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Parenting Education to Improve Relational Health Through Pediatric Primary Care: A Scoping Review

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Abstract

The objective of this study was to describe characteristics of effective pediatric primary care interventions that focused on parenting education about healthy parent-child relationships. A scoping review of 4 electronic databases searched for related systematic reviews published in English from January 2000 to June 2023. The full texts of 14 systematic reviews were evaluated by 2 independent reviewers and used to identify 25 unique parenting interventions of which 21 improved outcomes more than the comparison group. Results demonstrate that a range of low to high intensity interventions can improve parent-child relationships, and many of these also improve parent mental health and child behaviors. By contrast, multi-component interventions were needed to improve child development and reduce injuries. Interventions that decreased child injuries focused on reducing parental stress through professional support, access to community resources, and mental health information. Future research is needed on pediatric primary care parenting education that incorporates responsive parenting, includes patient samples with ACEs, and measures physical health outcomes or biomarkers.

Keywords

primary health care, pediatrics, social determinants of health, behavioral health, prevention, quality improvement

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Introduction

Pediatric primary care providers are the only professionals who regularly meet with children and their families from infancy through adolescence. Well-child care in particular is designed to focus on the prevention of disease, as well as the promotion of health and development. However, it is imperative to prioritize effective interventions given the limited amount of time for well-child care visits.[1]

Addressing Adverse Childhood Experiences (*ACEs*) may be an important topic for pediatricians to prioritize. As defined by the original CDC study, ACEs include family-relationship risk factors such as child maltreatment (physical, verbal, and sexual abuse; physical and emotional neglect) and household challenges (mental illness, substance abuse, intimate partner violence, incarceration, divorced, or separated parents).[2] Research shows that exposure to 1 ACE increases the odds of additional ACEs, there is a dose-response relationship between ACEs and poor health, and ACEs increase risk of a wide range of physical, mental, and social problems.[2-6] In children, studies suggest that ACEs increase risk of behavior problems, developmental delays, somatic complaints, sleep disruption, injuries, unhealthy weight, asthma, and substance use.[7-12]

A separate literature shows that safe, stable, and nurturing home environments promote optimal health and development. For example, recent reviews show that positive and collaborative parent-child relationships improve child mental health, including reduced depression,[13] reduced aggression,[14] and improved self-regulation.[15] There is also evidence that the quality of parent-child relationships can impact physical health, such as inflammatory responses in children with asthma,[16] glycemic control in patients with diabetes,[17] and medical adherence across chronic health

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conditions.[18] Studies of children with ACEs suggest that interventions that focus on promoting responsive parenting may affect cortisol regulation, brain development, epigenetic regulation, and autonomic nervous system functioning.[19] In consideration of this literature, the American Academy of Pediatrics encourages universal interventions to promote relational health.[20]

Since interventions that improve relational health may reduce the negative consequences of ACEs, many pediatricians are searching for feasible, evidence-based parenting advice, materials, and programs to implement in their clinics. The goal of this review was to identify and present parenting interventions in such a way that pediatricians can make an informed choice about what to implement and with what resources. Therefore, our specific aims were: (1) To identify interventions that focused on parenting education about healthy parent-child relationships, involved a pediatric primary care practice, and measured child or parent-child outcomes; (2) To describe characteristics of effective interventions; and (3) To offer guidance regarding strategies to improve relational health and related outcomes.

Methods

This review followed the reporting guidelines for the PRISMA extension for scoping reviews (PRISMA-ScR).[21] A flow diagram of our literature search is illustrated in Figure 1. In March 2021, we searched for systematic reviews of parenting education by pediatric providers published in English from January 2000 to December 2020. Key search terms were "Intervention" AND ("Parenting" or "Parent-child relations") AND ("Pediatric primary care" or "Primary health care"). The search was performed in PubMed, PsychInfo, SocIndex and Web of Science. In July 2023, this search was repeated from January 2021 through June 2023. Systematic reviews were included if they contained primary studies of parenting education about healthy parent-child relationships in a pediatric primary care setting.

The full-text of the systematic reviews were then evaluated by 2 independent reviewers. Primary studies were included if they (1) evaluated an intervention that focused on parenting education about healthy parent-child relationships, (2) involved a pediatric primary care practice (see Table 1 column "pediatricians" for specific types of involvement); and (3) measured child or parent-child outcomes. All studies of parenting education through pediatric primary care were included, regardless of whether child ACEs were measured. Studies that did not isolate the impact of parenting education but combined with other interventions (such as pharmacotherapy) were excluded.[22] In addition, descriptive studies and pilot work that did not report outcomes on a comparison group or did not demonstrate a statistically significant difference between groups due to low power were excluded.[23,24]

Extracted data included key components of the intervention; research design; child physical, behavioral, and developmental outcomes; parent-child relationship and parent mental health outcomes. Disagreements among reviewers were discussed and resolved by consensus. For interventions with 2 or more publications, emails were sent to first authors to validate the accuracy of intervention descriptions and outcomes. Results were collated by statistically significant outcomes and qualitatively analyzed for patterns across intervention components and information content. In addition, a 2×2 matrix was used to stratify interventions by the extent to which pediatric clinical staff were involved in the intervention and the extent to which additional professionals were needed.

Results

We identified 35 systematic reviews of which 11 met inclusion criteria. Three additional systematic reviews were identified by reviewing reference lists of the first 11 reviews or personal libraries.[66-79] From these 14 systematic reviews, a total of 25 unique parenting education interventions met inclusion criteria. Four of these parenting interventions did not improve outcomes more than the comparison group.[80-83] Table 1 provides a summary of intervention components for the remaining 21 interventions, Table 2 provides a summary of information content, and Figure 2 provides a contrast and comparison of interventions. Three interventions were delivered specifically to pediatric patients with ACEs,[26,27,53] 5 were delivered to pediatric patients with behavioral concerns,[29,41,44,45,52] 2 were delivered to low education or income families,[34,60] and the remaining eleven were delivered to general pediatric populations. Additional information on all the interventions can be found in the Appendix.

Interventions That Improved Child Physical Outcomes

Four out of 8 (50%) of the studies that measured any type of child physical health outcome demonstrated a statistically significant difference from the comparison group. One pilot study of *THRIVE* (Teaching Healthy Responsive parenting during Infancy to promote Vital growth and rEgulation) for general pediatric patients age 0 to 6 months found improvement in infant conditional weight gain.[25] This study used co-located psychology fellows to discuss responsive parenting at well-child care, including eating and sleep routines, and was compared to a control group that focused on mental health. Two interventions for children with ACEs reduced child injuries and assaults. One was a nurse home visiting program for infants which offered connection to community resources, parenting education, and social support.[26] The other was the Safe Environment for Every Kid (*SEEK*) intervention for age 0 to 5 years and trained pediatricians to

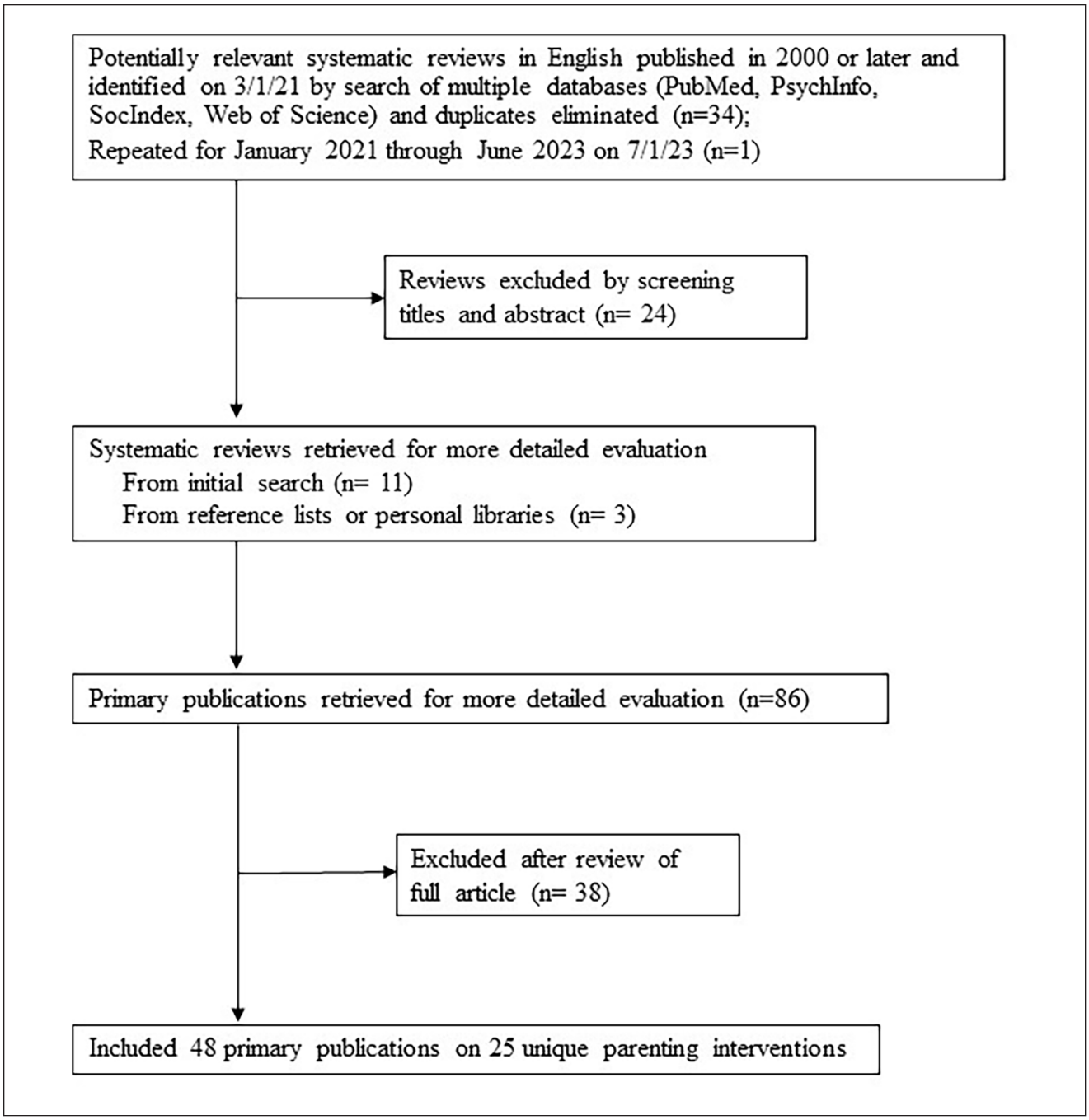

Figure 1. Flow diagram of literature search.

offer information and community resources related to depression, substance abuse, partner violence, and stress, in addition to making a social worker available.[27,28] The Minnesota Violence Prevention program reduced fight-related injuries.[29] This program was for children age 7 to 15 years with behavioral health symptoms, and provided information about child development, positive parenting, discipline and decision-making using a parenting manual, videotapes, and weekly phone coaching over 6 weeks.

Interventions That Improved Child Developmental Outcomes

Four out of the 9 (44%) interventions that measured child developmental outcomes demonstrated improvements. The Video-taped Interaction Project (*VIP*) utilized a co-located developmental specialist who met with families individually and reinforced positive interactions, in addition to sharing written information, books, and toys.[33-36] A

Table 1. Summary of Pediatric Parenting Intervention Components.

Outcome	Intervention/age group *(in order by age group)*	Pediatricians	Nurses or other clinic staff	Specialist	Parent coaches	Community health workers	Nurse or other home visitors	Phone coaching	Parent groups	Written handout or book	Videos or website	Books for child	Toys for child	Community resources
Weight gain	THRIVE/0-6 months[25]	WCC		P										
Injury reduction	Queensland Home Visits/0-4 months *with 1 or more ACEs*[26]	Team meetings		SW			√							√
	SEEK/0-5 years *screened for ACEs*[27,28]	Screen home		SW				√		√				√
	Minnesota Violence Prevention/7-15 years *with behavior concerns*[29]	Screen MH/refer		MH	√			√		√	√			√
Child development	Touchpoints/0-18 months[30]	WCC	√	SW	√		√	√		√	√			√
	Caribbean Parenting/3-18 months[31]	WCC	√			√				√	√			
	Social-emotional screening/6-36 months[32]	Referrals	√	P			√	√						√
	VIP/0-3 years, *maternal low education or income*[33-36]	WCC		D						√	√	√	√	
Child behavior	Building Blocks/0-3 years, *maternal low education or income*[37]	WCC								√		√	√	
	VIP/0-3 years, *maternal low education or income*[37]	WCC		D						√	√	√	√	
	Healthy Steps/0-3 years[38-40]	WCC		D			√	√	√	√				√
	Parenting Matters/2-5 years *with parent discipline concern*[41]	Referrals		P				√		√				
	PriCARE/2-6 years *with behavior concerns*[42,43]	Co-located MH		MH					√	√				
	DOCC/5-12 years *with behavior concerns*[44]	Team meetings		SW					√	√				
	Primary Care Triple P/2-12 years *with behavior concerns*[45-48]	Co-located group	√					√	√	√	√			
	Minnesota Violence Prevention/7-15 years *with behavior concerns*[29]	Screen MH/refer		MH	√			√		√	√			√
Parent-child	Queensland Home Visits/0-4 months *with 1 or more ACEs*[26]	Team meetings		SW			√							√
	Well-Child Care Counseling, North Carolina, 0-6 months[49,50]	WCC + responsiveness to infant social behaviors												
	Finger puppets/2-6 months[51,52]	Pediatric waiting room	√							√			√	
	Baltimore Home Visits/0-18 months, *maternal drug-abuse (ACE)*[53]	Team meetings		P			√			√				√

(continued)

Table 1. (continued)

Outcome	Intervention/age group *(in order by age group)*	Pediatricians	Nurses or other clinic staff	Specialist	Parent coaches	Community health workers	Nurse or other home visitors	Phone coaching	Parent groups	Written handout or book	Videos or website	Books for child	Toys for child	Community resources
	Well-child care counseling, New York, 0-18 months[54,55]	WCC		SW or P						√	√			
	Caribbean Parenting/3-18 months[31]	WCC	√			√				√	√			
	Toddlers without Tears, 8-15 months[56]	WCC	√		√				√	√				
	Care for Development, 0-24 months[57]	Development interview												
	Building Blocks/0-3 years, *maternal low education or income*[58-60]	WCC								√		√	√	
	VIP/0-3 years *maternal low education or income*[35,58-62]	WCC		D						√	√	√	√	
	Healthy Steps/0-3 years[38-40]	WCC		D			√	√	√	√				√
	SEEK/0-5 years *screened for ACEs*[27,28]	Screen home		SW				√		√				√
	Play Nicely, 1-5 years[63-65]	WCC + discipline									√			
	PriCARE/2-6 years *with behavior concerns*[42,43]	Co-located MH		MH					√	√				
	Primary Care Triple P/2-12 years[45-48]	Co-located group	√					√	√	√	√			
	DOCC/5-12 years *with behavior concerns*[44]	Team meetings		SW					√	√				
	Minnesota Violence Prevention/7-15 years *with behavior concerns*[29]	Screen MH/refer		MH	√			√		√	√			√

Abbreviations: D, developmental specialist; DOCC, Doctor Office Collaborative Care.; MH, mental health; P, psychologist; PriCARE, Child-Adult Relationship Enhancement in Primary Care; SEEK, Safe Environment for Every Kid; SW, social worker; THRIVE, Teaching Healthy Responsive parenting during Infancy to promote Vital growth and rEgulation; VIP, Videotape Interaction Project; WCC, well-child care.

Table 2. Summary of Pediatric Parenting Intervention Information.

		Caregiver		1° Care	Behavioral approach				Relational approach				Peers	
Outcome	Intervention/age group *(in order by age group)*	Parent mental health and stress	Parent substance use or violence	Preventative health care	Child development	Child behaviors	Positive parenting/ praising	Discipline	Responsive parenting/ showing love	Talking/ listening	Playing	Emotion regulation	Peer social skills	Exposure to violence
Weight gain	THRIVE/0-6 months[25]								√			√		
Injury reduction	Queensland Home Visits/0-4 months *with 1 or more ACEs*[26]	√		√	√									
	SEEK/0-5 years *screened for ACEs*[27,28]	√	√											
	Minnesota Violence Prevention/7-15 years *with behavior concerns*[29]				√		√	√					√	
Child development	Touchpoints/0-18 months[30]			√		√	√							
	Caribbean Parenting/3-18 months[31]						√			√	√			
	Social-emotional screening/6-36 months[32]	√	√		√	√		√	√	√	√			
	VIP/0-3 years, *maternal low education or income*[33-36]				√		√							
Child behavior	Building Blocks/0-3 years, *maternal low education or income*[37]				√		√							
	VIP/0-3 years, *maternal low education or income*[37]				√		√							
	Healthy Steps/0-3 years[38-40]	√			√									
	Parenting Matters/2-5 years *with parent discipline concern*[41]				√	√	√	√						
	PriCARE/2-6 years *with behavior concerns*[42,43]						√	√						
	DOCC/5-12 years *with behavior concerns*[44]	√			√		√	√				√	√	
	Primary Care Triple P/2-12 years *with behavior concerns*[45-48]				√	√	√	√						
	Minnesota Violence Prevention/7-15 years *with behavior concerns*[29]				√		√	√					√	
Parent-child	Queensland Home Visits/0-4 months *with 1 or more ACEs*[26]	√		√	√									
	Well-Child Care Counseling, North Carolina, 0-6 months[49,50]				√				√					
	Finger puppets/2-6 months[51,52]									√	√			
	Baltimore Home Visits/0-18 months, *maternal drug-abuse (ACE)*[53]				√				√					
	Well-child care counseling, New York, 0-18 months[54,55]				√									
	Caribbean Parenting/3-18 months[31]						√		√	√	√			
	Toddlers without Tears, 8-15 months[56]				√		√							

(continued)

Table 2. (continued)

Outcome	Intervention/age group *(in order by age group)*	Caregiver		1° Care	Behavioral approach				Relational approach				Peers	
		Parent mental health and stress	Parent substance use or violence	Preventative health care	Child development	Child behaviors	Positive parenting/ praising	Discipline	Responsive parenting/ showing love	Talking/ listening	Playing	Emotion regulation	Peer social skills	Exposure to violence
	Care for Development, 0-24 months[57]						√			√	√			
	Building Blocks/0-3 years, *maternal low education or income*[58-60]				√		√							
	VIP/0-3 years *maternal low education or income*[35,58-62]				√		√							
	Healthy Steps/0-3 years[38-40]	√			√									
	SEEK/0-5 years *screened for ACEs*[27,28]	√	√											
	Play Nicely, 1-5 years[63-65]						√	√				√	√	√
	PriCARE/2-6 years *with behavior concerns*[42,43]						√	√						
	Primary Care Triple P/2-12 years[45-48]				√	√	√	√						
	DOCC/5-12 years *with behavior concerns*[44]	√			√		√	√				√	√	
	Minnesota Violence Prevention/7-15 years *with behavior concerns*[29]				√		√	√					√	

Abbreviations: DOCC, Doctor Office Collaborative Care; PriCARE, Child-Adult Relationship Enhancement in Primary Care; SEEK, Safe Environment for Every Kid; THRIVE, Teaching Healthy Responsive parenting during Infancy to promote Vital growth and rEgulation; VIP, Videotape Interaction Project.

Figure 2. Comparison of pediatric primary care parenting education interventions.

Caribbean Parenting Intervention utilized community health workers and nurses to discuss waiting room videos and message cards about topics that included showing love, comforting, talking, praising, bath time, reading, and playing.[31] Both interventions improved cognitive development. VIP also improved expressive language, as did a program based upon Touchpoints that utilized parent coaches, handouts, videos, and follow-up home or telephone visits.[30] A fourth intervention improved social-emotional development compared to the group who declined the intervention.[32] This intervention by a pediatric psychologist was done at clinic or home-based visits and included parenting topics (such as discipline, sleep, feeding, and toileting), as well as information about developmental goals, play therapy, parent-child interaction therapy, and community resources.

Interventions That Improved Child Behavioral Outcomes

Eleven out of the 13 (84%) interventions that measured child behavior improved outcomes. Eight improved outcomes more than the comparison, including the Minnesota Violence Prevention program[29] and VIP.[37] The majority targeted children ages 2 years or older with parental concerns about child behavior.

A self-directed intervention enhanced imitation and play for toddlers from low-income and/or low education families

through monthly newsletters, learning materials, and developmental questionnaires.[37] All of the other interventions that were superior to the comparison condition utilized support staff other than the pediatrician. The Child-Adult Relationship Enhancement in Primary Care (*PriCARE*) program utilized co-located mental health professionals to run weekly positive parenting groups over 6 weeks.[42,43] Primary Care Triple P (Positive Parenting Program) utilized nurses to run four 2-h group sessions, in addition to weekly telephone calls, tip sheets and videos related to child development, behaviors, and positive parenting.[45-48] In Healthy Steps, a developmental specialist provided guidance on child development, parent support, and community resources through parent groups, home visits, and phone follow-up.[38,39] In the Doctor Office Collaborative Care (*DOCC*) program, social workers met with individuals or groups over 6 months and provided information about managing stress, promoting positive behavior, anger control, and social skills.[44] Parenting Matters utilized phone coaching by clinical psychology students weekly over 6 weeks and provided information about child development, behaviors, positive parenting and discipline.[41]

Interventions That Improved Parent-Child and/or Parent Mental Health Outcomes

Eighteen out of 20 (90%) interventions that measured parent-child outcomes improved outcomes. Seventeen improved outcomes more than the comparison group, including Queensland Home Visits,[26] SEEK,[27,28] Caribbean Parenting,[31] Minnesota Violence Prevention,[29] Building Blocks,[58-60] VIP,[35,58-62] PriCARE,[42,43] DOCC,[44] Primary Care Triple P,[45-47] and Healthy Steps.[40] In addition, 4 interventions improved outcomes through counseling by pediatricians. The Care for Development Intervention trained pediatricians in use of a standardized interview at acute visits and teaching parent strategies for listening, observing, praising, playing, and making homemade toys.[57] Play Nicely trained pediatricians to talk with parents about plans for discipline after they viewed a related video.[63-65] A third intervention focused on having pediatricians provide educational pamphlets, books, and videos at well-child care.[54,55] Another well-child care intervention focused on normal development and responsiveness to infant social behaviors.[49,50]

Three additional interventions relied on support staff. Both the Baltimore Home Visits program which utilized nurse home visitors[53] and the Toddlers without Tears program that utilized facilitated parenting groups[56] improved emotional responsiveness and reduced harsh parenting. Also, a low-intensity intervention that had clinic staff provide finger puppets and a list of suggested activities at the 2-month well-child visit demonstrated increased cognitive stimulation, as well as reduced parental depression.[51,52]

Ten of the 13 (77%) interventions that also measured parent mental health outcomes demonstrated reductions in parent stress, depression, anxiety, and/or smoking.[26,29,30,40,43,44,46,51,58,60]

Discussion

The purpose of this review was to identify pediatric primary care interventions that focused on improving relational health and thereby might reduce the negative consequences of ACEs. Our results demonstrate that a range of low to high intensity interventions can improve relational health, such as decreased corporal punishment and psychological aggression, as well as increased maternal-child attachment, stimulating interactions, and sensitivity. Lower intensity interventions improved relational health simply through distribution of written materials,[37] toys that encouraged interactive play,[51,52] or enhanced pediatrician counseling about parent-child interactions.[49,50,57,63-65] Higher intensity interventions involved pediatricians through screening and/or team meetings, as well as collaboration with nurse home visitors, social workers, or parent coaches.[36-29,44,53] The 3 studies that demonstrated improved relational health in pediatric patients with known ACEs were high intensity in both pediatrician involvement and use of additional professionals.[26,27,53] However, the majority of interventions that measured parent mental health demonstrated improvements, which suggests the potential for pediatric parenting interventions to reduce child exposure to ACEs and have clinical merit beyond the direct impact on the child.[29,30,40,43,44,47,52,58]

Child behaviors were also improved by a range of low to high intensity interventions. For example, 3 interventions were not superior to the comparison because child behaviors were improved by the low intensity comparison, specifically handouts only,[80] books only,[83] and phone coaching as opposed to in person coaching.[81] In addition, Building Blocks demonstrated enhanced child play and parent-child interactions, while lowering maternal depression, based only upon distribution of newsletters and learning materials.[37] Thus, pediatric practices that have limited resources to add support staff should keep in mind that sharing written information with families about positive parenting and play can be impactful.

By contrast, improving child development and reducing injuries required multicomponent interventions including support from additional professionals, such as developmental specialists, psychologists, social workers, parent coaches, and community health workers. In addition, all of the interventions that reduced child injuries[26,27,29] and half of the interventions that improved child development[30,32] also focused on connecting families to community resources, including information about parent mental health.

Positive parenting focuses on influencing child behavior through praise for positive behaviors and discipline strategies for negative behaviors. By contrast, responsive parenting focuses on building relationships between parents and children by listening to children, playing with them, and helping them to understand and manage their emotions. Of the interventions that improved child behavior and development, all included information about positive parenting strategies. Less than half of the interventions included responsive parenting content, and only 3 interventions included information specific to developing emotion regulation. Children affected by ACEs have been exposed to or are living with caregivers who have challenges with emotion regulation and stress management. Therefore, research is warranted to evaluate whether parenting education that incorporates information about responsive parenting is particularly helpful to reducing the negative consequences of ACEs.

Some limitations should be considered when interpreting our results. First, our conclusions may overestimate the efficacy of interventions due to publication bias. We tried to address this by reaching out to authors and making sure that our results included both significant and non-significant findings. Second, our review treated all of the interventions as having equal validity although some have been evaluated more extensively, particularly Healthy Steps and VIP. Most studies also only examined short-term impact, although Healthy Steps and VIP are exceptions. Furthermore, a variety of other pediatric interventions may impact child or parent-child outcomes but were not included in this review because they do not focus on education about parent-child relationships. For example, Reach Out and Read does not focus on education about parent-child relationships so was not included in this review, but does focus on child development with studies demonstrating positive impacts on language development and parent-child interactions.[84] The results of this review should be considered in the context of the broader literature on pediatric interventions.

Our results demonstrate a lack of parenting interventions to date that measured child physical health outcomes or biomarkers. More studies are needed that specifically evaluate the impact of pediatric primary care parenting interventions for children with ACEs, and more studies are needed on samples of school-age and adolescent patients.

In conclusion, this review provides a summary of pediatric primary care parenting intervention components and content which can be used by pediatricians to guide their selection of strategies to improve relational health and related outcomes. Our results highlight the potential for feasible, low-intensity interventions to improve relational health and child behaviors. Given that ACEs increase the risk for mental, physical, and developmental health issues across the lifespan, policies that support parents and access to parenting interventions are warranted, as is research funding to expand knowledge about how to foster healthier, more resilient communities.

Appendix. Pediatric Primary Care Parenting Interventions *(Alphabetical by Name of Intervention)*.

Target	Name of intervention	Clinical intervention	Research	Outcomes
Drug-abusing pregnant women and their newborns followed into pediatric practice	Baltimore Home Visits[53]	People: Nurse home visitors who met weekly with pediatrician and psychologist Materials: handouts on child development Delivery: 2 home visits before birth and biweekly from birth to 18 months Information: Healthy parent-child interaction, child development, and community resources. Based upon The Carolina Preschool Curriculum and Hawaii Early Learning Program Follow-up: home visits until 18 months	Design: RCT Sample: 60 pregnant women with histories of substance abuse and offspring followed until 18 months Comparison: usual primary care	Physical: no difference in birth weight Behavioral: n/a Development: no difference in cognitive and motor development Parent-Child: more emotionally response based upon HOME scale Parent: no difference in parenting stress
Newborns at risk of developmental delay based upon low maternal education and/or low income	Building Blocks (BB)[37,58-60] *abbreviated list focusing on studies in the United States	People: Pediatrician provided usual well-child care and materials Materials: monthly newsletters, learning materials (toy or book), developmental questionnaires Delivery: self-directed Information: Reinforce positive and supportive interactions Follow-up: none	Design: RCTs Samples: (multiple studies of infants 0-36 months) Comparison: usual well-child care	Physical: n/a Behavioral: enhanced imitation/play Development: no difference Parent-Child: improved stimulating interactions Parent: lower maternal depression
General pediatric population age <24 months receiving acute care	Care for Development Intervention[57]	People: 2 pediatricians who received training in the care for Development Intervention Materials: none Delivery: individual Information: standardized interview and strategies for listening, observing, praising, playing, and making homemade toys Follow-up: clinic visit 1 week later	Design: Quasi-experimental pre-post study Sample: 233 infants less than 24 months Comparison: usual primary care prior to training	Physical: no difference in medical compliance or illness outcomes Behavioral: n/a Development: n/a Parent-Child: improved environment on the HOME scale Parent: n/a
General pediatric population age 3-18 months living in the Caribbean	Caribbean Parenting Intervention[31]	People: Pediatrician provided usual well-child care with Community health workers who discussed videos with families and Nurses who provided reinforcing message cards Materials: Waiting room videos, Message cards Delivery: individual Information: Topics included love, comforting, talking, praising, using bath time, looking at books, simple toys to make, drawing, games, and puzzles Follow-up: at well-child visits over 18 months	Design: Cluster RCT Sample: 501 mother-child dyads from 29 health care centers; 262 children were reassessed at age 6 years Comparison: usual primary care	Physical: no difference in growth Behavioral: n/a Development: improved cognitive development at 18 months only Parent-Child: improved parenting knowledge scores at 18 months only Parent: no difference in maternal depression
General pediatric patients age 8-13 years with a primary diagnosis of anxiety who were referred by primary care physician or self-referred	Cool Kids[81]	People: Child anxiety specialist in pediatric primary care or Therapist by phone Materials: parent and child workbook with exercises Delivery: individual sessions in primary care or telephone Information: psychoeducation, changing unhelpful thoughts, exposures, problem solving exercises, parent management exercises, and assertiveness skills Follow-up: weekly over 10 weeks	Design: randomized comparison Sample: 48 8-13 year olds with anxiety seen by a pediatrician Comparison: face-to-face sessions in primary care compared to phone visits with therapist	Physical: n/a Behavioral: no difference (reduced parent and child report of anxiety in both groups) Development: n/a Parent-Child: n/a Parent: n/a

(continued)

Appendix. (continued)

Target	Name of intervention	Clinical intervention	Research	Outcomes
General pediatric population age 0-6 months	Developmental Stages and Guidance[82]	People: 2 Pediatricians and a Nurse Practitioner Materials: none Delivery: individual Information: Use of age specific discussions of affective, cognitive, and physical development Follow-up: well-child visits to 6 months	Design: RCT Sample: 83 inner city mothers and their healthy first-born infants followed to 6 months Comparison: usual well-child care	Physical: n/a Behavioral: n/a Development: n/a Parent-Child: no significant differences Parent: n/a
General pediatric population age 5-12 years old referred by pediatrician for behavior concerns	Doctor Office Collaborative Care (DOCC)[44]	People: 4 social workers with pediatrician involvement Materials: psychoeducational materials Delivery: 6-12 individual or group sessions Information: managing stress, promoting positive behavior, anger control, social skills Follow-up: over 6 months	Design: cluster RCT Sample: 321 5-12 year olds from general pediatric practice with ADHD, disruptive behavior or anxiety Comparison: usual care	Physical: no change physical quality life Behavioral: reduced behavior problems, hyperactivity, and internalizing problems Development: n/a Parent-Child: improved parent-child interaction Parent: decreased parenting stress
Low risk pediatric population age 2 months old (born full-term, >2500 g, without chronic conditions, or neurodevelopmental exposures to mothers age 18 years or older who spoke English or Spanish and did not expect to move during study period)	Finger Puppets[51,52]	People: Research assistant gave finger puppet to mothers in pediatric waiting room at infant well-child check Resources: finger puppet, list of 10 suggested activities to do Delivery: individual 1-min interaction Information: important to talk with infants so can learn to talk and be ready for school Follow-up: well-child care until a. 4 months or b. 6 months	Design: cohort study over 2-4 months Sample: 116 to 127 mothers of infants presenting for well-child at age 2 months old Comparison: usual well-child care	Physical: n/a Behavioral: n/a Development: n/a Parent-Child: increased parental involvement and cognitive stimulation Parent: reduced maternal postpartum depression reported at 4 month well-child visit
General pediatric population age 0-3 years	Healthy Steps for Young Children[38-40] *abbreviated reference list	People: Pediatrician provided usual well-child care with developmental specialist Materials: written handouts Delivery: individual and group Information: child development, parent support & community resources Follow-up: phone support plus up to 7 home visits after well-child visit	Design: RCTs and quasi-experimental Sample: (multiple studies of age 0-3 year olds; see Piotrowski et al[40] for summary) Comparison: usual primary care	Physical: n/a Behavioral: less likely to report child behavior problems Development: no difference in vocabularies Parent-Child: more securely attached, established routines, reading, playing; less harsh discipline, Parent: more likely to discuss depressive concerns but symptoms less likely to be above cutoff
General pediatric patients age 3-6 years screened using the Child Behavior Checklist for Oppositional Defiant Disorder (ODD)	Incredible Years in Primary Care[83]	People: Therapist-led or Nurse-led groups in pediatric primary care Materials: Incredible Years book Delivery: group Information: appropriate play, use of parental attention, praise, consequences, discipline techniques including time out Follow-up: over 6-12 sessions	Design: RCT Sample: 24 practices randomized to 1 of 2 conditions for 117 3-6 year olds with ODD seen in primary care Comparison: Incredible Years book only	Physical: n/a Behavioral: no difference (decreased behavior problems in all groups) Development: n/a Parent-Child: no difference in parenting knowledge Parent: n/a

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Appendix. (continued)

Target	Name of intervention	Clinical intervention	Research	Outcomes
General pediatric population age 7-15 years screened using the Pediatric Symptom Checklist-17	Minnesota Violence Prevention[29]	People: Pediatrician responded to positive screen and when appropriate made a referral to a telephone-based program (Positive Parenting parent educator), mental health, or other resources Materials: Positive Parenting manual and 2 videotapes Delivery: individual coaching by phone weekly over an average of 6 weeks (range 1-15) Information: child development, positive parenting, discipline, decision-making & peers Follow-up: by phone over 6 weeks (range 1-15)	Design: RCT Sample: 224 children age 7-15 years old with a positive screen for internalizing, externalizing, or inattentive symptoms Comparison: usual primary care (did not see screening results)	Physical: decreased fight-related injuries Behavioral: decreased aggressive, delinquent behavior & inattention Development: n/a Parent-Child: decreased use of corporal punishment Parent: decreased parental depression
General pediatric population age 2-5 years with parent concerns about child discipline	Parenting Matters[41]	People: Family medicine physician referred to telephone coach (graduate student in clinical psychology) Materials: written self-help booklet Delivery: individual by weekly phone calls for 6 weeks Information: child development, positive parenting, discipline, and decreasing negative behaviors Follow-up: coach by phone over 6 weeks	Design: RCT Sample: 178 caregivers of children age 2-5 years old Comparison: usual primary care	Physical: n/a Behavioral: decreased behavior problems Development: n/a Parent-Child: n/a Parent: n/a
General pediatric population age 1-5 year	Play Nicely[63-65]	People: pediatricians Materials: video Delivery: a/b: 5-10 min multimedia program about responding to child aggression viewed in waiting room; c. online website Information: do not allow child to be victim, do not allow aggression, decrease exposure to violence, show love, and consistency (also pediatricians may have discussed discipline) Follow-up: none	Design: RCT Sample: a. 258 caregivers of children 6-24 months old[63]; b. 258 caregivers of child age 1-5 years old presenting for well-child care[65]; c. 52 caregivers of children age 1-5 years old[64] Comparison: a/b. routine primary care; c. child maltreatment website	Physical: n/a Behavioral: n/a Development: n/a Parent-Child: parents were assisted in plans for discipline if discussion with pediatrician or viewed program; less likely to endorse physical punishment (not significant for sample c) Parent: n/a
General pediatric population age 2-6 years old with parent concerns about child behavior	Child-Adult Relationship Enhancement in Primary Care (PriCARE)[42,43]	People: 2 licensed mental health professionals co-located in urban pediatric practice Materials: home practice assignments Delivery: group Information: positive parenting to increase prosocial behaviors, effective commands to increase compliance Follow-up: weekly for 6 weeks	Design: RCT Sample: a. 120 2-6 year olds from an urban pediatric clinic[42]; b. 174 2-6 year olds from 1 of 4 urban pediatric clinics[43] Comparison: waitlist control	Physical: n/a Behavioral: decreased behavior problems Development: n/a Parent-Child: improved parenting attitudes on AAPI-2 Parent: reduced parenting stress
General pediatric population age 3-6 years with parent concerns about child behavior and willingness to participate in parent program, included if screened positive on the Eyberg Child Behavior Inventory	Primary Care Parent Child Interaction Therapy (PC-PCIT)[80]	People: Therapist-led groups in pediatric primary care Materials: handouts about managing difficult behaviors, parenting tip sheets Delivery: group Information: Enhanced parent-child attachment, positive parenting, child social skills, clear, and consistent rules Follow-up: over 4 weeks	Design: RCT Sample: 30 3-6 year olds with subclinical behavior problems Comparison: handouts only	Physical: n/a Behavioral: no difference (decreased behavior problems in both groups) Development: n/a Parent-Child: no difference (decreased dysfunctional discipline in both groups) Parent: n/a

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Appendix. (continued)

Target	Name of intervention	Clinical intervention	Research	Outcomes
General pediatric population a,b: age 2-12 years living in Hong Kong (no psychiatric illnesses or domestic violence) but referred for child behavior, parenting, or psychosocial concern c. age 2-6 years living in Australia (no developmental delay or psychiatric problem, parents not in therapy, or relationship problems) but concern for child behavior; d. Age 9-11 years living in Netherlands with mild psychosocial concerns based upon the Strengths and Difficulties Questionniare	Primary Care Triple P- Positive Parenting Program[45-48]	People: pediatric clinic staff and nurses Materials: tip sheets and videos Delivery: four 2-h group sessions led by nurses Information: common behavior problems and developmental issues, positive non-violent child management techniques Follow-up: weekly telephone calls	Design: a,b,d: RCT; c. pre-post Sample: a. 93 parents of age 3-7 year olds receiving care from a Maternal and Child Health Center[45]; b. 661 parents of age 2-12 year olds receiving care from a MCHC or Child Assessment Center[46]; c. 30 families of age 2-6 years presenting to community health clinics[47]; d. 81 families of age 9-11 years with mild psychosocial concerns[48] Comparison: a,b,c: wait-list control; d. Usual care	Physical: n/a Behavioral: decreased child disruptive behavior Development: n/a Parent-Child: decreased dysfunctional parenting Parent: decreased parenting stress, depression, and anxiety d. No statistically significant differences found
General postnatal pediatric population screened for family vulnerability including single parenting, mental health problems, substance use problems, domestic violence, and childhood abuse	Queensland, Australia Home Visits[26]	People: Nurse home visitors who met weekly with pediatrician and team social worker Materials: none Delivery: home visits weekly to 6 weeks, fortnightly to 3 months; also social work intervention for subset needing more support Information: enhance parenting self-esteem, provide guidance for normal child development, promote preventative child health care; facilitate access to appropriate community services Follow-up: home visits until 3 months	Design: RCT Sample: 181 mothers of newborns followed until 4 months Comparison: usual care	Physical: reduced parent-reported injuries and bruises Behavioral: n/a Development: n/a Parent-Child: improved all subscales of HOME including maternal-infant attachment Parent: no change in postnatal depression or stress; decreased smoking
General pediatric population age 0-5 years screened for parental depression, substance abuse, intimate partner violence	Safe Environment for Every Kid (SEEK)[27,28]	People: Pediatricians screened and counseled, Social worker if needed Materials: written handouts Delivery: individual Information: parental depression, substance abuse, major stress, intimate partner violence and related community resources Follow-up: social worker by phone if needed after initial primary care visit	Design: RCTs Sample: a. 729 caregivers of children age 0-5 year olds[27]; b. 1119 caregivers of children age 0-5 year olds[28] Comparison: usual primary care	Physical: fewer minor physical assaults Behavioral: n/a Development: n/a Parent-Child: less psychological aggression, fewer CPS reports Parent: n/a

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Appendix. (continued)

Target	Name of intervention	Clinical intervention	Research	Outcomes
General pediatric population age 6-36 months screened for developmental concerns	Social-emotional screening[32]	People: nursing staff distributed developmental screen and pediatric psychologist provided intervention or referrals in consultation with pediatrician Materials: none Delivery: office or home-based appointments as needed Information: discipline, sleep, feeding, toileting, developmental goals, play therapy, parent-child interaction therapy; community resources Follow-up: until 36 months; also telephone information line	Design: cohort study Sample: 170 infants and toddlers with developmental concerns based upon screening Comparison: declined intervention	Physical: n/a Behavioral: n/a Development: improvements on ASQ-SE scores Parent-Child: n/a Parent: n/a
General pediatric population age 0-6 months	Teaching Healthy Responsive parenting during Infancy to promote Vital growth and Regulation (THRIVE)[25]	People: psychology fellows integrated in pediatric primary care Resources: handouts Delivery: 4 individual sessions in conjunction with well-child care Information: responsive parenting principles targeted to establish healthy eating, sleeping, and emotion regulation Follow-up: well-child care until 6 months	Design: parallel RCT Sample: 65 mother-infant dyads Comparison: attention control focused on promoting mental health	Physical: medium effect on conditional weight gain (CWG) Behavioral: n/a Development: n/a Parent-Child: n/a Parent: n/a
General pediatric population age 8-15 months	Toddlers without Tears[56]	People: nurse and parenting facilitator in pediatric practice Materials: handouts on child development Delivery: three 2-h groups Information: unreasonable expectations, harsh parenting, and lack of nurturing parenting Follow-up: well-child care at 8, 12, and 15 months visits	Design: cluster randomized trial Sample: 733 English speaking mothers of 6-8 month old children in Australia Comparison: usual well-child care	Physical: n/a Behavioral: no difference in child behaviors Development: n/a Parent-Child: reduced harsh parenting and unreasonable expectations at 24 months; reduce unreasonable expectations at 36 months Parent: no difference in parent mental health
General pediatric neonatal population	Touchpoints, parent coaching based upon[30]	People: Parent coaches at a pediatric practice with support from social work, nursing, education director & community advisory group Materials: handouts and videos about parent-child interactions Delivery: coach met at well-child care then followed up with home visits and phone calls Information: (1) strengthen parent–health provider relationship and communication; (2) educate about the importance of nonharsh parent–child interactions and age-appropriate child behaviors; and (3) increase family use of community resources Follow-up: until 18 months	Design: quasi-experimental pre-post study Sample: 50 newborns from low-income Latino and African American families receiving well-baby care at an urban primary care health center Comparison: 30 matched newborns from community sample	Physical: n/a Behavioral: n/a Development: improved communication Parent-Child: n/a Parent: improved adequacy of family needs & parental resilience

(continued)

Appendix. (continued)

Target	Name of intervention	Clinical intervention	Research	Outcomes
Newborns at risk of developmental delay based upon low maternal education and/or low income	Video-taped Interaction Project (VIP)[33-37,58-62] *abbreviated list focusing on studies in the United States	People: Pediatrician provided usual well-child care with developmental specialist providing VIP Materials: learning materials (toy or book), video of parent-child interaction, pamphlets Delivery: 12-15 individual sessions between birth and age 3 years at well-child care visits Information: Reinforce positive and supportive interactions Follow-up: by developmental specialist up to 36 months	Design: RCTs Samples: (multiple studies of mother-infant dyads) Comparison: usual well-child care	Physical: n/a Behavioral: enhanced imitation/play and attention, reduced externalizing problems Development: improved cognitive development and expressive language Parent-Child: improved stimulating interactions and reading, lower physical punishment, decreased perceived picky eating Parent: lower parenting stress, lower maternal depression
General pediatric population age 0-18 months (first born child, mothers English-speaking, and at least eighth grade educated)	Well-Child Care Counseling, New York[54,55]	People: 35 pediatricians; if complex problems also social workers or psychologists Materials: educational pamphlets, books, and audio-visuals Delivery: well-child care Information: child development Follow-up: none	Design: cohort study over 30 months Sample: 595 mother-infant dyads Comparison: low, medium, and high physician teaching input	Physical: n/a Behavioral: not significant Development: not significant Parent-Child: more parent-reported positive contact Parent: n/a
General pediatric population age 0-6 months	Well-Child Care Counseling, North Carolina[49,50]	People: one pediatrician Materials: none Delivery: well-child visit Information: normal development and responsiveness to infant social behaviors Follow-up: well-child visits until 6 months old	Design: RCT Sample: 32 mother-infant dyads Comparison: accident prevention and nutrition	Physical: n/a Behavioral: n/a Development: no significant differences on structured developmental ratings Parent-Child: increased sensitivity and appropriateness of mother-infant interactions Parent: n/a

Abbreviation: RCT, randomized controlled trial.

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Dr. Ariane Marie-Mitchell conceptualized and designed the study, coordinated and supervised data extraction, drafted, and revised the manuscript. Dr. Cindy Delgago extracted data from literature, edited and summarized references, and critically reviewed the manuscript. Dr. Rachel Gilgoff conceptualized the study, extracted data from literature, and critically reviewed the manuscript. All authors contributed to manuscript revisions and editing, approved the final manuscript as submitted, and agree to be accountable for all aspects of the work.

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Consent to Participate

Not applicable (literature review).

Consent for Publication

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Supplemental Material

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