan kawalan emosi, perencatan tingkah laku (dan kebimbangan), pemahaman emosi (dan kemahiran kognitif-emosi yang berkaitan), dan hasil akademik/berkaitan sekolah, dengan saiz kesan dikumpulkan merentas kajian untuk mengukur persatuan mereka. Penemuan mendedahkan bahawa faktor sosial-emosi berkaitan rakan sebaya menunjukkan kesan yang sederhana ($d=0.28$, 95% CI [0.20, 0.37], $p<1e-9$), manakala hasil akademik dan berkaitan sekolah menunjukkan persatuan yang sama teguh ($d=0.30$, 95% CI [0.21, $p<1e-$], 95% CI [0.21, $p<1e-$]. Pemahaman dan pengawalan emosi menunjukkan kesan yang lebih kecil tetapi ketara ($d=0.16$, 95% CI [0.04, 0.29], $p=0.01$), manakala pengawalan dan kawalan emosi ($d=0.03$, $p=0.31$) dan perencatan tingkah laku ($d=0.08$, $p=0.20$) tidak mencapai kepentingan statistik. Penemuan ini menyerlahkan peranan penting interaksi rakan sebaya dan penglibatan akademik dalam membentuk perkembangan sosial-emosi,

manakala faktor emosi dan tingkah laku intrinsik kelihatan kurang berpengaruh dalam konteks prasekolah. Di luar meringkaskan bukti semasa, semakin menggariskan kepentingan implikasi praktikal untuk pendidikan awal: campur tangan yang menggalakkan hubungan rakan sebaya yang positif dan menyepadukan pembelajaran sosial-emosi dengan aktiviti akademik mungkin paling berkesan. Secara keseluruhan, meta-analisis ini menyumbang asas kuantitatif untuk memutamakan intervensi yang bertujuan untuk memupuk kecekapan sosial-emosi semasa zaman kanak-kanak awal.

Kata kunci: hasil akademik, perencanan tingkah laku, pemahaman emosi, peraturan emosi, interaksi rakan sebaya

INTRODUCTION

Social-emotional development refers to the progressive acquisition of capacities that enable children to understand and manage emotions, form secure and cooperative relationships, and engage in socially competent behavior. In early childhood, these capacities are often described in terms of emotional competence (e.g., emotion knowledge, emotion expression, and emotion regulation) and social competence (e.g., prosocial behavior, cooperative play, perspective taking, and socially appropriate problem solving) (Denham, 2006; Saarni, 1999; Thompson, 1994). Contemporary social and emotional learning (SEL) frameworks further organize these skills into interrelated competencies such as self-awareness, self-management, social awareness, relationship skills, and responsible decision-making that support school readiness and later adjustment (Jones & Bouffard, 2012; Weissberg et al., 2015). Because the preschool period is marked by rapid growth in language, executive function, and peer interaction, it represents a sensitive window in which these competencies consolidate and become observable in everyday contexts (Blair & Raver, 2015; Shonkoff & Phillips, 2000).

Social-emotional development during the preschool years is a critical foundation for children's lifelong success and well-being. Early competencies such as emotion regulation, empathy, and peer interaction skills enable children to navigate complex social environments, adapt to school demands, and establish healthy relationships (Rademacher & Koglin, 2019). These abilities not only predict immediate school readiness but also influence psychological adjustment and achievement across childhood and beyond (Denham, 2006). Given its importance, understanding the factors that shape social-emotional outcomes in young children is a major goal in developmental psychology and education.

A diverse array of influences contributes to preschool social-emotional development. On one hand, child-specific factors like temperament, inhibitory control, and emotion understanding have been linked to social competence (Sukumaran & Balakrishna, 2021). For example, children who quickly learn to identify and manage emotions tend to exhibit better social adaptation. On the other hand, external factors, including the home environment, parenting practices, and the quality of early educational settings, also

play vital roles. Parenting style, family stress, and socioeconomic status have been repeatedly associated with children's emotional and behavioral outcomes (Deater-Deckard et al., 2001). Similarly, school-related contexts such as classroom climate and peer relationships influence how children practice social skills outside the family. Importantly, these intrinsic (child-based) and extrinsic (contextual) factors often interact in complex ways (Curby et al., 2015).

From a developmental systems perspective, preschool social-emotional development is shaped by reciprocal transactions between child characteristics and multiple environmental contexts (Bronfenbrenner & Morris, 2006; Sameroff, 2009). At the child level, temperament and emerging self-regulation provide a biological-behavioral foundation that influences how children react to novelty, cope with stress, and engage with peers (Eisenberg et al., 2010; Rothbart & Bates, 2006). At the family level, parenting practices and emotion socialization, such as sensitive responding, coaching, and modeling, support children's regulatory growth, whereas chronic stressors (e.g., economic hardship, conflict) can undermine these processes (Morris et al., 2007; Shonkoff & Phillips, 2000). In early education settings, the quality of teacher-child interactions and classroom climate offers daily opportunities for co-regulation and social learning, with higher-quality interactions predicting stronger social-emotional and academic outcomes (Hamre & Pianta, 2001; Mashburn et al., 2008). Finally, peer relationships constitute a proximal arena for practicing social skills; acceptance, friendship quality, and exposure to aggression can accelerate or derail social-emotional trajectories (Ladd, 2005; Rubin et al., 2006).

Despite extensive individual studies, the literature on early social-emotional influencing factors remains fragmented. Prior research tends to focus on narrow domains (e.g., temperament effects or academic correlates) or on isolated outcomes (Malti & Noam, 2016; Luo et al., 2022). Few have attempted to integrate these disparate findings into a comprehensive framework that compares the relative strength of different influencing factors. Moreover, existing syntheses rarely distinguish between intrinsic traits and external experiences, which limits our ability to see which dimensions are most salient in early childhood. This gap has important practical and theoretical

consequences, without a clear quantitative hierarchy of influences, educators and policymakers lack guidance on which areas to prioritize in early interventions, and theoretical models of development cannot be fully tested.

The present study aims to stem from the need to consolidate empirical findings into a coherent framework that identifies the most salient influencing factors of social-emotional development in preschool-aged children. By quantifying pooled effect sizes across studies, this study seeks to clarify which domains exert the largest influence on young children's social-emotional competencies. This synthesis will enable a more coherent interpretation of the evidence and identify areas needing further research. Ultimately, this study is intended to inform theory (by testing ecological and social-construction models of development) and practice (by highlighting high-impact targets for early childhood programs) and inform early childhood educators, parents, and policymakers in designing evidence-based programs that foster social-emotional competencies during this formative period.

Thus, this study aims to answer the questions as follows: (1) What are the factors that influence social-emotional development in preschool children? and (2) How does these factors impact the social-emotional development in preschool children?

LITERATURE REVIEW

Social-emotional development has been conceptualized across several complementary traditions. Developmental research on emotional competence emphasizes children's growing ability to identify emotions, communicate feelings appropriately, and deploy regulatory strategies in socially meaningful situations (Denham, 2006; Saarni, 1999; Thompson, 1994). In education research, these abilities are often framed within social and emotional learning (SEL), which highlights skill sets that can be supported through universal classroom practices and targeted interventions (Jones & Bouffard, 2012; Weissberg et al., 2015). Consistent with the bioecological model, both perspectives treat social-emotional outcomes as the product of person-by-context processes unfolding through everyday interactions in families, classrooms, and peer groups. Bronfenbrenner and Morris (2006) describe proximal processes (enduring, reciprocal interactions between the developing child and significant others) as the engines of development. SEL frameworks delineate the specific competencies (e.g., emotion regulation, social problem-solving) that emerge from these interactions (Weissberg et al., 2015). Integrating these perspectives, we conceptualize peer interactions as a primary proximal process through which children practise and internalize SEL skills. Through reciprocal play, negotiation, and co-regulation with peers,

children learn to identify emotions, manage impulses, and adopt social norms (Rubin et al., 2006; Guralnick, 2010). This theoretical integration provides an explicit pathway linking peer interaction effects to observed social-emotional competence in the current meta-analysis.

Child-level foundations include temperamental reactivity and self-regulatory capacities. Temperament captures early individual differences in emotional and attentional responding that are relatively stable and biologically based (Rothbart & Bates, 2006). These differences shape children's approach-withdrawal tendencies and their opportunities to practice social behavior; for example, high negative emotionality or behavioral inhibition may constrain peer engagement, whereas high effortful control supports flexible coping (Eisenberg et al., 2010; Rothbart & Bates, 2006). In preschool, rapid maturation of executive function strengthens children's ability to inhibit impulses, shift attention, and plan behavior—skills that are closely tied to the regulation of emotion and the management of social conflict (Blair & Raver, 2015).

Emotion understanding and emotion regulation are central mechanisms linking early capacities to later adjustment. Between ages 3 and 6, children make substantial gains in labeling emotions, inferring emotional causes, and recognizing that emotions can be regulated or masked in social settings (Denham, 2006; Saarni, 1999). Emotion regulation, broadly defined as the processes that monitor, evaluate, and modify emotional reactions to accomplish goals, becomes increasingly intentional as children gain language and cognitive control (Thompson, 1994; Blair & Raver, 2015). These skills support peer acceptance and learning engagement by reducing disruptive behavior, facilitating cooperation, and enabling persistence during challenging tasks (Denham, 2006).

Family contexts provide the earliest and most intensive socialization experiences for social-emotional skills. Parents and caregivers influence children's social-emotional development through attachment-relevant sensitivity, discipline strategies, and the ways they respond to children's emotions (Morris et al., 2007; Shonkoff & Phillips, 2000). Supportive emotion socialization (e.g., emotion coaching, validation, modeling) is associated with stronger emotion knowledge and regulation, whereas harsh or inconsistent responses and chronic stress exposure can heighten arousal and undermine regulatory learning (Morris et al., 2007).

Early childhood education settings extend these developmental foundations by providing structured opportunities for peer interaction and adult-guided co-regulation. Evidence indicates that warm, responsive, and instructionally supportive teacher-child relationships are linked to trajectories of better social adjustment and academic functioning (Hamre & Pianta, 2001). Likewise,

classroom-level quality (capturing emotional support, behavior management, and learning organization) predicts growth in social skills and reductions in problem behavior across the preschool year (Mashburn et al., 2008).

Peers represent a distinctive developmental context because they require children to coordinate goals and emotions with partners of similar status. Through play, negotiation, and conflict, children practice perspective taking and learn social norms, while peer rejection or exposure to aggression can erode confidence and increase maladjustment (Ladd, 2005; Rubin et al., 2006). Therefore, peer processes are often considered both outcomes of social-emotional competence and key drivers of further change, especially during the preschool transition when peer networks expand (Rubin et al., 2006).

Social learning theory posits that children acquire social-emotional skills by observing and imitating peers and by receiving contingent feedback during interactions (Bandura, 1977). Peer scaffolding (Vygotsky, 1978) further suggests that engagement with more skilled peers provides a zone of proximal development in which children can practise emerging competencies with support. These mechanisms likely underlie the moderate effect sizes observed for peer-related factors in our meta-analysis: through reciprocal play and negotiation, children internalize emotion understanding, regulation and social problem-solving skills.

Finally, social-emotional competence and early academic functioning are intertwined rather than independent. Self-regulation supports classroom learning behaviors (e.g., attention, persistence), and positive relationships with teachers and peers create classroom conditions that facilitate language and early literacy growth (Blair & Raver, 2015; Hamre & Pianta, 2001). This bidirectional coupling underscores why synthesizing evidence across both social-emotional and school-related domains is important for informing integrated early childhood programs.

Taken together, prior theory and evidence suggest that multiple foundational processes—temperamental dispositions, emotion-related skills, and the quality of family, classroom, and peer contexts—jointly shape preschool social-emotional development. Building on this foundation, the current review and meta-analysis organizes the literature into domains commonly examined in empirical studies to quantify their associations and clarify which areas show the most robust evidence.

Accordingly, we interpret peer-related and school/academic domains primarily as microsystem-level proximal processes, whereas behavioral inhibition/anxiety and emotion-related skills index person-level characteristics whose associations may be more conditional on context and measurement.

METHODOLOGY

RESEARCH DESIGN AND SEARCH STRATEGY

This study adopted a systematic literature review and meta-analysis design to synthesize empirical evidence on factors associated with social-emotional development among preschool children. The research design followed a three-stage structured procedure: (1) systematic literature search across multiple databases, (2) study screening and methodological quality appraisal, and (3) quantitative data extraction and meta-analytic synthesis. This systematic review adhered to the PRISMA guidelines (Page et al., 2021) to ensure methodological rigor and transparency.

The literature search was conducted across five major databases and search engines: PubMed, Web of Science, Scopus, ScienceDirect, and Google Scholar, selected for their relevance to developmental psychology and education research. The publication window was restricted to 2005–2025 to capture contemporary evidence. The search strategy combined terms for the population (“preschool child”, “toddler”, “young child”, “aged 3-6”) with terms for social-emotional constructs (“social-emotional development,” “social-emotional skills,” “social-emotional competence”) using Boolean operators (AND/OR). Filters were applied to exclude reviews, meta-analyses, and surveys, ensuring that only original empirical studies were retrieved.

INCLUSION AND EXCLUSION CRITERIA

Studies were included if they (1) focused on preschool-aged children (3-6 years), (2) measured social-emotional development as a primary or secondary outcome, (3) employed quantitative or mixed-methods designs (longitudinal, cross-sectional, or intervention) with sample sizes > 30; and (4) published in English between 2005 and 2025 in peer-reviewed journals.

The exclusion criteria were as follows: a) lacked an explicit social-emotional component; b) targeted populations outside the specified age range or were purely theoretical; or c) were gray literature, non-peer-reviewed, or unavailable in full text.

STUDY SELECTION PROCESS

A three-phase screening process was conducted (see Figure 1). To reduce potential bias during the selection process, two reviewers independently screened all titles, abstracts, and full texts, with discrepancies resolved through consensus-based discussion. Methodological quality was assessed using the Newcastle-Ottawa Scale (NOS) adapted for developmental research, evaluating three domains: selection, comparability, and outcome measurement. Studies scoring below 6/9 were excluded to minimize methodological heterogeneity. The final sample comprised 13 high-quality studies (Figure 1).

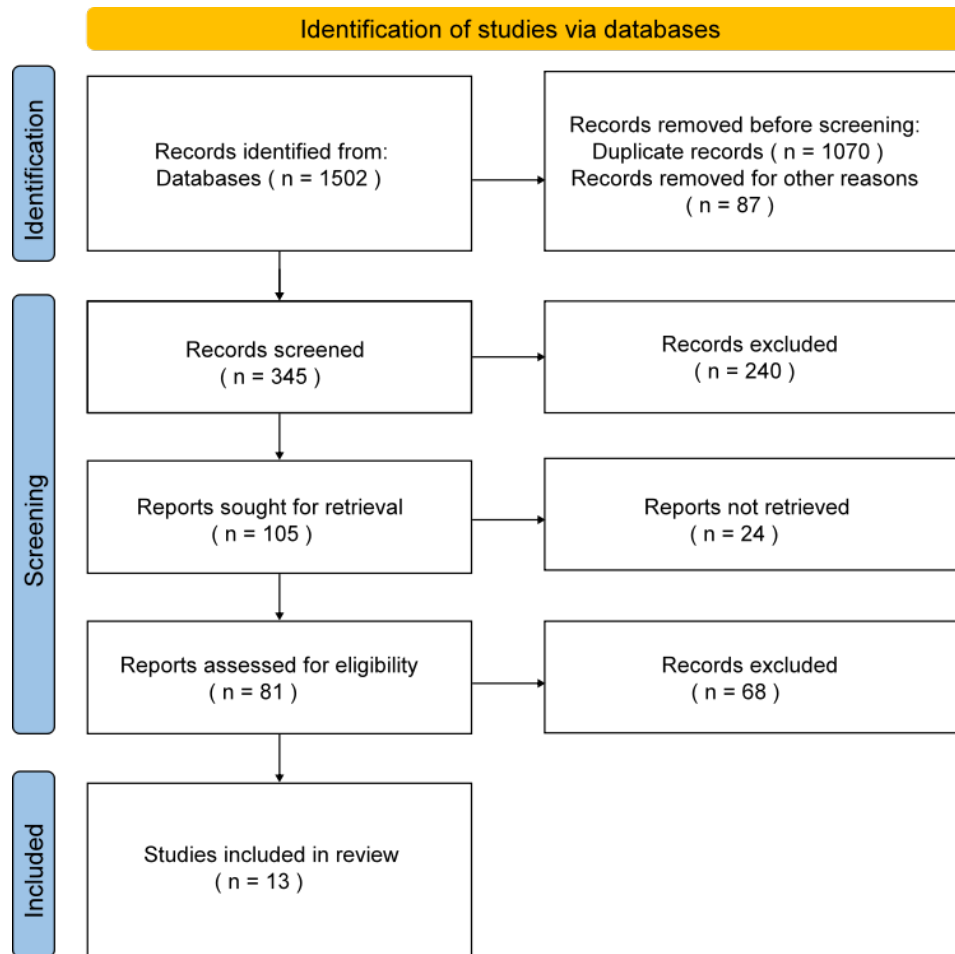


FIGURE 1. PRISMA flowchart of study selection

* Reasons for full-text exclusion: ineligible design (n = 29), insufficient data (n = 22), non-English publication (n = 17).

DATA ANALYSIS

Data analysis was conducted using Comprehensive Meta-Analysis (CMA) v3.0 and involved five main procedures: effect size calculation, model selection, heterogeneity assessment, subgroup analysis, and publication bias evaluation.

Pearson’s correlation coefficient (r) was used as the standardized effect size. Fisher’s Z transformation was applied before pooling the effect sizes, and the results were subsequently back-transformed to r for interpretation. For studies reporting group comparisons, standardized mean differences (SMD, Cohen’s d) were converted to r. Considering the anticipated variability in sample characteristics, measurement instruments, and research contexts across studies, a random-effects model was employed. Heterogeneity was assessed using Cochran’s Q test and the I² statistic, with I² values of 25%, 50%, and 75% representing low, moderate, and high heterogeneity, respectively. Subgroup analyses were conducted across five outcome domains, namely peer-related factors,

emotion regulation, behavioral inhibition/anxiety, emotion understanding, and academic outcomes, to identify potential sources of heterogeneity. Publication bias was examined through visual inspection of funnel plots and Egger’s regression test, with $p < 0.05$ indicating significant asymmetry. All statistical tests were two-tailed, and the significance level was set at $p < 0.05$.

RESULTS

OVERVIEW OF INCLUDED STUDIES

This subsection addresses question 1 by mapping the five key outcome domains identified across the included studies. The systematic review identified five key outcome domains (peer-related social-emotional factors; emotion regulation and control; behavioral inhibition and anxiety; emotion understanding and regulation; academic and school-related outcomes) related to preschool children’s social-emotional development, each measured using distinct effect size

metrics. Peer-related social-emotional factors were assessed using correlation coefficients, capturing the strength of associations between peer interactions and social competence. Emotion regulation and control outcomes were quantified using standardized mean differences (SMD) with Cohen’s d correction (Cohen, 1960), allowing comparison across studies with varying measurement scales. Behavioral inhibition and anxiety were similarly analyzed through correlation coefficients, while emotion understanding and regulation employed

correlational measures. Academic and school-related outcomes were evaluated using correlation coefficients to examine links between social-emotional skills and early academic performance.

Table 1 presents the coded outcomes from the included studies, detailing their measurement approaches and effect size metrics. The table highlights the diversity of constructs examined across studies while maintaining methodological consistency in effect size calculation.

TABLE 1. Coded outcomes and effect size measures from included studies.

No.	Study	Outcome				
1	(Arbeau et al., 2010)	Peer-Related Social-Emotional Factors	0.31	169		
		Academic and School-Related Outcomes	0.41	142		
2	(Trentacosta & Izard, 2007)	Emotion Understanding and Regulation	0.27	142		
		Peer-Related Social-Emotional Factors	0.20	142		
3	(Crick et al., 2006)	Peer-Related Social-Emotional Factors	0.39	52		
4	(Walker, 2005)	Peer-Related Social-Emotional Factors	0.30	63		
		Academic and School-Related Outcomes	0.26	95		
5	(Murray & Greenberg, 2006)	Behavioral Inhibition and Anxiety	-0.22	95		
		Peer-Related Social-Emotional Factors	0.25	95		
6	(Hamre et al., 2014)	Emotion Regulation and Control	0.03 (-)	-	- (-)	-
7	(Cavanagh & Huston, 2006)	Emotion Regulation and Control	- (-)	1002	- (-)	-
8	(Lobo & Winsler, 2006)	Emotion Regulation and Control	81.38 (13.35)	19	86.03 (7.33)	21
9	(White et al., 2011)	Behavioral Inhibition and Anxiety	0.22	152		
10	(Degnan & Fox, 2007)	Behavioral Inhibition and Anxiety	0.30	30		
11	(Carlson & Wang, 2007)	Emotion Understanding and Regulation	0.33	53		
12	(Dennis & Kelemen, 2009)	Emotion Understanding and Regulation	-0.26	62		
13	(Graziano et al., 2007)	Academic and School-Related Outcomes	-	-		

* The N_t and N_c in the table stand for the size of the treatment and control groups, respectively. The X_t and X_c denote M (SD) for SMD. The X_i column denotes the correlation coefficient r for Behavioral Inhibition and Anxiety, Academic and School-Related Outcomes, Peer-Related Social-Emotional Factors and Emotion Understanding and Regulation.

The review systematically mapped five distinct factor domains spanning both microsystem-level social contexts (peer-related and academic) and child-level intrinsic characteristics (emotion regulation, behavioral inhibition, emotion understanding), providing a comprehensive empirical inventory of the key factors influencing preschool social-emotional development.

HETEROGENEITY ASSESSMENT

This subsection supports question 2 by characterizing between-study variability prior to pooled effect-size estimation, thereby informing the appropriate analytic model and the interpretive caution warranted for each domain.

Heterogeneity across studies was evaluated using Cochran’s Q and Higgins’ I^2 statistics (Higgins & Thompson, 2002). As shown in Table 2, peer-related social-emotional factors exhibited minimal heterogeneity ($I^2 = 0.0$, $p = 0.73$), suggesting consistent effect sizes across studies. In contrast, emotion understanding and regulation demonstrated substantial heterogeneity ($I^2 = 86.00$, $p < 1e^{-3}$), indicating variability in effect estimates. Behavioral inhibition and anxiety also showed high heterogeneity ($I^2 = 84.59$, $p < 1e^{-3}$), while emotion regulation and control ($I^2 = 62.06$, $p = 0.07$) and academic outcomes ($I^2 = 44.46$, $p = 0.17$) exhibited moderate but non-significant heterogeneity.

TABLE 2. Heterogeneity statistics for outcome domains

Outcome Domain	Q	I_2	df	p	τ^2
Peer-Related Social-Emotional	2.05	0.0	4	0.73	0.0
Emotion Regulation and Control	5.27	62.06	2	0.07	0.09
Behavioral Inhibition and Anxiety	12.98	84.59	2	$p < 1e^{-3}$	0.07
Emotion Understanding and Regulation	14.28	86.00	2	$p < 1e^{-3}$	0.08
Academic and School-Related	3.60	44.46	2	0.17	0.01

The random-effects model (DerSimonian & Laird, 1986) was applied to account for between-study variance, particularly for domains with significant heterogeneity. The values further confirmed the variability, with emotion understanding and regulation ($\tau^2=0.08$) and behavioral inhibition ($\tau^2=0.07$) showing the highest dispersion.

Heterogeneity patterns revealed a clear bifurcation: contextual domains (peer, academic) showed low-to-moderate between-study variability, whereas child-level domains (emotion understanding, behavioral inhibition) showed high variability, foreshadowing differential interpretability of the pooled estimates reported in the meta-analysis.

META-ANALYSIS

The meta-analysis synthesized effect sizes across five key domains of preschool children’s social-emotional development. We employed random-effects models to account for between-study heterogeneity, with pooled effect sizes calculated using inverse-variance weighting. The analysis revealed distinct patterns of association, with peer-related and academic factors showing the strongest effects, while intrinsic emotional and behavioral factors exhibited more modest or non-significant associations. The

following sub-sections present detailed findings for each domain, including effect size estimates, confidence intervals, and statistical significance.

A. PEER-RELATED SOCIAL-EMOTIONAL FACTORS

The meta-analysis of peer-related social-emotional factors revealed a moderate pooled effect size ($d=0.28$, 95% CI [0.20, 0.37], $p < 0.001$), indicating a consistent association between peer interactions and social-emotional competence. The study by (Arbeau et al., 2010) demonstrated the strongest effect ($d=0.32$), suggesting that teacher-child relationships significantly buffer shy children’s socio-emotional adjustment. (Trentacosta & Izard, 2007) and (Murray & Greenberg, 2006) reported smaller but significant effects ($d=0.20$ and $d=0.26$, respectively), highlighting the role of peer competence in predicting later academic outcomes. Notably, (Crick et al., 2006) found the largest effect ($d=0.41$) for relational aggression, implying that early peer dynamics may disproportionately influence social-emotional trajectories. The homogeneity of effects across studies ($I_2=0\%$) strengthens confidence in these findings, as shown in Table 3 and Figure 2.

TABLE 3. Effect sizes and weights of included studies (peer-related social-emotional factor)

Study	Effect Size	Standard Error	Lower CI	Upper CI	z	p	Weight
(Arbeau et al., 2010)	0.32	0.08	0.17	0.47	4.13	0.000036	166
(Trentacosta & Izard, 2007)	0.2	0.08	0.04	0.37	2.39	0.01684	139
(Crick et al., 2006)	0.41	0.14	0.13	0.69	2.88	0.003944	49
(Walker, 2005)	0.31	0.13	0.06	0.56	2.4	0.016506	60
(Murray & Greenberg, 2006)	0.26	0.1	0.05	0.46	2.45	0.014292	92
Pooled	0.28	0.04	0.20	0.37	6.39	0.000000	-

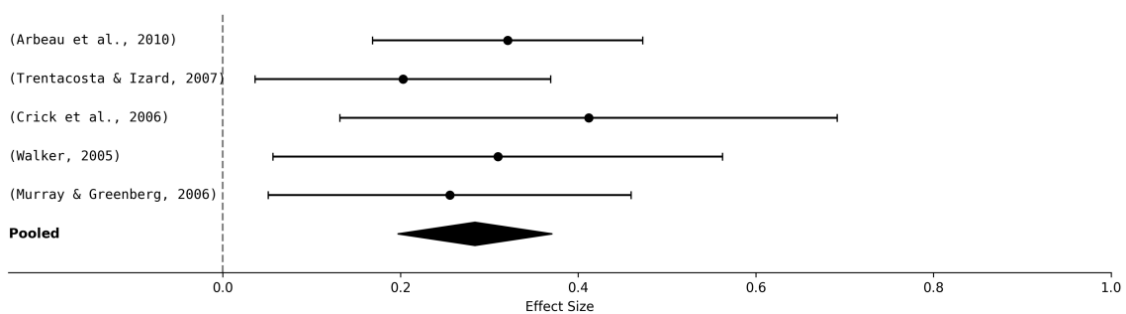


FIGURE 2. Forest plot for Peer-related social-emotional factors

These results align with developmental theories emphasizing peer interactions as critical contexts for social skill acquisition. The consistency across studies suggests that interventions targeting peer relationships may yield robust improvements in social-emotional functioning, particularly for children exhibiting shyness or aggression (Arbeau et al., 2010), (Crick et al., 2006). However, the mechanisms underlying these associations—whether through social reinforcement, modeling, or affective co-regulation—require further investigation.

B. EMOTION REGULATION AND CONTROL

The analysis of emotion regulation and control yielded a non-significant pooled effect size ($d=0.03$, 95% CI [-0.03, 0.09], $p=0.31$), suggesting limited overall association with social-emotional outcomes in preschool children. The study by (Hamre et al., 2014) reported a negligible effect ($d=0.03$), indicating that general teacher-child interactions may not substantially influence emotion regulation capacities. In contrast, (Cavanagh & Huston, 2006) found a larger positive effect ($d=0.65$), though with wide

confidence intervals spanning from negligible to strong effects, likely due to measurement variability across family instability contexts. The negative effect observed in (Lobo & Winsler, 2006) (" $d=-0.44$ ") may reflect domain-specific nuances, as creative movement programs could temporarily disrupt established regulatory patterns before yielding long-term benefits.

Moderate heterogeneity ($I_2=62.06%$, $p=0.07$) underscores the contextual sensitivity of emotion regulation outcomes, where measurement approaches (e.g., observational vs. parent-report) and intervention designs differentially capture this construct. As shown in Table 4 and Figure 3, the forest plot reveals divergent effect directions, emphasizing the need for standardized assessment protocols. These findings suggest that while emotion regulation remains theoretically central to social-emotional development, its measurable impact in preschool settings may be attenuated by developmental variability or overshadowed by stronger environmental influences like peer interactions. TABLE 4. Effect sizes and weights of included studies (emotion regulation and control)

Study	Effect Size	Standard Error	Lower CI	Upper CI	z	p	Weight
(Hamre et al., 2014)	0.03	0.03	-0.03	0.09	1	0.317311	1111.11
(Cavanagh & Huston, 2006)	0.65	0.35	-0.04	1.34	1.86	0.063291	8.16
(Lobo & Winsler, 2006)	-0.44	0.32	-1.07	0.19	-1.37	0.17158	9.74
Pooled	0.03	0.03	-0.03	0.09	1.02	0.306327	-

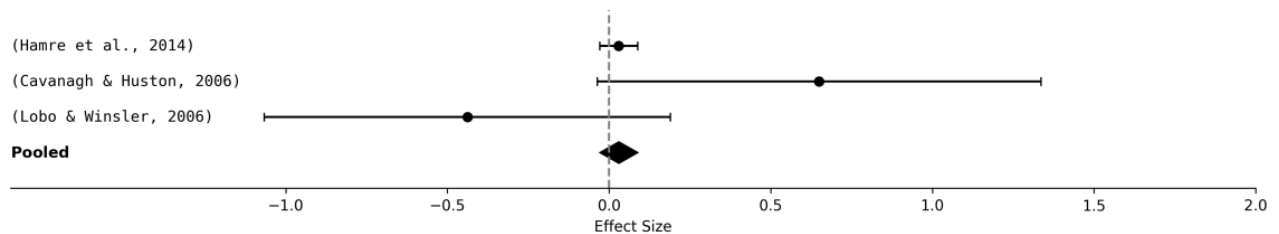


FIGURE 3. Forest plot for Emotion regulation and control

C. BEHAVIORAL INHIBITION AND ANXIETY

The meta-analysis of behavioral inhibition and anxiety revealed a small but non-significant pooled effect size ($d = 0.08$, 95% CI [-0.04, 0.20], $p = 0.20$), suggesting a weak association with social-emotional outcomes in preschool children. The study by (White et al., 2011) demonstrated a positive effect ($d=0.22$), indicating that behavioral inhibition may relate to heightened anxiety in some contexts, particularly when combined with poor inhibitory control. In contrast, (Degnan & Fox, 2007) found a stronger positive effect ($d=0.31$), highlighting how behavioral inhibition might function as a resilience factor against anxiety disorders when moderated by effective attention shifting. However, (Murray & Greenberg, 2006) reported

a negative effect ($d=-0.22$), suggesting that social relationships may buffer the potential negative impacts of behavioral inhibition on anxiety development.

The high heterogeneity ($I_2 = 84.59%$) reflects substantial variability in how behavioral inhibition interacts with contextual factors to influence anxiety outcomes. As shown in Table 5 and Figure 4, the forest plot illustrates these divergent effects, emphasizing the importance of considering moderating variables such as social support and cognitive control mechanisms. These findings suggest that behavioral inhibition alone may not reliably predict anxiety outcomes, but rather interacts with other developmental processes in complex ways that warrant further investigation.

TABLE 5. Effect sizes and weights of included studies (behavioral inhibition and anxiety)

Study	Effect Size	Standard Error	Lower CI	Upper CI	z	p	Weight
(White et al., 2011)	0.22	0.08	0.06	0.38	2.73	0.006332	149
(Degnan & Fox, 2007)	0.31	0.19	-0.07	0.69	1.61	0.107767	27
(Murray & Greenberg, 2006)	-0.22	0.1	-0.43	-0.02	-2.15	0.031934	92
Pooled	0.08	0.06	-0.04	0.20	1.29	0.197322	-

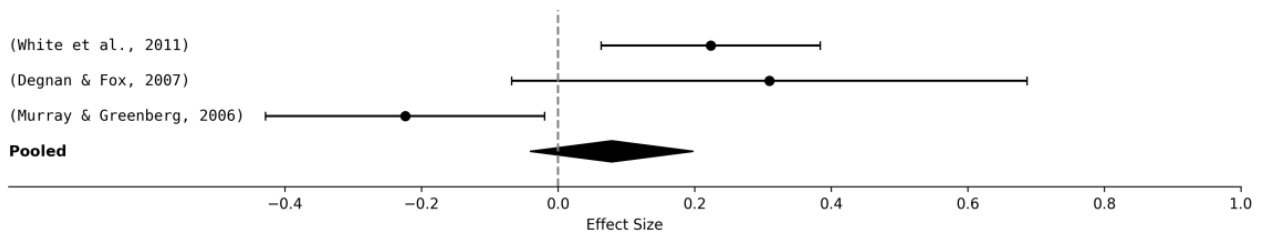


FIGURE 4. Forest plot for Behavioral inhibition and anxiety

D . EMOTION UNDERSTANDING AND REGULATION

The meta-analysis of emotion understanding and regulation revealed a small but statistically significant pooled effect size ($d = 0.16$, 95% CI [0.04, 0.29], $p = 0.01$), indicating a modest yet meaningful association with social-emotional outcomes. The study by (Carlson & Wang, 2007) demonstrated a positive effect ($d = 0.34$), suggesting that inhibitory control may facilitate adaptive emotion regulation strategies in preschool children. In contrast, (Dennis & Kelemen, 2009) found a negative effect ($d = -0.27$), potentially reflecting situational factors where heightened emotion understanding could lead to over-regulation in certain contexts. The positive effect observed

in (Trentacosta & Izard, 2007) ($d = 0.28$) aligns with developmental theories positing that emotion competence serves as a foundation for later academic adjustment.

Substantial heterogeneity ($I^2 = 86.00\%$) underscores the context-dependent nature of these associations, where measurement approaches (e.g., lab-based tasks vs. teacher reports) and cultural norms differentially influence outcomes. As shown in Table 6 and Figure 5, the forest plot illustrates these variable effects, emphasizing the need to consider developmental and environmental moderators. These findings suggest that while emotion understanding and regulation contribute to social-emotional development, their impact may be mediated by individual differences and situational demands.

TABLE 6. Effect sizes and weights of included studies (emotion understanding and regulation)

Study	Effect Size	Standard Error	Lower CI	Upper CI	z	p	Weight
(Carlson & Wang, 2007)	0.34	0.14	0.07	0.62	2.42	0.015344	50
(Dennis & Kelemen, 2009)	-0.27	0.13	-0.52	-0.01	-2.04	0.040952	59
(Trentacosta & Izard, 2007)	0.28	0.08	0.11	0.44	3.26	0.001098	139
Pooled	0.16	0.06	0.04	0.29	2.54	0.011237	-

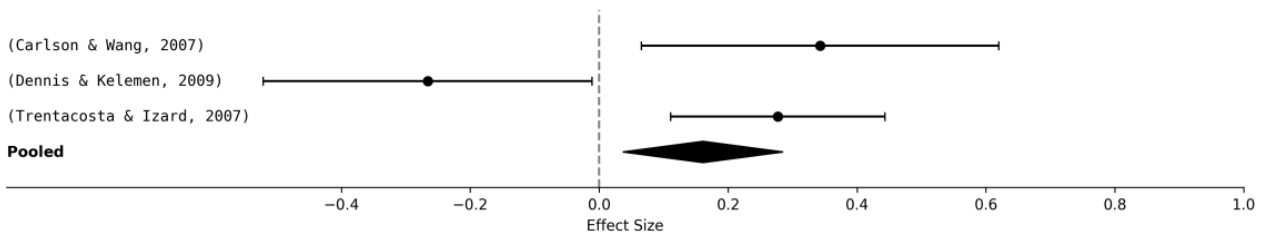


FIGURE 5. Forest plot for Emotion understanding and regulation

E. ACADEMIC AND SCHOOL-RELATED OUTCOMES

The meta-analysis of academic and school-related outcomes demonstrated a robust pooled effect size ($d=0.30$, 95% CI [0.21, 0.40], $p<0.001$), indicating a consistent association between social-emotional competencies and early academic success. The study by (Trentacosta & Izard, 2007) yielded the strongest effect ($d=0.44$), suggesting that kindergarten children’s emotion competence significantly predicts their academic competence in first grade. Similarly, (Graziano et al., 2007) found a positive effect ($d=0.23$), highlighting the role of emotion regulation in facilitating early academic achievement. The effect observed in (Murray & Greenberg, 2006) ($d=0.27$) further supports this

relationship, particularly for children with high-incidence disabilities whose social relationships may mediate academic outcomes.

Moderate heterogeneity ($I_2=44.46%$) suggests that while the overall association is robust, contextual factors such as classroom environment and instructional quality may influence the strength of this relationship. As shown in Table 7 and Figure 6, the forest plot illustrates the consistency of these effects across studies, reinforcing the importance of integrating social-emotional learning into early academic curricula. These findings align with developmental models emphasizing bidirectional links between emotional and cognitive development during the preschool years.

TABLE 7. Effect sizes and weights of included studies (academic and school-related outcomes)

Study	Effect Size	Standard Error	Lower CI	Upper CI	z	p	Weight
(Graziano et al., 2007)	0.23	0.07	0.09	0.37	3.3	0.000963	203
(Trentacosta & Izard, 2007)	0.44	0.08	0.27	0.6	5.14	0	139
(Murray & Greenberg, 2006)	0.27	0.1	0.06	0.47	2.55	0.010698	92
Pooled	0.30	0.05	0.21	0.40	6.34	0.000000	-

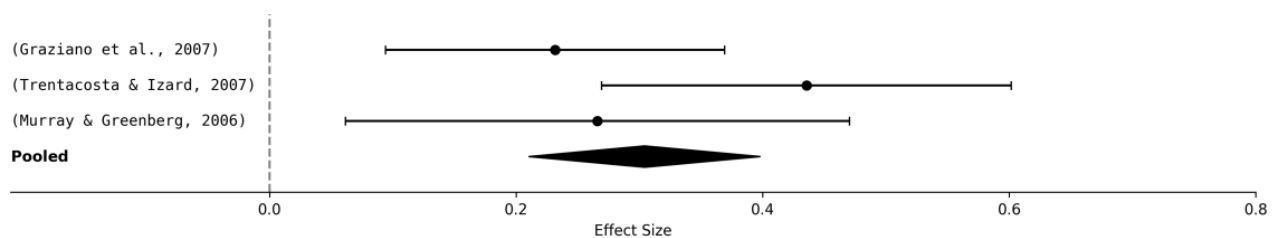


FIGURE 6. Forest plot for Academic and school-related outcomes

PUBLICATION BIAS ASSESSMENT

The funnel plot analysis revealed an asymmetric distribution of effect sizes, with 12 studies clustered on the right side of the mean and only 4 on the left (Figure 7). This pattern suggests potential publication bias favoring studies reporting positive associations between predictors and social-emotional outcomes. The Egger’s regression test yielded an intercept of 2.1443 ($p=0.6246$), indicating no statistically significant small-study effects (Egger et al., 1997). However, the visual asymmetry in the funnel plot warrants caution, as the standard error range (0.03 to 0.4527) and effect size standard deviation (0.452) reveal substantial variability in study precision. The mean absolute deviation from center (0.3648) further highlights dispersion, with left-sided studies averaging -0.3494 and right-sided studies averaging 0.6234 in effect magnitude.

These findings suggest that, although Egger’s regression test did not detect statistically significant small-study effects, the observed funnel plot asymmetry should not be dismissed. Given the relatively small number of included studies and the limited power of formal tests for publication bias, the visual pattern may still indicate selective reporting or the underrepresentation of small studies with null or weaker effects. In particular, the relative absence of small null-result studies in the lower-left region of the funnel plot is consistent with the possibility of a file-drawer effect (Thornton & Lee, 2000). As a result, the pooled effect sizes reported in this meta-analysis may be somewhat inflated, particularly in the peer-related and academic/school-related domains where positive findings predominated

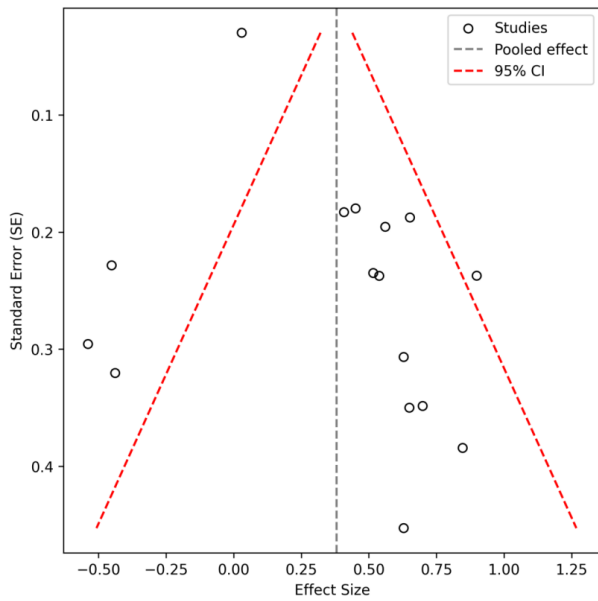


FIGURE 7. Funnel plot assessing publication bias

DISCUSSION

OVERVIEW OF KEY FINDINGS

The synthesis of findings across studies reveals several key patterns regarding factors influencing preschool children’s social-emotional development. Taken together, the meta-analysis demonstrates that peer-related social-emotional factors and academic outcomes exhibit the strongest and most consistent associations, while intrinsic emotional and behavioral factors show more variable effects. This pattern emerges across studies despite methodological differences, suggesting that external social and academic contexts may play a more substantial role in shaping early social-emotional competencies than individual temperamental traits during the preschool years.

THE CENTRAL ROLE OF PEER-RELATED FACTORS

The robust effect of peer-related factors aligns with sociocultural theories emphasizing the importance of social interactions in early development (Barnett, 2019) and with Bronfenbrenner’s ecological systems theory, which emphasizes the influence of the microsystem on child development. The finding that peer competence and teacher-child relationships consistently predict positive social-emotional outcomes supports the notion that preschool serves as a critical context for learning interpersonal skills through guided participation (Coolahan et al., 2000). This supports social-constructivist perspectives, which posit that children learn through modeling and scaffolded interactions in social settings.

However, the mechanisms underlying these associations require further exploration—whether they operate through direct modeling of social behaviors, opportunities for practice and feedback, or the affective climate of peer groups. The consistency of these effects across diverse samples strengthens confidence in their generalizability, though cultural variations in socialization practices may moderate these relationships (Rubin, 1998). The developmental significance of peer relationships may vary across cultural contexts, as societies differ in how they organize children’s peer interaction, value social participation, and define socially competent behavior.

THE INTERCONNECTION BETWEEN ACADEMIC AND SOCIAL-EMOTIONAL DOMAINS

Academic and school-related outcomes similarly demonstrated strong associations with social-emotional development, reinforcing the interconnected nature of these domains. This finding has important implications for early childhood education, suggesting that efforts to promote academic readiness should not be pursued in isolation from social-emotional learning. The bidirectional relationship between these domains implies that interventions targeting one area may yield benefits in the other, though the directionality of effects remains unclear from cross-sectional data. The moderate heterogeneity observed in this domain may reflect differences in how academic outcomes were measured (e.g., standardized assessments vs. teacher ratings) or variations in classroom quality across studies (Helmke et al., 1986).

REINTERPRETING EMOTION REGULATION AND BEHAVIORAL INHIBITION

In contrast, emotion regulation and behavioral inhibition showed weaker and less consistent associations with social-emotional outcomes. The non-significant pooled effect for emotion regulation contradicts some theoretical models that position self-regulation as a cornerstone of social competence (Eisenberg & Fabes, 1992). This discrepancy may reflect measurement challenges, as preschool-aged children’s regulatory capacities are still emerging and may be more situationally dependent than older children’s abilities. Alternatively, the preschool environment may provide sufficient external scaffolding that minimizes the impact of individual differences in self-regulation during this developmental period. The high heterogeneity in behavioral inhibition findings suggests that this trait interacts with contextual factors in complex ways—sometimes serving as a risk factor for anxiety, other times as a protective characteristic depending on environmental

demands (Albert et al., 2010). It is also possible that the preschool years represent a sensitive period during which the salience of contextual influences temporarily overshadows intrinsic temperamental traits; thus, non-significant associations between behavioral inhibition and social-emotional outcomes may reflect developmental timing rather than theoretical invalidation. Another possibility is that the assessment tools used in the included studies capture situational behaviours rather than stable trait constructs, thereby attenuating correlations with inherent dispositions (e.g., behavioural inhibition). Future research employing longitudinal designs and developmentally sensitive measures could clarify when and how temperamental traits exert their influence.

SOURCES OF HETEROGENEITY IN PERSON-LEVEL DOMAINS

Beyond measurement differences, the high heterogeneity in person-level domains may reflect (a) developmental instability during ages 3–6, when emotion knowledge, executive function, and regulatory strategies change rapidly; (b) cultural sensitivity in what counts as ‘competent’ emotion display and regulation; and (c) moderation by situational forces—particularly peer climate and classroom structure—that may overpower or redirect trait-level tendencies. These possibilities are consistent with variability in effect direction and magnitude and underscore the need for future meta-analyses with sufficient studies to test moderators such as classroom quality, cultural context, and peer acceptance/rejection.

CULTURAL CONSIDERATIONS IN INTERPRETING THE FINDINGS

The weak overall association for emotion regulation should also be interpreted cautiously in light of cultural context. Most included studies were conducted in Western settings, where the developmental meaning and social valuation of emotion regulation may differ from those in cultures characterized by stronger emotional interdependence and a greater emphasis on relational harmony. In such contexts, emotion regulation may be more explicitly socialized and more closely linked to competent social functioning. Accordingly, the modest effect observed in the present review should not be interpreted as culturally universal, but rather as potentially shaped by the cultural composition of the available evidence base.

Relatedly, some synthesized constructs may reflect Western normative assumptions. For example, restrained or cautious behavior is often treated in Western developmental research as a risk marker for maladjustment

or social withdrawal; however, this interpretation may not be globally applicable. In some Indigenous and non-Western communities, where observational learning, respectful attentiveness, and measured participation are culturally valued, such behavior may instead reflect an adaptive form of engagement. This possibility cautions against universalizing the developmental interpretation of behavioral inhibition from predominantly Western samples and suggests that behavioral inhibition may be better understood as a culturally mediated behavioral tendency, whose developmental significance depends on local norms of participation and social competence.

THEORETICAL IMPLICATIONS: TOWARD A BIOECOLOGICAL–TRANSACTIONAL PERSPECTIVE

The present findings carry important theoretical implications for understanding preschool social-emotional development. Rather than supporting models that privilege either intrinsic temperamental dispositions or environmental influences in isolation, the results are more consistent with bioecological and transactional perspectives, which conceptualize development as emerging through ongoing interactions between child characteristics and social contexts over time (Bronfenbrenner & Morris, 2006; Sameroff, 2009).

More specifically, the findings extend these perspectives in two respects. First, proximal processes at the microsystem level appear to be especially influential during the preschool period. Peer-related factors showed a moderate and highly consistent association with social-emotional development ($d=0.28$; $I_2=0\%$), and academic- and school-related outcomes demonstrated a similarly robust association ($d=0.30$; $I_2=44.46\%$). This pattern suggests that repeated peer interaction and everyday classroom experiences may serve as key developmental contexts in which children practise, negotiate, and consolidate SEL-related competencies. Integrating bioecological and social-constructivist perspectives, peer exchanges may be understood as core proximal processes through which emotion understanding, self-management, and relationship skills are rehearsed and internalized. Reciprocal play, negotiation, and co-regulation with classmates may therefore provide particularly powerful opportunities for early social-emotional learning.

Second, child-level factors appeared to be comparatively weaker and more context-sensitive. Emotion understanding/regulation was associated with social-emotional development at a modest level but with substantial heterogeneity ($d=0.16$; $I_2=86\%$), whereas behavioral inhibition/anxiety showed a non-significant

overall association and similarly high heterogeneity ($d=0.08; I_2=84.59\%$). Taken together, these results suggest that, in early childhood, proximal social experiences may exert more stable and observable effects on social-emotional development than individual dispositional characteristics, whose influence may be more conditional on measurement approaches and on cultural or classroom contexts. The comparatively stronger effects observed for peer and academic domains further imply that preschool social-emotional development may be especially responsive to the quality of children's interpersonal and learning experiences, whereas temperament and self-regulatory differences may assume a more pronounced role at later developmental stages. Overall, this pattern underscores the formative role of proximal microsystems, such as classrooms and peer groups, during early childhood.

PRACTICAL IMPLICATIONS FOR EARLY CHILDHOOD EDUCATION

Practically, these findings have important implications for early childhood education and intervention design. The strong associations between peer relationships and social-emotional outcomes suggest that preschool programs should prioritize creating opportunities for positive peer interactions, perhaps through structured play activities or social skills training. Similarly, the link between academic and social-emotional domains supports integrated approaches to curriculum design that simultaneously address both areas of development. The weaker than expected associations for emotion regulation and behavioral inhibition suggest that universal interventions targeting these skills may need to be more intensive or developmentally tailored to show effects, or that their benefits may emerge over longer timeframes than typically studied.

LIMITATIONS OF THE PRESENT REVIEW

Several caveats should be noted regarding the present meta-analysis. (1) Limited evidence base. A primary limitation of the present meta-analysis is the small number of included studies ($n = 13$). Although additional potentially relevant studies were identified, many could not be included because of incompatible designs or insufficient statistical information. This constrains generalizability, reduces the stability of confidence intervals and heterogeneity estimates, and prevents meaningful moderator analyses (2) Narrow cultural scope Most studies were conducted in Western, educated, industrialized contexts. Findings may not extend to diverse cultural settings where socialization goals and schooling differ.

This is especially relevant for emotion regulation and behavioral inhibition, whose developmental meaning may vary across cultures. (3) Predominantly cross-sectional designs. Causal inferences and developmental trajectories cannot be drawn from the observed associations. (4) Measurement heterogeneity. Substantial heterogeneity in domains such as emotion understanding and behavioral inhibition likely reflects differences in assessment methods (e.g., teacher vs. laboratory assessments) and unmeasured moderators (e.g., classroom quality). (5) Potential publication bias. Although funnel plot inspection did not reveal strong statistical evidence of publication bias, the possibility that null or negative findings were underreported means that effect sizes may be somewhat overestimated. The stronger pooled effects observed for peer-related and academic domains may partly reflect positive bias in the available literature.

FUTURE RESEARCH DIRECTIONS

The limitations of the current evidence base suggest several promising directions for future investigation. (1) Longitudinal Designs. Tracking children over time to clarify causal pathways (e.g., does early peer competence lead to later emotional adjustment, or vice versa?). (2) Cross-Cultural Samples. Including children from diverse cultural and socioeconomic backgrounds to test the universality of observed patterns; benefit from greater attention to understudied populations, including children from low-income backgrounds, cultural minorities, and those with developmental disabilities, as their social-emotional development may follow different pathways. (3) Multi-Method Assessment. Using consistent, developmentally appropriate tools (e.g., structured observations combined with parent/teacher reports) to reduce heterogeneity. Incorporating physiological measures alongside behavioral observations could provide a more comprehensive understanding of children's emotional responses and regulatory capacities. (4) Advanced statistical approaches. Greater use of advanced statistical techniques, such as growth curve modeling and person-centered approaches, could capture the dynamic and heterogeneous nature of social-emotional development during the preschool years. (5) Experimental and Intervention Studies. Evaluating whether enhancing peer interaction opportunities or integrated SEL curricula leads to measurable improvements in social-emotional skills. (6) Transactional Analyses. Examining interactions between child traits and contexts. rather than focusing on isolated predictors, for example, how a child's temperament might moderate the impact of classroom quality on social-emotional outcomes.

CONCLUSION

This systematic review and meta-analysis synthesized evidence on factors influencing preschool children's social-emotional development, quantifying the relative contributions of peer-related, academic, and intrinsic emotional-behavioral factors. The findings highlight the robust role of peer interactions and academic engagement in shaping social-emotional competencies, while intrinsic factors such as emotion regulation and behavioral inhibition showed weaker or inconsistent associations. These results challenge assumptions about the primacy of temperamental traits in early development, instead emphasizing the importance of social and learning contexts during the preschool years.

The practical implications are clear: interventions targeting peer relationships and integrated social-emotional-academic learning may yield stronger benefits than those focusing solely on individual skill-building. However, the high heterogeneity in some domains suggests that developmental pathways are context-dependent, requiring tailored approaches. Future research should prioritize longitudinal designs to establish causal mechanisms; cross-cultural comparisons to determine whether the prominence of peer-related and academic/school-related factors observed here reflects broadly generalizable developmental processes or culturally specific patterns tied to particular educational and socialization systems; and multi-method assessments to capture the complexity of social-emotional development. By addressing these gaps, the field can advance toward more effective, evidence-based strategies for supporting young children's social-emotional growth.

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