

Primary Care–Based Interventions to Promote Positive Parenting Behaviors: A Meta-analysis

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abstract

CONTEXT: Utilization of primary care settings offers a promising approach to enhance parenting practices that are critical for promoting early childhood development. Determining the impact of existing primary care interventions on key parenting behaviors will aid providers and policy makers as they seek strategies to improve early child outcomes.

OBJECTIVE: To evaluate the efficacy of primary care–based interventions on parenting practices that promote early child development among children younger than 36 months.

DATA SOURCES: PubMed, Excerpta Medica dataBASE, PsycINFO, and Cumulative Index to Nursing and Allied Health Literature databases were searched electronically.

STUDY SELECTION: English-language articles that were quasi-randomized or randomized controlled trials, included parents of children <36 months of age, and reported outcomes related to parenting behaviors that promote early child development.

DATA EXTRACTION: Two reviewers independently extracted data regarding participants, interventions, and outcomes. Quantitative meta-analyses were conducted with random effects for study and fitted with restricted maximum likelihood methods.

RESULTS: The review included 13 studies reporting parenting outcomes in 2 categories: participation in cognitively stimulating activities and positive parent-child interactions. We found a statistically significant positive effect of primary care–delivered interventions and parent-child interactions (summary standardized mean difference 0.29, 95% confidence interval [CI] 0.06–0.52, $P < .0001$) and participation in cognitively stimulating activities (summary standardized mean difference 0.34, 95% CI 0.03–0.54; summary odds ratio 0.13, 95% CI 0.01–0.25, $P < .0001$).

LIMITATIONS: Limitations included heterogeneity in measures used, outcomes, and timing of assessments.

CONCLUSIONS: Primary care–based interventions modestly affect positive parenting behaviors important for early childhood development. Randomized controlled trials with comparable outcome measures using standardized assessments are needed to assess further beneficial impacts.



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Early childhood development can profoundly affect a child's educational trajectory and subsequent life-course.¹ For example, early childhood deficits in language, cognition, and social-emotional development can lead to lower academic skills on kindergarten entry. The deficit gap widens as a child progresses through school, resulting in diminished reading and math performance, decreased graduation rates, and lower educational attainment.²⁻¹²

As highlighted by the Sociocultural Learning and the Ecobiodevelopmental Framework, and supported by human and animal studies, positive parenting behaviors are critical in promoting early child development.¹³⁻¹⁵ Converging economic, developmental, and biological research informed by these views highlight 2 aspects of parenting behaviors, which function as central scaffolds to children's development: (1) early and frequent participation in cognitively stimulating activities (eg, reading and play), and (2) sensitive and responsive parent-child interactions during these and everyday interactions. A cognitively enriched home environment with sensitive parenting early in early childhood is predictive of a child's early language, social-emotional, and cognitive development as well as future educational achievement.^{8,10,16-24} Thus, enriching parenting behaviors in early childhood offers a promising strategy to enhance a child's educational trajectory. Further, neuroscience and epigenetic research reveals that inadequate parental stimulation and interactions can disruptively activate stress hormones, influencing critical brain regions. In combination with this research, a strong rationale exists to promote positive parenting behaviors during the first 3 years of life when critical neuronal connectivity and synaptic brain processes are forming.^{12,25-27}

In the United States, a number of interventions have been developed to enhance parenting behaviors during early infancy, many of which are delivered through home visits and early education center-based programs. Many of these intensive programs have positively affected parenting behaviors and early child outcomes; however, financial, logistical, and staffing challenges have constrained their widespread dissemination. Additionally, high rates of attrition have limited their potential effectiveness.^{28,29}

The pediatric primary care setting provides several advantages to address these barriers: an established infrastructure, a nonstigmatizing location, and frequent and well-attended well-child visits during the first 3 years of a child's life. These advantages offer a promising opportunity to provide a population-level approach to enhance parenting behaviors and an encouraging solution to access for more than the 30 million children in the United States who face poverty-related developmental disparities.^{30,31} A number of innovative primary care-based interventions have been developed to enhance key parenting behaviors, many specifically targeting at-risk families. Some of these interventions have used pediatricians to promote positive parenting behaviors during well-child visits, whereas others have incorporated home visits and other paraprofessionals. Recognizing the potential benefits of the primary care setting, national research and pediatric communities have called for more primary care-based strategies to enhance parenting behaviors.³² A comprehensive review evaluating the impact of primary care-based interventions on parenting behaviors that promote early child development is needed to help providers, policy makers, and researchers make informed decisions regarding (1) further advocacy of

these strategies; (2) implementation, incorporation, and dissemination of these interventions into clinical practice; and (3) refinement of existing and development of new interventions by using the primary care setting to enhance parenting practices. The objective of this review was to fill this important gap in the literature and evaluate the efficacy of primary care-based interventions on parenting practices that promote early child development of children <36 months old.

METHODS

Search Strategy

A systematic review of the literature for articles published from January 1, 1980, to September 1, 2015, was conducted and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines.³³ A literature search was conducted by a clinical librarian (MDC) by using PubMed, Excerpta Medica dataBASE, PsycINFO, and Cumulative Index to Nursing and Allied Health Literature. The search string comprised 2 intersecting, broadly defined concept sets: (1) a parenting or child-rearing concept set including controlled vocabulary terms and keywords signifying circumstances in which these relationships might be expressed, and (2) primary care settings and services concept set including controlled vocabulary terms and keywords signifying family, pediatric, and community setting or services. Filters were applied to the intersection of these 2 sets to limit retrieval to randomized controlled trials (RCTs) or quasi-RCTs, published in English between 1980 and the date of the search run (September 1, 2015). The search strategy is available on request.

Selection Criteria

This review focused on preventive primary care-based interventions in

the United States aimed at enhancing parenting practices that promote early child development among parents of children younger than 36 months. We included English-language articles that were quasi-RCTs or RCTs, included parents of children <36 months of age, and reported outcomes related to participation in cognitively stimulating activities or parental responsiveness and sensitivity. Although the impact of the intervention on child outcomes was not a criterion for inclusion, we did report these results if the study included them. We excluded articles that (1) evaluated interventions designed specifically to treat a behavioral issue or disorder (eg, oppositional defiant disorder) or focused only on children with developmental disabilities, (2) addressed only safety or obesity issues, (3) targeted only changes in parental attitudes without measuring changes in parenting behavior, and (4) were based primarily outside the pediatric office (eg, home visits).

Data Extraction and Evaluation of Study Quality

Database search results were migrated to RefWorks (ProQuest, Ann Arbor, Michigan) and duplicates were removed. Two investigators screened the initial titles for relevancy (MDC, RS). Abstracts of potentially eligible studies were reviewed by 3 independent reviewers (RS, SCB, and SK) by using a structured screening tool to evaluate articles against inclusion criteria: study design (RCT/quasi-RCT), study population (parents of children <36 months), country (United States), setting of intervention (pediatric primary care), and outcomes of interest (parenting behaviors that promote early child development: participation in cognitively stimulating activities and positive parent-child interactions). Disagreements among reviewers were resolved by discussion and consensus. Full-text articles of

included studies were read and analyzed. A structured form was used to extract data independently from studies by at least 2 investigators. Methodological quality assessment of included studies was undertaken by using the Cochrane Risk of Bias Tool to assess for selection, performance, detection, attrition, and reporting biases.³⁴

Data Synthesis

For studies that reported continuous outcomes, meta-analysis was conducted on standardized mean difference (SMD) (Hedges *g*) between intervention and control groups, with studies weighted by the inverse variance method. For studies that used dichotomous outcomes, odds ratios (ORs) were aggregated instead. When studies reported demographic differences between groups and reported adjusted ORs, we used the adjusted ORs. All meta-analyses were conducted with random effects for both measure and study (to adjust variances for clustering of measures within studies) fitted with restricted maximum likelihood methods by using the metafor package for R 3.1 (www.R-project.org). Heterogeneity among studies was summarized by using the I^2 statistic.³⁵

RESULTS

Studies Included

Our initial search yielded 4368 articles (Fig 1). After duplications were removed, 3428 articles were excluded based on lack of relevancy to primary care–delivered parenting interventions. The remaining 297 abstracts were reviewed and 201 studies were excluded. One hundred abstracts proceeded to full-text review where 87 failed to meet inclusion criteria. Four articles were identified through the hand search. Thirteen unique studies were included in this systematic review.^{36–48}

Methodological Quality

Quality profiles of the 13 studies are reported in Supplemental Table 2. All 13 studies provided a clear description of the intervention, outlined inclusion and exclusion criteria for the study population, enrolled participants at similar time points, prospectively collected data, and report stated outcomes. Most of the studies used blinded outcome assessors; however, only 5 studies adequately generated an allocation sequence and concealed the assignment.^{44–48} Although many of the studies used valid instruments or measures that have been published in peer-reviewed journals, only 4 of the studies used observer (rather than self-report) measures of parenting outcomes.^{36,37,41,42} One study did not report whether significant demographic differences existed between intervention and control groups,⁴⁰ and 4 of the studies did have an imbalance in demographics, which may have affected the results.^{38,46–48} Given the nature of parenting interventions, blinding was not possible for the caregivers in the studies.

Study Characteristics

Thirteen studies evaluated 6 different interventions delivered in the primary care clinic to enhance parenting. Table 1 shows characteristics of the included studies.

Settings and Participants

Healthy Steps (HS) included community and hospital-based sites; all other interventions took place in hospital-based clinics. Study participants were primarily mothers. Children ranged in age from newborns to 5 years old, although all participants were enrolled while younger than 36 months. Most of the studies' parents were described as having low income or children who received Medicaid. Many of the interventions specifically recruited

parents with risk factors that placed their children at greater risk for poorer developmental outcomes, such as poverty, low maternal education, and/or substance use (Table 1).

Intervention Delivery

Pediatricians or primary care providers delivered 3 of the interventions^{36–41}; 3 were delivered by developmental specialists or professionals, such as a nurse practitioner or social worker.^{42–48} Most of the interventions were delivered individually to parents, but 1 used a group format⁴² and HS incorporated a parent group as part of its structure. Five interventions were integrated with well-child visits^{36–38,41,42,46}; 1 used the time that parents waited to be seen by their provider.⁴⁵ Most interventions were delivered recurrently in 3 to 15 sessions over an extended period, ranging from 6 to 24 months. Interventional components featured book distributions, discussions on enhancing parent-child interactions, and education regarding development.

Meta-analysis Results

Six studies included 5 outcome measures associating primary care-based parenting interventions and parent-child interaction outcomes. All studies used continuous outcomes and results demonstrated a significant positive aggregate effect for primary care-delivered interventions on parent-child interactions (Fig 2; summary SMD 0.29, 95% confidence interval [CI] 0.06–0.52, $P < .0001$).

Ten studies reported a total of 10 outcome measures associating primary care-based parenting interventions and participation in cognitively stimulating activities. Although studies evaluating HS also reported outcomes related to playing, all other studies reported outcomes related to reading.

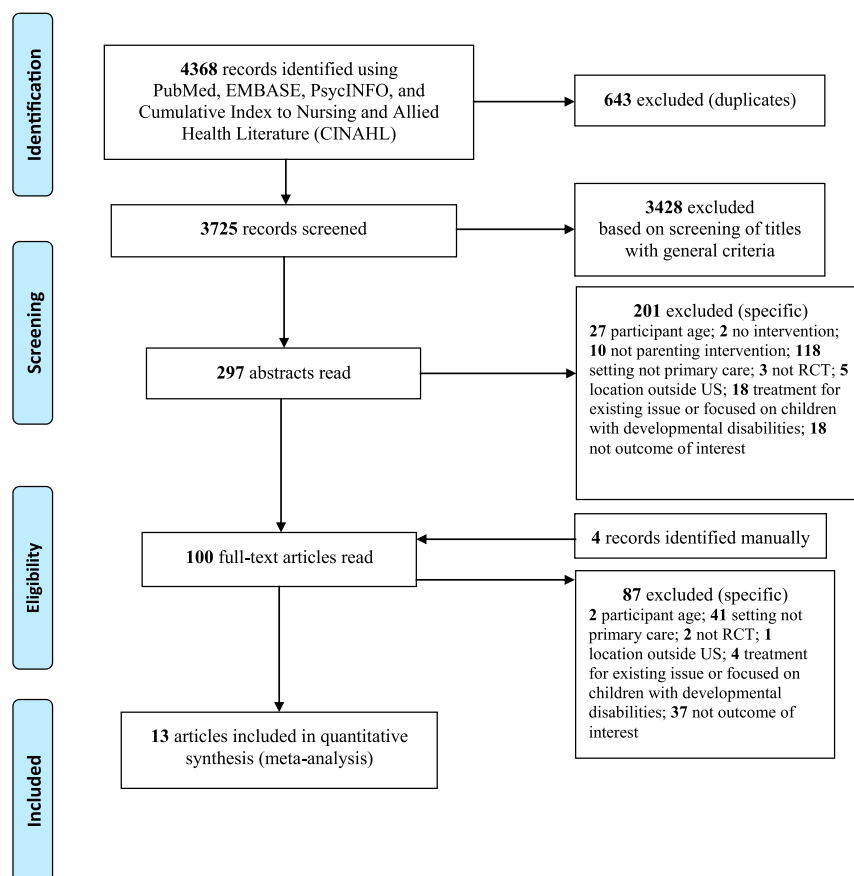


FIGURE 1 Study identification, exclusion, and inclusion. EMBASE, Excerpta Medica database.

Consequently, meta-analysis was conducted on reading outcomes. In SMD summary effects, we found statistically significant positive effects for primary care-based interventions and participation in cognitively stimulating activities (Fig 3; summary SMD 0.34, 95% CI 0.03–0.54, $P < .001$). Positive significant effects were also found for studies that used dichotomous outcomes (Fig 4; summary OR 0.13, 95% CI 0.01–0.25, $P < .0001$). Substantial heterogeneity was evident in all meta-analyses.

Results of Individual Studies

Pediatric Provider-Delivered Interventions

Two studies evaluated an intervention in which mothers received extra well-child visits that focused on enhancing mother-infant interactions.^{36,37} The pediatrician

who delivered the intervention, and was an author in both studies, provided well-child care to first-time mothers with low incomes (<\$15 000). Parents received 2 additional well-child visits relative to current American Academy of Pediatrics recommended schedules⁴⁹; each visit lasted between 20 and 25 minutes. The studies used observer assessments that demonstrated significant positive differences in sensitivity, cooperativeness, appropriateness of interaction, and appropriateness of play in mother-infant relationships between the control group (same pediatrician but without mother-infant interaction-focused appointments) and the intervention group, but did not demonstrate significant differences in responsive behavior between the groups.

TABLE 1 Individual Study Characteristics

First Author, Year	Intervention	Participants Sample Size (n)			Outcomes Relevant to Review (Assessment Used)		Evaluation Period	Findings
		Description	Mode of Delivery	Number and Length of Sessions for Study	Parental Characteristics	Child's Age		
Casey 1990, ³⁶ Whitt 1992 ³⁷	Well-child visits scheduled at 2, 4, 8, 15, 21, and 27 wk; discussions at all visits designed to enhance mother-infant interaction and stimulate infants' cognitive development	Pediatrician	6 sessions; 25–30 min in length	First-time mothers with low incomes (47)	Newborn	1. Mother-infant interactions (1. Observational assessment that was scored based on Ainsworth Scales	Before 27-wk visit	Parental Outcome: 1. Mean global score and 4 subscales (Interaction Appropriateness, Cooperation-Interference, Appropriateness of Play, and Sensitivity-Insensitivity) showed significant differences between control and experimental groups ($P < .05$); 2. subscales (Interaction Appropriateness and Sensitivity-Insensitivity) remained significant with no contact group (ie, different pediatrician; $P < .05$) 2. No significant group differences in individual maternal responsive behaviors or overall occurrence of responsive behaviors Child Outcome: No significant differences between intervention and control groups in Bayley MDI; Vocal Imitation scale of the Ordinal Scales of Psychological Development showed significant differences between intervention and no-contact group (ie, different pediatrician, $P < .01$)
Jones 2000 ⁴⁰	Pediatrician	All well-child visits for children 2–24 mo for a 2-y period; length of session not given in study	More than 90% of the caregivers were a single parent and living at or near poverty level (352)	2–24 mo	Questionnaire regarding literacy development and literacy practices in the home	Not assessed	2 y after entry into the study	Parents who received the intervention were more likely to report that they enjoyed reading together with their child compared with control (38% vs 19%, $P < .05$)

TABLE 1 Continued

First Author, Year	Intervention	Participants Sample Size (n)			Outcomes Relevant to Review (Assessment Used)		Evaluation Period	Findings
		Mode of Delivery	Number and Length of Sessions for Study	Parental Characteristics	Child's Age	Parental		
Dworkin 1987 ⁴¹	Pediatrician	Use of age-specific discussions of affective, cognitive, and physical development during 2-wk through 6-mo well-child visits	4 sessions 20–25 min in length	Mothers; Most families headed by single-parent households (128)	Newborn	Maternal-infant interaction (1. Observational assessment based on Home Observation for Measurement of the Environment and Infant Social Behavior Manual 2. Qualitative measure that includes ratings of maternal sensitivity and responsiveness, physical involvement and closeness, and reciprocal positive affect between mother and child)	Following 6-mo visit	No significant differences on observational measure; on qualitative measure, mothers in the intervention group received higher ratings for physical involvement and closeness ($P = .035$)
Taylor 1997, ⁴² 1998 ⁴³	Nurse practitioners	Group well-child visits scheduled with other mothers and children; at each visit, topics developed to improve maternal-child interaction and development are discussed	7 group well-child visits scheduled at 4, 5, 6, 8, 10, 12, and 15 mo; each session lasted between 45 and 60 min	Mothers who reported one of the following: poverty, single marital status, education less than high school, age <20, previous substance abuse, or a history of abuse as a child ($n = 220$)	0–4 mo old	1. Maternal-infant interactions (1. Nursing Child Assessment Teaching Scale 2. Home Observation for Measurement of the Environment)	When child reached 15 mo of age	Parental Outcomes: 1. No significant differences found between groups 2. No significant differences found between groups Child Outcomes: No significant differences found between groups

TABLE 1 Continued

First Author, Year	Intervention	Participants Sample Size (n)			Outcomes Relevant to Review (Assessment Used)		Evaluation Period	Findings
		Description	Mode of Delivery	Number and Length of Sessions for Study	Parental Characteristics	Child's Age		
Mendelsohn 2007 ⁴⁴	Child developmental specialist	VIP: 15 sessions taking place primarily on well-child appointments from 2 wk to 3 y of age where interactions are videotaped between a caregiver and her child and discussed with a child developmental specialist; parents provided with learning materials	30–45-min sessions that coincide with well-child visits from 2 wk until age of assessment (33 mo)	Hispanic or Latina mothers, Mothers had education less than high school (150)	Newborn	1. Parent-child interactions (StimQ questionnaire)	Child 33 mo	Parental Outcomes: 1. Significant difference in 1 of the 4 subscales of the StimQ: Parental Involvement in Developmental Advancement ($P = .003$); no significant difference in total score Child Outcomes: 1. Intervention group had a greater percentage of children with normal cognitive scores (63.5% vs 44.4%, $P < .05$) 2. No significant differences 3. No significant differences
Mendelsohn 2011 ⁴⁵	and written pamphlets	4 visits lasting 30–45 min, which coincide with well-child visits in first 6 mo	Nearly 90% of the sample described as Hispanic or Latina >85% of sample described as having low SES (675)	Newborn	1. Parent-child interactions (StimQ questionnaire)	Not assessed (OBCLJ)	When child 6 mo of age	1. Parents who received the intervention had improved parent-child interactions with significant differences in each of 4 subscales of StimQ and total score ($P < .01$) 2. Parents who received the intervention spent more time reading ($P = .02$) and more instances reading ($P = .001$)

TABLE 1 Continued

First Author, Year	Intervention	Participants Sample Size (n)			Outcomes Relevant to Review (Assessment Used)		Evaluation Period	Findings
		Number and Length of Sessions for Study	Parental Characteristics	Child's Age	Parental	Child		
Minkovitz 2001 ⁴⁶	Developmental specialists (early childhood educator, nurse, nurse practitioner, social worker, or other professional)	Sessions coincide with well-child visits that occurred from enrollment to age of assessment; length of session not given in study	Mothers and fathers (2235 randomized; 3350 QE)	Infants up to 4 wk	Parenting practices that promote child development (1. Showing picture books to infant at least once a day; 2. Following routines at bedtime, nap time, or meal time; 3. Playing with infant at least once a day)	Not Assessed	When infant between 8 and 18 wk of age	1. In the families at randomization sites, a higher percentage of families who received the intervention reported showing picture books at least once a day compared with the control group (28% vs 26.4%, $P \leq .05$) 2. In the families at QE sites, more families who received the intervention reported playing with their infant at least once a day (91.8% vs 87.1%, $P \leq .01$)
Minkovitz 2003 ⁴⁷		Sessions coincide with well-child visits that occurred from enrollment to age of assessment; length of session not given in study			Parenting practices that promote child development: (1. Reading to child or showing the child picture books; 2. Following routines at naptime, mealtime, and bedtime; 3. Playing with child at least once a day)	Concern about child's behavior (GBCL)	When child 30–33 mo of age	Parental Outcomes: In the families at QE sites, more families who received the intervention reported following routines (66.0% vs 60.4%, $P < .01$) NS for families at randomization sites Child Outcomes: No significant differences
Minkovitz 2007 ⁴⁸		Sessions coincide with well-child visits that occurred from enrollment to 3 y of age; length of session not given in study			Parenting practices that promote child development: (1. Child looked at or read books) 1. Concern about child's development (Parents' Evaluation of Developmental Status) 2. Concern about child's behavior (GBCL) 3. Child's Social Skills (Social Skills Rating System)	1. Concern about child's development (Parents' Evaluation of Developmental Status) 2. Concern about child's behavior (GBCL) 3. Child's Social Skills (Social Skills Rating System)	When children 5.0–5.5 y of age	Parental Outcomes: 1. In the families at QE sites, more families who received the intervention reported following routines (89.4% vs 84.7%, $P < .01$) and looking at/reading books in the past week (59.4% vs 51.2%, $P < .001$); NS for families at randomization sites Child Outcomes: 1. No significant differences 2. In the families at QE sites, there was a greater clinical/borderline concern regarding child's behavior in those families who received the intervention (16.8% vs 13.4%, $P = .05$); NS for families at randomization sites 3. No significant differences

NS, not significant; SES, socioeconomic status.

In Dworkin et al,⁴¹ pediatricians and pediatric nurse practitioners incorporated discussions regarding developmental stages into anticipatory guidance provided at well-child visits. Parents received 4 well-child visits that lasted 20 to 25 minutes. Compared with mothers who did not receive the intervention, intervention mothers had higher ratings for physical involvement and closeness on a self-report measure ($P = .035$); however, no significant differences were found when maternal-infant interactions were measured by using items drawn from the Home Observation for Measurement Inventory.

In the Reach Out and Read (ROR) model, pediatricians deliver a book to a child during each attended pediatric well-child visit, from 6 months to 5 years of age, with brief education regarding the importance of shared reading. There have been 2 previously published review articles evaluating ROR.^{50,51} In contrast to those reviews, only 3 ROR studies met inclusion criteria for our review. As noted in previous reviews, no observer assessments were used in these studies, but in self-reported measures ROR did demonstrate positive impacts on parenting behaviors toward literacy-promoting activities.

Nonphysician/Paraprofessional-Delivered Intervention

Two interventions incorporated developmental specialists into well-child visits to enhance parental outcomes.^{44,47} In the first intervention, the Video Interaction Project (VIP), a developmental specialist reviewed videotaped interactions between a mother and her child, discussed development, and provided learning materials and written pamphlets to enhance parenting practices. These 15 sessions that lasted 30 to 45 minutes occurred primarily during each well-child appointment

from 2 weeks to 3 years of age. Qualifications of the developmental specialists were not described in the studies. Mendelsohn et al⁴⁵ found a significant difference in self-reported parent-child interactions among primarily Hispanic mothers with low socioeconomic status who received VIP compared with those who did not receive the intervention.

The second intervention that incorporated a developmental specialist was HS.^{20,32,33} In HS, a developmental specialist (ie, an early childhood educator, nurse, nurse practitioner, social worker, or other professional) participated in well-child visits with the primary care provider.^{20,32,33} Additionally, HS incorporated home visits, a telephone information line, and parent groups. One systematic review has evaluated HS, but includes nonexperimental studies and prenatal components that are out of scope for this review.⁵² The 3 studies included in our review assigned newborns either randomly or via enrollment at quasi-experimental (QE) sites (ie, consecutively enrolled at intervention sites and matched with control sites).^{20,32,33} Between ages 8 and 18 weeks, a greater percentage of parents who received HS self-reported showing picture books at least once a day to their infant.⁴⁶⁻⁴⁸ When evaluating parenting practices that promote development at 30 to 33 months of age, there were no significant differences between families who received the intervention and those who did not at randomized sites; however, in families at the QE sites, a higher percentage that received the intervention reported following routines and using less severe discipline.⁴⁷ These behaviors remained significant when the child was between 5.0 and 5.5 years for the families in the QE group and remained nonsignificant for families at the randomization sites.⁴⁶⁻⁴⁸

Taylor et al^{42,43} reported on using well-child care groups, which included a general parenting curriculum run by nurse practitioners. Group well-child visits were scheduled at an increased frequency relative to current American Academy of Pediatrics recommended schedules if mothers reported at least 1 psychosocial risk factor. In 2 observer assessments evaluating maternal-infant interactions, no significant differences were found between control and intervention groups.

Child Outcomes

All but 4 studies assessed child outcomes in addition to parental outcomes. Four used the Bayley Scales of Infant Development, an administered assessment of child development.^{36,37,42,44} Of these, only Mendelsohn et al⁴⁴ found a significant difference between groups (a greater percentage of children who received VIP had normal cognitive scores compared with the control group).

Many of the studies included in this review evaluated the impact of the intervention on early childhood language development. Mendelsohn et al⁴⁴ used an administered assessment tool, Preschool Language Scale, and found no significant differences between VIP and control groups. In contrast, High et al³⁸ and Golova et al³⁹ used a parental self-report assessment to evaluate the impact of ROR on early language skills. Although Golova et al³⁹ found no significant differences in early language outcomes, High et al³⁸ did note significant differences between the intervention and control group in receptive vocabulary; significant differences in expressive vocabulary were noted in a subset analysis of children 18 to 25 months of age. The potential impact of HS and VIP on behavioral outcomes also was evaluated with the self-reported Achenbach Child Behavior Checklist.

I² = 42%

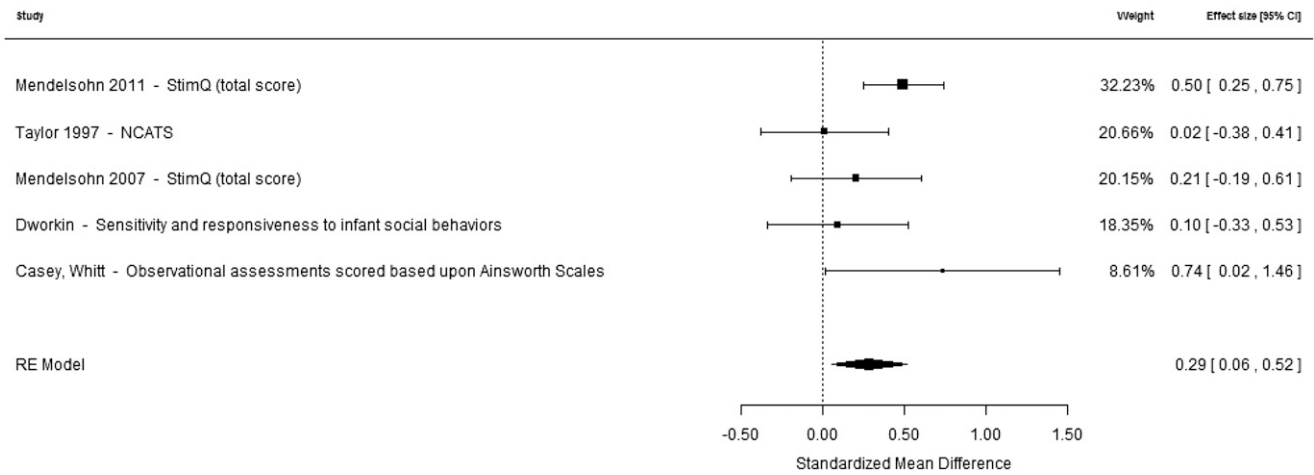


FIGURE 2
The effect of primary care-based parenting interventions on parent-child interactions. The squares represent individual studies, with the size of the square representing the weight given to each study in the meta-analysis. Error bars represent 95% CIs. The diamond represents the combined result. NCATS, Nursing Child Assessment Teaching Scale.

I² = 65%

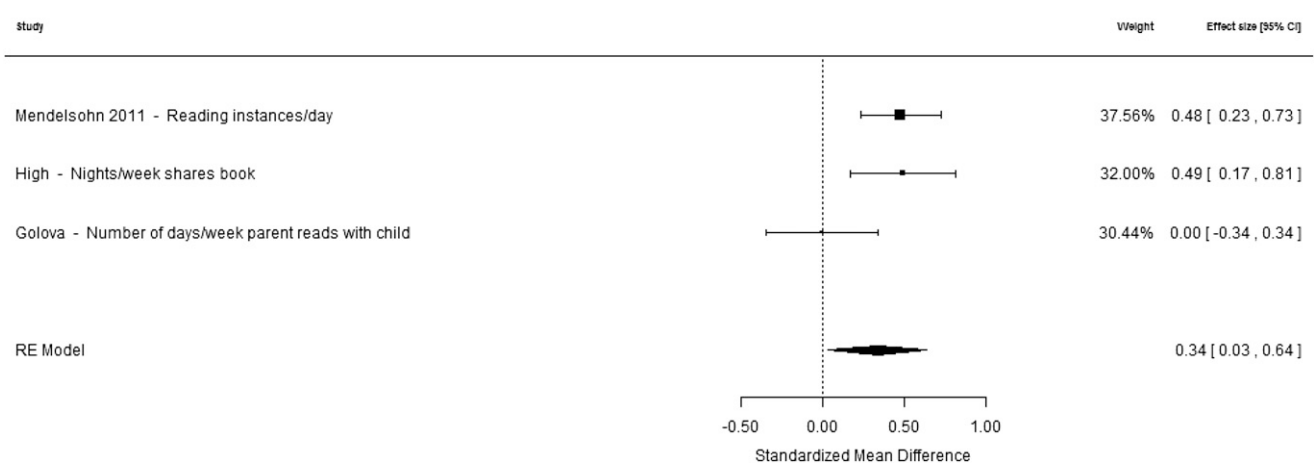


FIGURE 3
The effect of primary care-based parenting interventions and cognitively stimulating activities (reading) by using continuous outcomes. The squares represent individual studies, with the size of the square representing the weight given to each study in the meta-analysis. Error bars represent 95% CIs. The diamond represents the combined result.

No significant differences were found in these measures at 30 to 33 months and at 5.0 to 5.5 years in the group of newborns who were randomized to HS⁴⁸; Mendelsohn et al⁴⁴ similarly reported no significant differences between VIP and control groups.

DISCUSSION

Parenting practices are important modifiable aspects of a child’s home

environment that can be targeted to promote early child development. Consequently, there have been an increasing number of interventions developed to enhance parenting practices. This systematic review highlights the diverse ways the primary care setting has been used to disseminate these interventions. Studies meeting our review’s inclusion criteria used a number of strategies to promote positive

parenting behaviors, such as using pediatricians to distribute books and paraprofessionals to enhance existing well-child appointments. Evidence suggests that these strategies have a modest, but significant, impact on promoting positive parent-child interactions and cognitively stimulating activities.

Many of the studies included in this review targeted parents from disadvantaged backgrounds, including

Parenting practices (reading)

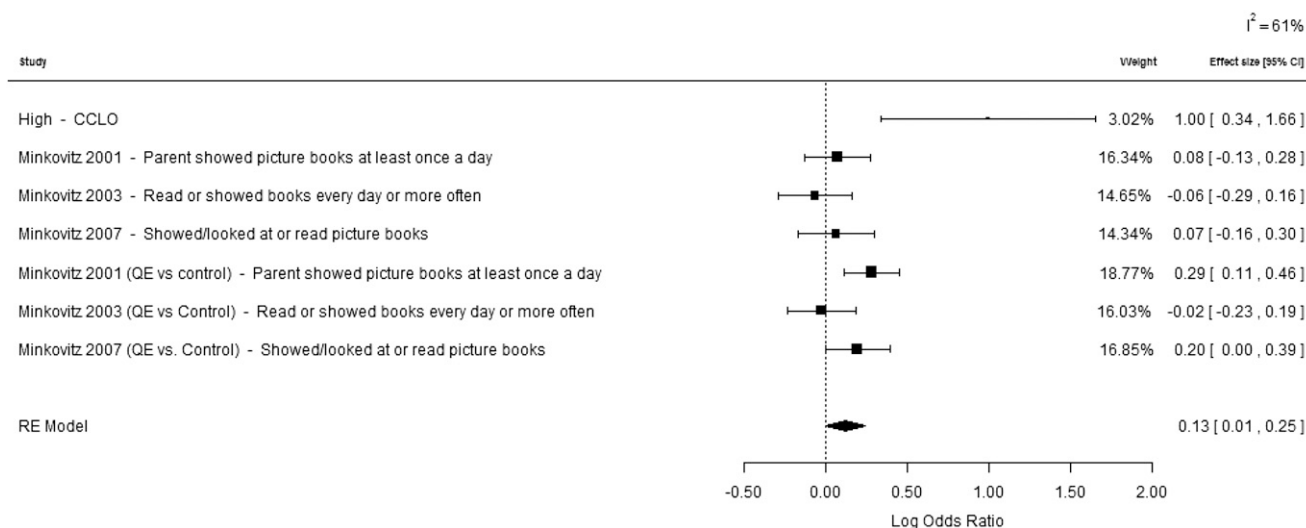


FIGURE 4

The effect of primary care-based parenting interventions and cognitively stimulating activities (reading) by using dichotomous outcomes. The squares represent individual studies, with the size of the square representing the weight given to each study in the meta-analysis. Error bars represent 95% CIs. The diamond represents the combined result. CCLLO, Child Centered Literacy Orientation.

families with low incomes. Given that >20% of children in the United States live in poverty,³⁰ the ability to reach a large portion of low-income families is an important aspect of primary care-based interventions. Most studies in this review demonstrated modest impacts on parenting behaviors among this vulnerable population. Of note, studies varied in their use of observer measures, the gold standard for measuring parenting outcomes.⁵³ In contrast to observer measures, self-report measures are criticized for the risk of bias. However, many of the studies that used self-report measures did include a large sample size (600–2000 parents), which limits the feasibility of an observer assessment. One strategy to address this may be to conduct observer assessments on a subset of a sample or to use validated standardized assessments for defined parenting outcomes in all studies.

We included the impact of primary care-based parenting interventions on early child outcomes when such results were reported. Three major domains of a child's development were evaluated in the studies included in this review:

speech and language, behavior, and cognition. Similar to parenting outcomes, there was heterogeneity in assessments, with some studies using parent-reported measures, and others used assessments administered by examiners. The studies demonstrating improvements in language used self-reported assessments, whereas the studies that did not demonstrate an impact on language outcomes used examiner-administered assessments. However, all studies that assessed cognitive outcomes used the examiner-administered Bayley Scales of Infant Development, and 1 intervention, VIP, did demonstrate significant differences between the intervention and control groups. Because a major goal of many interventions targeting parenting is to ultimately enhance early child outcomes, this will be an important area to evaluate for future research.

Although primary care-based parenting interventions are promising, cost will be an important factor for sustainability and the widespread dissemination of these interventions moving forward.

For example, for primary care-based interventions such as HS, with an average cost of \$65 500 annually, financial challenges may become an important factor in limiting its dissemination.⁵⁴ In contrast, ROR reaches 4 million children each year, perhaps in part because of its relatively low cost: ~\$2.75 per book.⁵⁵ Attrition and staffing concerns for primary care-based interventions that require paraprofessionals, home visits, and/or additional appointments are other factors that will need to be considered to encourage successful implementation and distribution.

Our review found a modest number of studies over the course of 30 years. Obtaining the resources for developing and implementing these interventions, as well as assessing these primary care-based interventions through RCTs, may be contributing factors limiting the number of studies. Limitations of the review methods may have also affected the number of studies. There are many terms for parenting interventions, and although we conducted an extensive search, it is

possible that studies were missed. Also, studies may have been excluded secondary to our interest in children younger than 3. There is also the possibility of publication bias, as trials with negative outcomes may have been less likely to be published. Calculations of the Fail-safe N suggest that 17 missing studies of parent-child interactions showing no effect and 15 missing studies of cognitively stimulating activities (reading) using continuous outcomes or 22 missing studies of cognitively stimulating activities (reading) using dichotomous outcomes showing no effect would be necessary to conclude that publication bias explains our findings.⁵⁶ We did not include pediatric primary care–delivered interventions in other countries, as health care delivery models vary widely internationally. A future review that includes interventions in developing countries and other developed countries may reveal additional strategies for improving parenting practices. Our study was also limited in the heterogeneity of measures used, outcomes, and timing, which made it difficult for comparisons and conducting a meta-analysis on all outcomes reported.

Despite these limitations, our review has important implications. First, it highlights the positive impact of primary care–based interventions on parenting behaviors that promote early child development. With growing research establishing that

educational disparities are set forth in the first 3 years of a child’s life, there has been much emphasis on enhancing parenting behaviors to positively affect a child’s future educational achievement. Developing theory-based interventions in the pediatric setting offers a promising opportunity with a universal approach to enhance parenting behaviors and support early child development, particularly for the millions of children who live in poverty and face well-documented developmental disparities as a result.

Second, our results underscore the need for RCTs with comparable outcome measures that use standardized assessments so that primary care practices and health care organizations can make well-informed decisions on which interventions will be most helpful for their patients. Barriers, such as cost, additional personnel, and space allocation, will likely need to be addressed if interventions are to be more widely distributed. One strategy that would be valuable is to evaluate the cost savings of these interventions as it relates to improved educational and economic trajectories among vulnerable populations.

Last, many of these interventions were developed for use in the primary care setting; however, research into their use in other important environments, such as home visits, Early Head Start, or Women, Infants, and Children

programs, may enable their increased dissemination. Investigation into the benefits of using other settings to concurrently deliver these interventions may illuminate additional opportunities to reach at-risk children and families and offer greater benefit in promoting early childhood development.

CONCLUSIONS

The pediatric primary care setting offers an innovative platform to disseminate parenting interventions and shows promise in enhancing parenting behaviors that promote early child development. Understanding how to more effectively enhance parenting behaviors and incorporate strategies for doing so into the primary care setting should continue to be rigorously investigated. Additional studies that use standardized measures for assessing parenting and early childhood outcomes also will be necessary to clearly define the impact of such interventions.

ABBREVIATIONS

CI: confidence interval
HS: Healthy Steps
OR: odds ratio
QE: quasi-experimental
RCT: randomized controlled trial
ROR: Reach Out and Read
SMD: standardized mean difference
VIP: Video Interaction Project

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