

## Review Article

# A Review of Randomized Controlled Trials Addressing Childhood Adversities in Pediatric Primary Care

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**Abstract**

Pediatric providers play a critical role in the lives of developing children and are well-positioned to ameliorate the impacts of childhood adversity. Despite evidence-based recommendations and progress in drawing awareness to this issue, best practices have yet to be established. An investigation of the literature was conducted to understand how primary care pediatric providers have targeted childhood adversity through interventions evaluated using a randomized controlled trial (RCT) study design. Thirty-three articles describing 25 intervention programs were identified. Pediatric providers have largely participated in or implemented home visiting programs, parenting groups, parent trainings, or screening models. Engagement has ranged from referral to direct program implementation. Most RCTs addressed the prevention or reduction of childhood adversities, such as child maltreatment and parental mental health. Few studies evaluated mental/behavioral outcomes in adversity-exposed youth and none evaluated physical health impacts of adversity. Screening models implemented by pediatric providers, one-on-one parent trainings provided by diverse health professionals, and programs with an adversity-framework were overall effective at achieving favorable outcomes and should be emphasized for practice. Certain clinical practice gaps, including serving adolescent and rural populations, and involving paternal caregivers in intervention programs, should be addressed. Finally, ongoing research is needed to understand efficacy and translation of findings from randomized trials into clinical settings.

**ABBREVIATIONS**

AAP: American Academy of Pediatrics; ACE: Adverse Childhood Experience; NEI: Neuroendocrine Immune; BHC: Building Healthy Children; CAMP: Colorado Adolescent Maternity Program; CBT: Cognitive Behavioral Therapy; CINAHL: Cumulative Index to Nursing and Allied Health Literature; CPP: Child-Parent Psychotherapy; CPS: Child Protective Services; DV: Domestic Violence; FRB: Family Resource Book; GWCC: Group Well Child Care; HS: Healthy Steps for Young Children; IPT: Interpersonal Psychotherapy; IY: Incredible Years; MOM: Motivating Our Mothers; MOSAIC: Mothers' AdvocateS in the Community; MOVE: Mothers Experiencing Domestic Violence; NFP: Nurse-Family Partnership; PILOTS: Published International Literature on Traumatic Stress; PRISM: Program of Resources, Information and Support for Mothers; PSC-17: Pediatric Symptom Checklist-17; PSQ: Parent Screening Questionnaire; RCT: Randomized Controlled Trial; SEEK: Safe Environment for Every Kid; TWT: Toddlers Without Tears; VIP: Video Interaction Project; WE CARE: Well-child Care Visit, Evaluation, Community Resources, Advocacy, Referral, Education; US: United States

**INTRODUCTION**

The pediatric provider holds a unique position in addressing the well-being of a child, ranging from physical to developmental to behavioral health. The physiological and psychological safety from stressful experiences is one of the most fundamental aspects of a child's livelihood and should be considered as a key component of a pediatric provider's role. The American Academy of Pediatrics (AAP) has recognized the role of pediatricians in responding to childhood traumas, including adverse childhood experiences (ACEs), which can derail child health and development [1-3].

Traditional ACEs include physical, sexual, and emotional abuse, physical and emotional neglect, parental separation/divorce, household member mental illness, incarceration, or substance abuse, and domestic violence; additional adversities include experiences such as parental death, school bullying, and community violence [4-6]. According to the 2011-2012 National Survey on Children's Health, the prevalence of any one childhood adversity ranges from 40-60% with economic hardship and

parental separation as leading adversities, followed by household member mental illness and substance abuse [7,8].

Research has documented a dose-response relationship between these adverse exposures and poor physical, mental, behavioral, and academic outcomes, with worse outcomes for children with greater doses of stress [7,9-12]. Additionally, later life-threatening conditions such as cancer and heart disease have been substantiated with a greater number of ACEs in retrospective adult studies [4,13]. Recent scientific inquiry has shed light on mechanisms for biological embedding of early traumatic experiences. The frequent and/or prolonged physiological stress response in the absence of a buffering factor, such as a responsive caregiver, is referred to as the toxic stress response [14]. The toxic stress response, through the dysregulation of the neuroendocrine-immune (NEI) network and in the context of ongoing and unaddressed exposure to stressor(s), can have immune, epigenetic, and neurological implications, posing risk for serious health outcomes such as autoimmune disorders and premature mortality [15]. Variability in the child's biological response, predisposing vulnerabilities and protective factors, as well as the characteristics of the stressor, are important aspects in understanding disease development [16,17].

Interest in translating the science of childhood adversity and toxic stress to pediatric practice has increased since the AAP's call for action and guidelines for screening [18,19]. Researchers have piloted and evaluated adversity screening tools in clinical settings [6,20-23], and overall lessons reveal feasibility of screening in clinical settings and patient acceptance of screening, although greater need for physician training and resources [23-26]. Recommendations for treatment include promoting protective and buffering factors, increasing sources of resilience, and referral to home visiting programs and mental health treatment [2,27-29]. Flynn and colleagues [30] published a systematic review of pediatric primary care provider-led interventions addressing traumatic stress, and lessons suggest mostly favorable results among providers, including an increase in provider likelihood for screening, and reduced traumatic experiences and child behavior issues. Cluxton-Keller and others [31] investigated pediatric primary care-based family therapy to address parental mental health and similarly, findings were positive overall, with diminished parental distress, especially reduction of parental depression and dysfunctional parent-child relationships.

Although the pediatric community has some resources available to address childhood adversity, a consensus regarding best practices has not yet emerged and existing resources may be limited. Most recommendations are based solely on non-experimental evidence, and reviews have focused largely on specific adverse exposures or evaluating outcomes among providers, such as openness to screening - which does not necessarily translate to improvement in patient health outcomes. More information is needed to develop standardized practices for addressing multiple adversities, achieving patient-focused outcomes, and involving providers through different levels of engagement, given that strictly pediatrician-led intervention may not be feasible in settings with competing priorities and limited resources. The purpose of this scoping literature review is to

therefore explore intervention studies that address childhood adversities with these considerations in mind. We intend to provide clarity on next steps for both research and practice on the basis of a comprehensive understanding of ameliorating childhood adversity and its impacts within the context of a pediatric setting.

## METHOD

The literature search strategy targeted original research articles published in the English language through 12/31/2016. Search terms focused on the study population (i.e., children, adolescents), child-serving health settings (i.e., pediatric primary care, family medicine), childhood adversity (i.e., abuse, neglect), and study type (i.e., intervention, RCT). Search terms were developed through examination of relevant articles, screening tools, and literature reviews. Table (1) provides a comprehensive list of terminology utilized in the search process.

Search terms were applied across nine databases and details about the article selection strategy are outlined in Figure (1). For inclusion, articles were required to target children (age 0-18 years) and/or their parent/caregiver, take place in association with a primary pediatric setting or provider, address a childhood adversity (either through prevention or through treatment of outcomes), and utilize a randomized controlled trial study design in order to focus on high quality evaluation studies. The primary and secondary author (SKPB, SS) carried out the article selection, screening, and data extraction processes. Articles were independently reviewed by the primary and secondary authors. Discrepancies were discussed and authors (SKPB, SS) came to consensus about article selection and data interpretation through weekly discussion meetings, and engagement with co-authors, on an as-needed basis.

## RESULTS

### Study design characteristics

This review describes 33 articles published between 1994 and 2015 that evaluated one of 25 intervention programs. Details about study design and findings are located in Table (2). Six interventions were evaluated more than once: Group Well Child Care (GWCC) [32,33], Incredible Years (IY) [34,35], Nurse-Family Partnership (NFP) [36-38], Safe Environment for Every Kid (SEEK) Model [39,40], Toddlers Without Tears (TWT) [41,42], and Video Interaction Project (VIP) [43-45], either with different samples or outcomes, or at different time points. Most studies took place in the United States (n=21), followed by Australia (n=9).

Studies randomized participants to one of four comparison groups using block randomization (n=4; by week, family unit or characteristics), cluster randomization (n=13; by clinical site or provider), or through individual randomization (n=16). The majority of studies (n=22) utilized standard care as the control condition. However, for many studies, standard services for children may exceed general standard care. For example, some intervention sites conducted universal screening for adversity and referred families for identified needs [46,47]. Almost one-third of studies (n=10) utilized an active comparison group that received literature or an alternate version of the intervention.

Search results

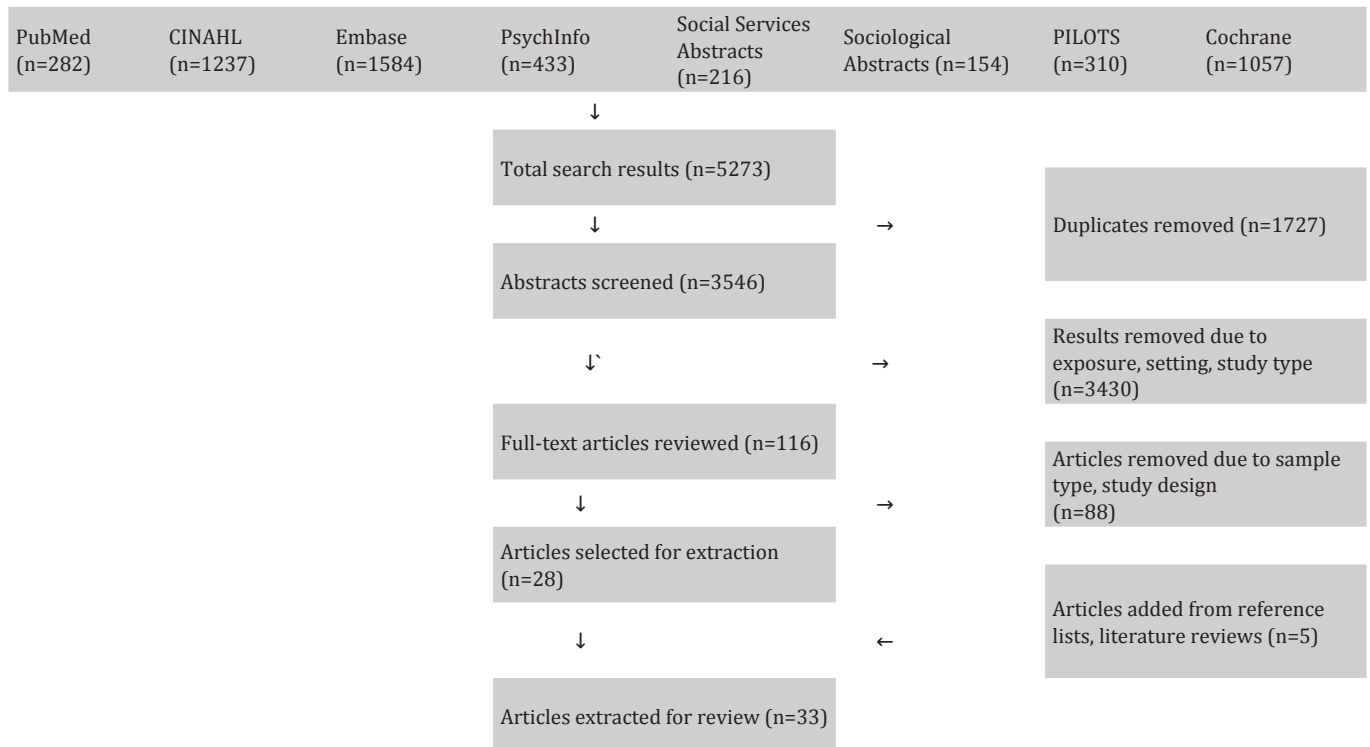


Figure 1: Flow diagram of literature search process

Table 1: Literature search terms.		
Search category	Search description	Search terms
Study population	Children, age 0-18 years	Child* OR "early life" OR girl OR boy OR baby OR infant* OR newborn OR toddler OR juvenile OR kid OR minor OR preschool OR student OR preteen OR teen* OR young OR youth OR adolescen*
Setting	Setting where children are served for primary or general health needs	"Family medicine" OR "family practice" OR "general medicine" OR pediatric OR pediatrician OR "primary care"
Exposure or outcome	Childhood adversity, including Adverse Childhood Experiences (ACEs), and additional adversities documented to impact child health outcomes	Abuse OR "adverse childhood experience" OR adversity OR "battered child syndrome" OR bereavement OR bullying OR "child protective services" OR "child welfare" OR conflict OR corporal OR punishment OR deportation OR disaster OR "distressed caregiver" OR divorce OR earthquake OR fire OR flood OR "food insecurity" OR foster care OR grief OR grieving OR "harsh parenting" OR homelessness OR "household dysfunction" OR "housing insecurity" OR maltreatment OR "maternal depression" OR "mental illness" OR molestation OR molested OR mourning OR neglect OR "parent-child conflict" OR "parental depression" OR "parental incarceration" OR "parental mental health" OR "parental separation" OR "physical punishment" OR "post-partum depression" OR poverty OR "psychosocial risk" OR "public housing" OR "sexual assault" OR stress OR terror OR trauma OR victim* OR violence OR war
Article type	Evaluation study design	Intervention OR counseling OR counselor OR curriculum OR education OR effectiveness OR evaluation OR experiment OR initiative OR longitudinal OR policy OR prevention OR program OR quasi OR "randomised clinical trial" OR "randomised control trial" OR "randomised controlled trial" OR "randomized clinical trial" OR "randomized control trial" OR "randomized controlled trial" OR RCT OR reform OR rehabilitation OR support OR therapy OR training OR treatment

Samples sizes ranged from n=30 to n=7259 [48,49]. Twelve studies enrolled fewer than 200 participants. Fourteen studies enlisted between 200 and 750 participants, and far fewer (n=7) studies enrolled greater than 1000 participants; larger studies took place in academic or public hospital systems. Outcome measures were assessed from immediately post-intervention to 12 years post-intervention. An equal number of studies assessed outcomes at 12 months or less (n=15) and 1.5 to 3.5 years (n=15). The longest follow-up consisted of 6, 9, 12 years for the NFP [36-38].

### Sample characteristics

Both child and parent characteristics were reported for the majority (n=22) of studies. Most studies (n=22) focused on infants and their caregivers. Some studies (n=5) covered a wide age range (i.e. infancy through middle childhood). Four studies enrolled toddler through preschool-age children. Few studies (n=3) evaluated outcomes in older children and teenagers. When child gender was reported (n=15 studies), several studies (n=13) enlisted a slightly greater proportion of boys (51-64%)

than girls. On the other hand, parents who were involved in the intervention were more likely to be female; 25 studies enrolled mothers exclusively. Studies that enrolled both parents typically had greater maternal than paternal involvement (i.e. 83% vs. 17%) [35,39,50]. Many studies (n=11) recruited parents in their early thirties (i.e. age 30-35), followed by late twenties (age 25-29; n=7). Some studies (n=5) enrolled young mothers, including adolescent mothers [36-38,46,51].

Nine studies in the U.S. involved mostly African American families, five studies enrolled majority Hispanic or Latino participants, and four studies consisted of majority White participants; three studies were racially diverse. Studies were spread across the country, with a concentration of studies based in urban Washington and New York state regions. Australian-based studies infrequently reported race/ethnicity although largely enrolled Australian-born, English-speaking participants with the exception of one study that recruited women born overseas and Vietnamese-speaking participants [52]. Australian studies took place in Queensland and Victoria.

Most study samples (n=24) can be characterized by a vulnerability. In five studies, children were exposed to a specific adversity. Three studies exclusively enrolled parents (mostly mothers) with mental health issues, including mood disorders and depression [53-55]. Two studies evaluated outcomes in mothers who were either abused or abused drugs, respectively [48,56]. The remaining (n=19) studies enrolled families at various levels of risk for poor child outcomes due to child behavior or sleep problems, low family income and educational attainment, risk of child abuse, and varying prevalence of: drug use, domestic violence, mental illness, and history of parent child abuse.

### Intervention characteristics

Pediatric-engaged interventions consisted of five types of programs: home visiting programs (n=5), screening models (n=5), training/consultation (n=5), parenting groups (n=4), models of care (n=3), and other programs such as mental health treatment (n=1), nurse case management (n=1), and parent self-study (n=1). Pediatric providers were engaged in a variety of ways, including directly leading intervention components, collaboration within a team, or referral to an onsite or offsite program.

Home visiting programs included the NFP, the Colorado Adolescent Maternity Program (CAMP), Mothers' AdvocateS in the Community (MOSAIC), and two unspecified home visiting programs [36-38,48,51,52,57]. Home visiting programs placed emphasis on improving maternal health and well-being, and child health and development. These programs were largely aimed at improving outcomes for vulnerable families, including adolescent and drug-abusing mothers [48,51]. Home visiting programs were either integrated at pediatric health settings with referral from a provider, or carried out in collaboration with a pediatric provider as part of a multidisciplinary team. Home visiting programs were scheduled at varying but predictable frequencies (i.e., weekly, biweekly or monthly) from 6 months to 2 years post-childbirth. All programs were led by nurses, with the exception of MOSAIC, which was led by a peer mother mentor [52]. Table (3) details more information about these programs.

While many programs may have included screening prior to intervention enrollment, five studies evaluated screening in conjunction with a proceeding service. These screening models (see Table 4) included: the Pediatric Symptom Checklist-17 (PSC-17) followed by the Positive Parenting program; Parent Screening Questionnaire (PSQ) followed by social worker engagement under the SEEK model; Well-child Care Visit, Evaluation, Community Resources, Advocacy, Referral, Education (WE CARE) survey with referral utilizing the Family Resource Book (FRB); modified TickiT electronic survey with provider discussion; and a modified screening tool for mothers experiencing domestic violence (MOVE) followed by referral to services [39,40,47,50,58,59]. The PSC-17 and PSQ are validated tools, and the WE CARE survey has been demonstrated to be reliable [39,40,50,58]. Several of the tools included survey questions from other validated measures, such as the TickiT survey [59]. Screening tools assessed psychosocial problems, child maltreatment risk factors, youth violence, and domestic violence. Pediatric providers were trained on interpretation of results, anticipatory guidance, and referral to services. All screening activities took place during routine healthcare visits at primary care pediatric settings, at least once annually, depending on visit schedules; the MOVE screening took place once at the 3-4 month child health visit [47].

A behavior modification program, the Preventative Intervention Project, Motivating Our Mothers (MOM), Triple P-Positive Parenting Program, and VIP involved individual or family training or consultation on-site in a pediatric setting [43-45,53,54,60,61]. All programs lasted between one and 11 sessions and included elements of improving parent mental health. Some additional program components included infant sleep problems and parenting skills. Most interventions took place during routine primary care visits in pediatric settings and programs were led by diverse health care providers including nurses, social workers, psychologists, and development specialists. Table (5) further describes programs that utilized consultation modalities.

Parenting groups consisted of: an educational package on child abuse prevention, GWCC, IY, and TWT [32-35,41,42,53,61,61,62]. All programs (see Table 6 for more information) enrolled children and families at primary health visits. Additionally, most parenting group sessions took place in a primary care setting (usually at times convenient for parents); some IY sessions took place at community locations [35]. One of three TWT sessions and all seven GWCC occurred during routine well-child visits [32,33,41,42]. Programs were led by nurse practitioners, nurses and supporting providers including health educators, psychologists, and social workers. These programs addressed topics such as child behavior and development, child abuse, and mental health. Most programs were interactive and in a group format. The number of interactions lasted between 2 and 10 sessions and individual sessions lasted between 30 minutes to 2 hours over the span of 2 weeks through 9 months.

Healthy Steps for Young Children (HS), Building Healthy Children (BHC), and Program of Resources, Information and Support for Mothers (PRISM) are comprehensive models of care designed to meet multiple patient needs. These models include screening, provider training, and a suite of services, including assigned outreach workers, community activities,



**Table 2:** Description of RCT studies evaluating adversity-related outcomes in pediatric primary care settings.

Study	Study design and setting	Sample characteristics	Relevant Measures	Adversity-related findings
Home visiting program [57]	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=90), control (n=91, standard care)</li> <li>• Assessment: baseline, 6 weeks (Queensland, Australia)</li> </ul>	<p>Child Age: 0-6 weeks                      Parent (Vulnerable)                      Age, mean: 6.6-6.7% &lt;18 years                      Gender: 100% female (mother)                      Race/ethnicity: 6-9% Aboriginal/ Torres Strait Islander                      Education: 22-17% &lt;10 years                      Family Income: 75-77% &lt;\$26K (AUD)</p>	<p>.Maternal depression (<i>Edinburgh Postnatal Depression Scale, EPDS</i>)</p>	<p>Baseline mean depression scores comparable (p=0.21) in intervention (8.18(SD=4.95) and control (9.17, SD=5.57). At 6 weeks, intervention group mean maternal depression score significantly lower (5.67(SD=4.14) than control (7.90 (SD=5.89) p=0.004. Using clinical cutoff of EPDS (score&gt;12), intervention (19.5%) and comparison (25.8%) groups were comparable at baseline (p=0.32); at follow-up, greater proportion of comparison group had significantly higher clinical levels, vs. intervention, (20.7 vs. 5.8%), p=0.003.</p>
Period of PURPLE crying [64]	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=1374), control (n=1364, infant safety and sleep material)</li> <li>• Assessment: baseline, 2 months (Washington, USA)</li> </ul>	<p>Child Age: 0-2 months                      Parent Age: 35% 30-34 years; 27-26% 25-29 years                      Gender: 100% female (mother)                      Education: 65-62% college +                      Household Income: 36-37% \$0-60K (USD)</p>	<p>.Knowledge about infant shaking                      .Sharing of infant shaking knowledge (<i>Researcher developed tool</i>)</p>	<p>Intervention group scored significantly higher on shaking knowledge scale (mean 84.8(SD=10.7) than control (83.5, SD=9.4) with difference of 1.3; 95% CI [0.5-2.1]). Percent of mothers who shared information about dangers of shaking with other caregivers was significantly higher for the intervention group (35.3% (SD=54.6) versus control (29.7% (SD=53) with difference of 5.6; 95% CI [1.6-9.6].</p>
Toddlers Without Tears [41]	<ul style="list-style-type: none"> <li>• RCT: cluster randomized</li> <li>• Intervention (n=329), control (n=404, standard care)</li> <li>• Assessment: baseline, 12, 18, 24, &amp; 36 months (Melbourne, Australia)</li> </ul>	<p>Child Age: 6-7 months                      Gender: 50-52% male                      Parent Age, mean: 33 years [SD=4.8-4.7]                      Gender: 100% female (mothers)                      Race/ethnicity: 77-79% Anglo                      Education: 46-47% tertiary/post-graduate                      Household income: 59-56% &gt;\$60K (AUD)</p>	<p>.Parent depression                      .Parent anxiety (<i>Depression Anxiety Stress Scales, DASS</i>)</p>	<p>Baseline maternal depression score comparable for intervention (4.1(SD=5.4) and control (3.5(SD=4.5), as well as mean anxiety score (intervention 2.2(SD=3.6), control 1.9(SD=3.1). At child age 3, differences between intervention and control groups in depression or anxiety scores not significant: intervention mean depression score 3.4(SD=5.0) vs. control 3.6(SD=5.1), adjusted mean difference -0.1, 95% CI [-0.9, 0.7], p=0.82.; intervention mean anxiety score 1.8(SD=3.0) vs. control 1.8 (SD=3.1), adjusted mean difference -0.1, 95% CI [-0.6, 0.4], p=0.77.</p>
Preventative Intervention Project [53]	<ul style="list-style-type: none"> <li>• RCT: block randomized by family unit</li> <li>• Intervention (n=59 families (78 children; 106 adults), control (n=46 families (60 children; 84 adults), lecture control)</li> <li>• Assessment: baseline; 1, 2.5 years (Massachusetts, USA)</li> </ul>	<p>Child Age, mean: 11.6 years [SD=1.9]                      Gender: 57% male                      Parent (Mood disorders)                      Age, mean: 43.1 years [SD=4.8]                      Race/ethnicity: 93.6% White                      Education: 42% grad/professional                      Family income: 36% \$65-90K (USD)</p>	<p>.Children's change in understanding of parent mental health (<i>Semi-structured Child Interview</i>)</p>	<p>Children in the clinician facilitated group reported more change in understanding of parental illness than children in the lecture group (p=0.04). There was also a positive association between the amount of change children reported in their understanding of parental illness and the number of changes couples reported in child-related behaviors/attitudes (p&lt;0.0001). Despite overall decrease in internalizing symptoms, there was no group-based effect.</p>

<p>Video Interaction Project (VIP); Building Blocks (BB) [45]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=126 VIP, 147 BB), control (n=134), standard care</li> <li>• Assessment: baseline, 6 months (New York, USA)</li> </ul>	<p><b>Child Age:</b> Newborn  <b>Gender:</b> 48% male  <b>Parent (Low-income)</b>  <b>Age, mean:</b> 27-28 years [SD=4.9-6.2]  <b>Gender:</b> 100% female (mother)  <b>Race/ethnicity:</b> 91-93% Latina  <b>Education, mean:</b> 10 years  <b>SES:</b> 90-92% low SES</p>	<p>.Parent depression (<i>Patient Health Questionnaire-9, PHQ-9</i>)</p>	<p>Baseline depressive symptoms were comparable for three groups. Mean PHQ-9 score significantly lower for VIP vs comparison groups; effect size <math>d=0.34</math>. VIP and BB groups had significantly lower mild depressive symptoms: absolute RR 11.5% [0.7, 21.8%]; relative RR 35.7% [2, 57.8%] for VIP and absolute RR 11% [0.7, 21.1%]; relative RR 34.3% [2.2, 55.9%]. Only VIP benefitted from reduced moderate symptoms: absolute RR 5.7% [0.6, 12.3%]; relative RR 59.1% [11.4, 85%]. For VIP, increased parental responsiveness mediated intervention effects.</p>
<p>Home visiting program [48]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=31), control (n=29, standard care)</li> <li>• Assessment: baseline, 3, 6, 12, 18 months (USA)</li> </ul>	<p><b>Child Age:</b> Infants  <b>Gender:</b> 45-59% male  <b>Race/ethnicity:</b> 88-90% African American  <b>Parent (Drug abusing)</b>  <b>Age, mean:</b> 26.4-27.9 years [SD=0.7-0.9]  <b>Gender:</b> 100% female (mother)  <b>Education:</b> 10.9-11 years [SD=0.4]</p>	<p>.Child abuse potential (<i>Child Abuse Potential Inventory</i>)                  .Ongoing drug abuse (<i>Researcher developed tool</i>)</p>	<p>Intervention mothers slightly more likely to report being drug-free at 18 months vs. control, <math>p=0.059</math>. At prenatal baseline, intervention and comparison mothers at elevated risk of child abuse versus reference range (<math>p&lt;0.01</math>). At 18 months follow up, intervention mothers reported abuse score similar to reference; scores elevated in 2/6 subtests. Control mothers continued to report greater mean abuse potential than reference (<math>p&lt;0.01</math>) with elevated scores in 6 subtests. After adjusting for covariates, groups did not differ in score patterns, <math>p=0.075</math>.</p>
<p>PSQ-17 and Positive Parenting [58]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=112), control (n=112, clinician did not see results)</li> <li>• Assessment: baseline, 9 months post-visit (Minnesota, USA)</li> </ul>	<p><b>Child Age, mean:</b> 11 years [SD=2.3]  <b>Gender:</b> 55-50% male  <b>Race/ethnicity:</b> 78-79% White  <b>SES:</b> 12.1-12.6% received welfare  <b>Parent</b> Not specified</p>	<p>.Parent depression (<i>Rand Corporation Screening Instrument for Depressive Disorders</i>)                  .Corporal punishment                  .Child bullying victimization (<i>Researcher developed tool</i>)</p>	<p>At baseline 40% and 45% of intervention and control parents reported depression. At follow up, 24% and 39% of intervention and control parents reported depression, adjusted difference 2.03, 95% CI 1.08, 3.81, <math>p=0.03</math> (greater change in depression score for intervention). Parent-reported baseline corporal punishment comparable between intervention and control (1.26 (SD=0.43) vs 1.31 (SD=0.40)) with significant difference at follow up, 1.15 (SD=0.33) intervention vs. 1.27 (SD=0.40) control, <math>p=0.04</math>. There was no difference (<math>p=0.52</math>) in corporal punishment according to youth, (baseline 1.37(SD=0.52) intervention vs. 1.28(SD=0.40) control vs. follow up 1.28 (SD=0.43) intervention 1.22(SD=0.48) control. At baseline, child-reported bullying scores were 23(SD=36.5), intervention and 24(SD=36.4) control. At follow up, scores for intervention were 14(SD=21.5) and 28(SD=42.4) control, AOR 3.23, 95% CI [1.96, 5.31], <math>p&lt;0.001</math>. No change in parents' report of child being bullied, <math>p=0.09</math>.</p>
<p>VIP, BB [44]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=161 VIP, n=113 BB, n=164 control, standard care)</li> <li>• Assessment: 6, 14, 24 months (New York, USA)</li> </ul>	<p><b>Child Age:</b> Newborn  <b>Gender:</b> 48-55% male  <b>Parent (Low-income)</b>  <b>Age:</b> 9-12% &lt;21 years  <b>Gender:</b> 100% female (mother)  <b>Race/ethnicity:</b> 92-95% Hispanic  <b>Education:</b> 55-63% non-high school grad  <b>SES:</b> 91-93% low SES</p>	<p>.Physical punishment (<i>Socolar Discipline Survey</i>)                  .Maternal depression symptoms (<i>PHQ-9</i>)</p>	<p>At 14 months, VIP participants used less physical punishment versus BB and control (62%, 69%, 70% respectively) although differences were not significant. At 24 months, differences between VIP, BB, and control groups were significant (75%, 81%, 85%) in use of physical punishment, <math>p&lt;0.05</math>. VIP group had reduced odds (0.59[0.35, 0.99] compared to BB and control. Increases in maternal depression directly influenced physical punishment; number of VIP sessions directly correlated with maternal depression at 24 months (<math>r=-0.16</math>).</p>
<p>Safe Environment for Every Kid (SEEK) model [39]</p>	<ul style="list-style-type: none"> <li>• RCT: cluster randomized</li> <li>• Intervention (n=406), control (n=323, standard care, human services worker)</li> <li>• Assessment: follow-up ranged 3-3.5 years (Maryland, USA)</li> </ul>	<p><b>Child Age, median:</b> 6-8 months  <b>Gender:</b> 54-49% male  <b>Race/ethnicity:</b> 93-94% Black  <b>Parent (Low-income, urban)</b>  <b>Age, mean:</b> 25.3 years [SD=6.8-7.3]  <b>Gender:</b> 93-92% mother  <b>Education:</b> 36-42% &lt;high school</p>	<p>.Child abuse, neglect (<i>Child's medical chart, Child Protective Services (CPS) record, Parent-Child Conflict Tactics Scale, (CTSPC)</i>)</p>	<p>There were fewer CPS reports among intervention families (13%) versus control (19%), (<math>p=0.03</math>). The control group was 1.5 times more likely to have had at least 1 CPS report. Intervention group (0.11(SD=0.75) reported lower severe or very severe physical assault (<math>p=0.04</math>) than control (0.33(SD=1.96). However, there were no significant differences between groups in psychological aggression, or minor physical assault (<math>p=0.41</math>, <math>p=0.17</math>).</p>

SEEK [40]	<ul style="list-style-type: none"> <li>• RCT: cluster randomized</li> <li>• 7 intervention practices; 11 control practices</li> <li>• Intervention (n=595), control (n=524, standard care; human services worker)</li> <li>• Assessment: time points vary (Maryland, USA)</li> </ul>	<p><u>Child</u> Age, mean: 25-27 months [SD=20] Gender: 51% male Race/ethnicity: 75-86% White <u>Parent</u> Age, mean: 33-35 years [SD=5-6] Gender: 100% female (mother) Education: 33-34% college grad, 21-39% prof school grad Income: 53-61% \$75K+, 54-56% \$75K+ (USD)</p>	<p>.Child abuse and neglect <i>((1) Child's medical chart, (2) CPS record, (3) CTSPC)</i></p>	<p>Mean psychological aggression scores were significantly lower in the intervention group initially (p=0.006) and at 12 months (p=0.047), but not at 6 months. Mean scores for minor physical assault were significantly lower in the intervention group initially (p=0.019) and at 12 months (p=0.043), but not at 6 months. Maltreatment reports documented in medical records were not statistically significant between groups, nor were differences in the number of CPS reports.</p>
Motivating Our Mothers (MOM) [54]	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=52), control (n=52, general depression resources)</li> <li>• Assessment: Baseline, post-intervention, 2, 8 weeks (California, USA)</li> </ul>	<p><u>Child</u> Age: 3.8 years [SD=3.7] <u>Parent</u> (Positive depression screen) Age, mean: 30.7 years [SD=7.3] Gender: 100% female (mother) Race/ethnicity: 32% Hispanic, 27% Non-Hispanic White Education: 60% some college + Income: 42% \$10-34,999</p>	<p>.Intention to contact resource .Attempt to contact resource <i>(Researcher adapted tool)</i></p>	<p>Post-visit, MOM mothers had greater intention than control to contact resource (5.22 vs. 4.00, p=0.009). At 2 weeks post-intervention, attempt to contact any resource to discuss screen greater in intervention vs. control (74 vs. 53%; diff=20.3% CI: [-0.1, -38.5%]; p=0.052). Among mothers with clinical range depression, MOM mothers more likely to contact resources vs. control, although difference not significant (75% vs. 54.6%, p=0.17). Among mothers who did not report attempts to contact resource by 2 weeks, MOM mothers reported higher intention in future than control (p=0.001). Proportion of MOM mothers who reported attempt to contact resource by 8 weeks was greater vs control (89% vs 59%, p=0.015).</p>
Well-child Care Visit, Evaluation, Community Resources, Advocacy, Referral, Education (WE CARE) [50]	<ul style="list-style-type: none"> <li>• RCT: cluster randomized by provider</li> <li>• Intervention (n=100), control (n=100, standard care, includes access to resource book)</li> <li>• Assessment: post-visit, 1 month (USA)</li> </ul>	<p><u>Child</u> Age, mean: 2.9 years [SD=2.5] <u>Parent</u> (Low-income, urban) Age, mean: 30.4 years [SD=9.9] Gender: 83% female (mother) Race: 91% Black Education: 66% high school grad SES: 86% on Medicaid Household income: 40% &lt;\$15,000</p>	<p>.Discussion of psychosocial topics .Unmet desire to discuss topics .Recollection of referral .Follow up with resource <i>(Medical chart review, researcher developed tool)</i></p>	<p>Intervention group discussed greater number of topics than control (2.9 vs 1.8, p&lt;0.01). Intervention had fewer unmet desires to discuss topics vs. control (0.46 vs 1.41, p=0.001). Intervention received significantly greater mean number of referrals versus control (1.15 vs 0.24; p&lt;0.001). More parents in intervention reported receiving referral than control (51% vs 11.6%; p&lt;0.001). A greater proportion of intervention parents recalled referral compared to control group one month later (69% vs 20%, p&lt;0.01). Of parents receiving referral, 20% of intervention parents reported contacting referral resources compared to 2% of control group parents.</p>
Behavior Modification Program [6]	<ul style="list-style-type: none"> <li>• RCT: cluster randomized by site</li> <li>• Intervention (n=174), control (n=154, standard care)</li> <li>• Assessment: baseline, 10, 12, 24 months (Melbourne, Australia)</li> </ul>	<p><u>Child</u> Age, mean: 7.3-7.4 months [SD=0.6] Gender: 51-58% male <u>Parent</u> Age, mean: 32.8-33.2 years [SD=4.3-4.8] Gender: 100% female (mothers) Education: 49-53% tertiary/post-graduate degree SES: 50-51% low disadvantage</p>	<p>.Maternal depression <i>(EPDS)</i></p>	<p>Mothers in the intervention group were significantly less likely to report clinical levels of depression (EPDS&gt;9) than control mothers (26 vs 15%; adjusted [OR]: 0.41 [95% CI]: 0.20 to 0.86; p=0.02). Mean depression scores were lower for intervention compared with control (5.50 vs 6.72; adjusted mean difference: 1.47 [95% CI: 2.42 to 0.51]; p=0.003). With EPDS cut off of 13+, intervention mothers reported lower clinical depression levels than control (4% vs 13%, AOR 2.0 [0.07, 0.60, p=0.004]).</p>
Toddlers Without Tears [42]	<ul style="list-style-type: none"> <li>• RCT: cluster randomized by center</li> <li>• Intervention (n=329), control (n=404, standard nurse care)</li> <li>• Assessment: baseline, 12, 18, 24 months (Victoria, Australia)</li> </ul>	<p><u>Child</u> Age, range: 8-15 months Gender: 50-52% male <u>Parent</u> Age, mean: 33 years [SD=4.7-4.8] Gender: 100% female (mothers) Education: 46-47% tertiary/post-graduate degree Household Income: 56-59% \$60K+ (AUS)</p>	<p>Maternal mental health .Anxiety .Depression <i>(DASS)</i></p>	<p>At 18 months follow up, maternal depression scores were not significantly different between intervention and control groups (3.4(SD=4.3) vs 2.9(SD=4.3, p=0.30) or at 24 months, (3.5(SD=5.2) vs 2.9(SD=4.0, p=0.09). Similarly, at 18 months, mean anxiety scores were not significantly different between intervention and control groups, (1.9(SD=3.4) vs 1.8(SD=3.1, p=0.64) or at 24 months, (2.0(SD=3.9) vs 1.9(SD=3.4, p=0.82).</p>

<p>Healthy Steps for Young Children (HS) [63]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=239 HS + PrePare), control (n=136, standard care)</li> <li>• Assessment: baseline, 24, 30 months (Pacific northwest, USA)</li> </ul>	<p><u>Child</u> Age: 0-23-24 months                  Gender: 52-56% male  <u>Parent</u> Age, mean: 33-40 years [SD=4.8-5.1]                  Gender: 100% female (mother)                  Race/ethnicity: 79-81% White                  Education: 53-60% some college or college graduate                  Family income: 39-46% \$40-75K, 37-48% &gt;\$75K</p>	<p>.Maternal depression (<i>modified Center for Epidemiological Studies Depression Scale (CES-D)</i>)                  .Discussed sadness at pediatric practice                  .Parent drug use                  .Domestic violence                  .Harsh physical discipline (<i>Researcher developed tool</i>)</p>	<p>No significant difference in maternal depression between intervention and control (RR 0.75[0.20-1.31] or PP+HS and HS only [RR 0.55[0.67, 1.30]. Clinical depression not different between groups, intervention vs. control RR 1.21[0.80, 1.82] or PP+HS vs HS only RR 0.93[0.67, 1.30]. There was no difference in discussion of sadness at pediatric practice, intervention vs. control RR 1.45[0.95, 2.21] or PP+HS vs HS only RR 1.04[0.53, 2.04]. No difference in parent drug use, intervention vs. control RR 1.61[0.71, 3.64] or PP+HS vs HS only RR 1.02[0.50, 2.09] or domestic violence, intervention vs. control RR 0.4[0.16, 1.05] or PP+HS vs HS only RR 2.09[0.73, 6.01]. Harsh discipline significantly lower for intervention vs control, 2.1 vs 2.9, 0.45[0.29, 0.73].</p>
<p>Nurse Case Management [56]</p>	<ul style="list-style-type: none"> <li>• RCT: cluster randomized</li> <li>• Intervention (n=119), control (n=114, standard care, (screening, referral card) (n=360 randomized)</li> <li>• Assessment: 6, 12, 18, 24 months (Large urban area, USA)</li> </ul>	<p><u>Child</u> Age: 72% 1.5-18 years                  Race/ethnicity: 67% Hispanic, 26% African American  <u>Parent</u> (Physically and sexually abused)                  Gender: 100% female (mother)</p>	<p>.Abuse assessment for mother (<i>Researcher developed tool</i>)                  .Child behavior (<i>Child Behavior Checklist, CBCL</i>)</p>	<p>Mean scores for child behavior improved over time for both intervention and control groups of physically and sexually abused mothers; there was no difference in child behavior outcomes between intervention and control. At follow-up, children scored significantly lower on the CBCL than clinically referred children. Young children (age 18 months to 5 years) improved the most and teenagers improved the least.</p>
<p>VIP, BB [43]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=52), control (n=47, standard care)</li> <li>• Assessment: baseline, 33 months (New York, USA)</li> </ul>	<p><u>Child</u> (Developmental delay risk)                  Age: Birth                  Gender: 61-64% male                  Race/ethnicity: 100% Latino  <u>Parent</u> Age, mean: 29.8 years [SD=5.8-6.2]                  Gender: 100% female (mother)                  Race/ethnicity: 100% Latina                  Education, mean: 6.8-7.3 years [SD=2.1-2.5]                  SES: 96-100% social class 5</p>	<p>.Parent stress-related anxiety                  .Parent stress-related depression (<i>Parenting Stress Index-Short Form (PSI-SF)</i>)                  .Maternal depression (<i>CES-D</i>)</p>	<p>Stress related anxiety and depression was lower for the intervention group (mean 60.9 (SD=25.1) than control (mean 68.9(SD=19.6) but differences were not statistically significant. Although lower for the intervention group, mean maternal depression score did not differ significantly between groups either; intervention (10.6(SD=12.0); control (12.4(SD=9.5), p=0.42. Fewer mothers in the intervention (19.2%) were in clinical range for depression (CES-D 16+) versus control (25.5%) but this was not significant, p=0.61.</p>
<p>Cognitive Behavior Therapy (CBT) through general practitioner, nurse or psychologist management [55]</p>	<ul style="list-style-type: none"> <li>• RCT: cluster randomized</li> <li>• Group A physician management, (n=23), Group B CBT with nurse, (n=22), Group C CBT with psychologist, (n=23)</li> <li>• Assessment: baseline, 3, 8 weeks (Melbourne, Australia)</li> </ul>	<p><u>Child</u> Age, mean: 14.8-20.7 weeks [SD=9.2-11.4]  <u>Parent</u> (Depressed mothers)                  Age, mean: 30-33 years [SD=3.3-5.6]                  Gender: 100% female (mother)                  Education: 61-71% degree or higher                  Income: 45-52% \$40-80K (AUD)</p>	<p>.Maternal depression (<i>Beck Depression Inventory II (BDI-II)</i>)                  .Parent anxiety                  .Parent depression (<i>DASS 21 Short Form</i>)                  .Perceived effectiveness(<i>Researcher developed tool</i>)</p>	<p>All groups experienced decrease in mean maternal depression baseline to post-study (A: 27.9 (SD=10.8) to 11 (SD=8); B: 25.5 (SD=8.3) to 6.7 (SD=4.3); C:30.9 (SD=10.7) to 10.4 (SD=9.5)); no significant difference in depression among groups over time. Decrease in anxiety scores over time but no between-group differences at follow up. Group B showed the greatest declines. Most participants reported that sufficient treatment (9/14, 16/18, 12/14) and rated treatment highly (6.9, 8.6, 7.4/10), group B reported most favorably (p=0.04).</p>
<p>Nurse-Family Partnership (NFP) [36]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=228), control (n=515, transportation, screening, referral)</li> <li>• Assessment: baseline, 6 years (Tennessee, USA)</li> </ul>	<p><u>Child</u> Age: Birth  <u>Parent</u> (Vulnerable)                  Age: 64% &lt;19 years                  Gender: 100% female (mother)                  Race/ethnicity: 100% Black                  Household SES: 85% below FPL</p>	<p>.Mental health                  .Marijuana use                  .Moderate/heavy drinking                  .Behavior problems due to substance use                  .Domestic violence (<i>Researcher developed tool</i>)</p>	<p>There was no significant difference (mean, standard error) between intervention and comparison groups in mental health score 100.18(0.71) vs 99.92(0.48), p=0.76. There was also no significant difference in proportion of intervention versus comparison mothers on current marijuana use (4.6% vs. 3.4%, p=0.47), moderate or heavy drinking (5.2 vs. 2.6%, p=0.11), behavioral problems due to substance abuse (3.9 vs 4.1%, p=0.88), any domestic violence (38.8 vs. 39.5%, p=0.87).</p>



NFP [37]	(See above for details) <ul style="list-style-type: none"> <li>Assessment: present study assessed outcomes 9 years later</li> </ul>	<u>Child Age</u> : Birth <u>Parent</u> (Vulnerable) Age: 64% <19 years Gender: 100% female (mother) Race/ethnicity: 100% Black Household SES: 85% below FPL	.Maternal depression ( <i>CES-D</i> ) .Domestic violence .Substance use .Jailed .Arrests ( <i>Researcher developed tool</i> )	Comparing intervention to control group, there was no statistically significant difference in domestic violence reports (20.6 vs 23.7%; $p=0.37$ ), mother being jailed (3.7 vs. 2.5%; $p=0.46$ ), number of substances used (0.10 vs. 0.17 incidence, $p=0.08$ ), number of maternal arrests (0.41 vs. 0.30 incidence, $p=0.16$ ), mean maternal depression score (1.71(SD=0.04) vs 1.72(SD=0.03, $p=0.87$ ).
NFP [38]	(See above for details) <ul style="list-style-type: none"> <li>Assessment: present study assessed outcomes 12 years later</li> </ul>	<u>Child Age</u> : Birth <u>Parent</u> (Vulnerable) Age: 64% <19 years Gender: 100% female (mother) Race/ethnicity: 100% Black Household SES: 85% below FPL	.Psychological distress ( <i>Brief Symptom Inventory</i> ) .Child foster care placement .Intimate partner violence .Role impairment .Alcohol, drug use .Jailed .Arrests ( <i>Researcher developed tool</i> )	At 12 years follow up, there were no differences in intervention versus control on most outcomes: intimate partner violence (22.2 vs 21.3%; $p=0.81$ ), alcohol or other drug use (9.6 vs. 10.4%; $p=0.76$ ), mother jailed (12.8 vs. 13.2%; $p=0.90$ ), symptoms of psychological distress (18.4 vs. 17.1%; $p=0.77$ ), maternal arrests (0.49 vs. 0.36 incidence; $p=0.15$ ), and child foster care placements (0.12 vs 0.04 incidence; $p=0.08$ ). Intervention mothers did experience significantly lower role impairment due to alcohol or other drug use however (0 vs. 2.5%; $p=0.04$ ).
Building Healthy Children [46]	<ul style="list-style-type: none"> <li>RCT: individually randomized</li> <li>Intervention (n=270), control (n=227, standard care, community referral)</li> <li>Assessment: baseline, 12, 24 months (New York, USA)</li> </ul>	<u>Child Age</u> , mean: 6.3 months Gender: 52% male <u>Parent</u> (Vulnerable) Age, mean: 19 years Gender: 100% female (mother) Race/ethnicity: 68% Black Income, mean annual: \$10,900 Education: 39% high school/GED	.Child protective services involvement ( <i>CPS record</i> )	A review of CPS reports has shown that 98% of the treatment group and 95% of the comparison group has avoided CPS involvement. This difference was not statistically significant however.
Incredible Years (IY) programme [34]	<ul style="list-style-type: none"> <li>RCT: randomized by blocks, demographics, time preference</li> <li>Intervention (n=60), control (n=56, no intervention)</li> <li>Assessment: baseline, post-intervention, 6 months (United Kingdom)</li> </ul>	<u>Child</u> (Behavioral problems) Age: 2-8 years <u>Parent Age</u> : Not reported Gender: Not reported although both parents encouraged to attend Race/ethnicity: 91% White SES: 39% Social Class II (of V)	.Parent depression .Parent anxiety ( <i>General Health Questionnaire (GHQ)</i> )	Mean parent baseline anxiety for intervention and control comparable, 1.6(SD=1.9) vs. 1.5(SD=1.9). Both groups' scores decreased post-intervention but not significantly different from baseline, intervention 1.2(1.9) vs. control 1.8(2.2). Both groups experienced significant decrease ( $p<0.05$ ) in mean anxiety score at 6 months, intervention 1.0(1.8) vs. control 0.9(1.7). Difference in groups' change in mean anxiety scores over time were not significant between groups at post-intervention or 6 months, $p=0.18$ , 0.24. Mean parent baseline depression scores slightly higher for intervention vs. control, 0.7(SD=1.5) vs. 0.2(SD=0.6). Intervention post intervention depression decreased from baseline but not significantly, 0.3(SD=0.8) vs. control 0.4(SD=1.1). Intervention experienced significant decrease ( $p<0.05$ ) in mean depression score at 6 months, 0.07(SD=0.3) vs control 0.09(SD=0.4). Differences in group's change in mean depression scores not different between groups, post-intervention or 6 months, $p=0.26$ , $p=0.09$ .
TickiT survey [59]	<ul style="list-style-type: none"> <li>RCT: cluster randomized</li> <li>Intervention (n=93 youth), control (n=90 youth, standard screening)</li> <li>Assessment: post-visit (Northeast region, USA)</li> </ul>	<u>Child Age</u> , mean: 15.1-15.2 years [SD=1.6] Gender: 50-58% male Race/ethnicity: 56-61% Hispanic, 21-28% non-Hispanic Black <u>Parent</u> Not specified	.Youth violence (YV) discussion ( <i>Adapted from Young Adult Health Care Survey</i> ) .Helpfulness of discussion ( <i>Researcher developed tool</i> )	More intervention youth reported discussion about YV with provider 65% [CI 55, 74] vs. control 42% [CI 32-53]. Intervention had 2.6 greater AOR [CI 1.2, 5.6] of YV discussion vs. control. Participants more likely to report YV discussion if they talked with doctor alone (AOR 5.3 [CI 1.2, 22.7] and were the same gender as doctor, AOR 2.6 [CI 1.3, 5.2]. Among youth reporting discussion, 66% reported as very helpful, 30% as somewhat helpful; no group differences in helpfulness, 65% [CI 53-77] vs. 68% [CI 53-85].

<p>Program of Resources, Information and Support for Mothers (PRISM) [49]</p>	<ul style="list-style-type: none"> <li>• RCT: cluster randomized</li> <li>• Intervention (n=3,984), control (n=3,275, no intervention)</li> <li>• Assessment: 6 months, 2 years (Victoria, Australia)</li> </ul>	<p><u>Child</u> Age: birth to 2 years  <u>Parent</u> Age: 34% 38-42 years                  Gender: 100% female (mothers)                  Education: 29-31% diploma/ apprentice, 28-32% degree                  Family income: 46-52% \$30-70,000 (AUD)</p>	<p>.Maternal depression (<i>EPDS</i>)                  .Parent mental health (<i>mental component score of Short Form 36</i>)</p>	<p>At 2 year follow up, intervention group and control reported similar depression outcomes. Prevalence of EPDS score of 13+ was 13.4% and 13.1% for intervention and control, p=0.92. Mean EPDS scores for intervention (6.53) and control (6.45) were not significantly different, p=0.61. Mental health outcomes were similar; mean MSC score 73.27 vs. 73.74 for intervention versus comparison, p=0.23.</p>
<p>Colorado Adolescent Maternity Camp (CAMP) [51]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=84), control (n=87, no home visit)</li> <li>• Assessment: 6, 12 months (Colorado, United States)</li> </ul>	<p><u>Child</u> Age: 0-16 weeks                  Gender: 40-52% male  <u>Parent</u> (Vulnerable)                  Age, mean: 17.5 years [SD=1.4]                  Gender: 100% female (mother)                  Race/ethnicity: 47-48% minority                  Education: 48-61% school dropout                  SES: 91-95% Medicaid</p>	<p>.Risk for maltreatment (<i>Family Stress Checklist</i>)                  .Child abuse                  .Child neglect                  .Child abandonment (<i>Researcher developed tool, medical records</i>)</p>	<p>The intervention group had lower incidence of child neglect, (3.6%) compared to control (15.3%), p=0.02. However, there were no differences in abuse (3.6 vs 0%), abandonment (10.9 vs 4.6%) and any maltreatment (18.2 vs. 19.4%). By end of study period 19% of located children were removed from mothers, there was no differences in removal although intervention group were less likely to be removed due to neglect, more likely to be removed due to serious abuse and abandonment.</p>
<p>Incredible Years (IY) programme [35]</p>	<ul style="list-style-type: none"> <li>• RCT: block randomized based on availability</li> <li>• Intervention (n=56), control (n=60, standard care)</li> <li>• Assessment: baseline, 6, 12 months (Oxford, United Kingdom)</li> </ul>	<p><u>Child</u> (Behavioral problems)                  Age, mean: 4.6 years [SD=2.0]                  Gender: &gt;50% males  <u>Parent</u> Gender: Mostly mothers</p>	<p>.Parent anxiety                  .Parent depression (<i>GHQ</i>)</p>	<p>Baseline anxiety higher for intervention 1.6[1.9] vs. control 1.5[1.9]. At 6 months follow up, scores significantly decreased for both groups vs. baseline, control 0.9[1.7] and intervention 1.0 [1.8], and slightly increased (nonsignificant) at 12 months, intervention 1.3[2.0], control 1.4[1.9]. Group differences not significant at follow up points; changes from baseline at 6 or 12 months were not significantly different. Baseline depression score higher for intervention group, 0.7[1.5], vs. control, 0.2[0.60]. Depression scores significantly decreased for intervention 0.07[0.3] and decreased (nonsignificant) for control 0.09[0.4] at 6 months vs. baseline. At 12 months, scores slightly increased for both groups from 6 months, 0.1[0.4], 0.1[0.5] with a significant increase for the intervention vs baseline. Differences in mean score from baseline to 12 months significantly lower for intervention vs. control, p=0.03.</p>
<p>Mothers Experiencing Domestic Violence (MOVE) [47]</p>	<ul style="list-style-type: none"> <li>• RCT: cluster randomized by team</li> <li>• Intervention (n=1269), control (n=1352, standard screening)</li> <li>• Assessment: 12, 15 months, 2 years (Melbourne, Australia)</li> </ul>	<p><u>Child</u> Not specified  <u>Parent</u> Age, mean: 34 years [SD=4.5-4.6]                  Gender: 100% female (mothers)                  Education: 60-64% degree/higher degree                  Family income: 60-65% &gt;\$70K(AUD)</p>	<p>.Intimate partner violence (<i>Composite Abuse Scale, CAS</i>)</p>	<p>There was no significant difference between intervention and control on being asked about family violence, preference for speaking about partner with nurse, feelings about self due to attitude of nurse toward self, discomfort answering questions. Intervention group more likely to report that partners either humiliated or tried to control them versus control group (32% vs 20%; AOR 1.52[CI 1.19, 1.95]). Women in the intervention group were also more likely to report problems in their relationship or intimacy with partner vs. comparison group (49% vs. 34%, AOR 1.27 [CI 1.03, 1.58]).</p>
<p>MotherS Advocates In the Community (MOSAIC) [52]</p>	<ul style="list-style-type: none"> <li>• RCT: cluster randomized by clinic</li> <li>• Intervention (n=113), control (n=61, no mentoring)</li> <li>• Assessment: baseline, 12 months (Melbourne, Australia)</li> </ul>	<p><u>Child</u> Not specified  <u>Parent</u> Age, mean: 32 years [SD=5.8-6.7]                  Gender: 100% female (mothers)                  Nationality: 32-36% born overseas                  Education: 47-53% ≤12 years                  Income: 53-62% on welfare</p>	<p>.Intimate partner violence (<i>CAS</i>)                  .Maternal depression (<i>EPDS</i>)</p>	<p>Baseline partner abuse scores were similar for both groups. Intervention group reported lower mean abuse scores (15.9 vs 21.8) than control (adjusted difference -8.67, CI [-16.2, -1.15] at follow-up. There was no significant difference in reduction of depression scores between the two groups, intervention (15 to 8.9) control (12.9 to 9.9), adjusted difference -1.90, CI [-4.12, 0.32].</p>

<p>Group Well Child Care (GWCC) [32]</p>	<ul style="list-style-type: none"> <li>• RCT: block randomized</li> <li>• Intervention (n=83), control (n=86, standard care)</li> <li>• Assessment: age 4, 5, 6, 8, 10,12, 15 months (Washington, USA)</li> </ul>	<p><u>Child</u> Age: &lt;4 months  <u>Parent</u> (Vulnerable)                  Age: 50-69% 20-30 years                  Gender: 100% female (mothers)                  Race: 35-52% African-American                  Education: 33-46% &gt;high school                  Household Income: 40-47% &lt;\$500/month</p>	<p>.Maternal-child interaction (<i>Nursing Child Assessment Teaching Scale</i>)                  . Environment for cognitive development (<i>Home Observation for Measurement of the Environment</i>)</p>	<p>The prevalence of high-risk maternal-child interactions was 10% in both the GWCC and control groups. A high-risk home environment was found in 16% of control versus 4% GWCC [AOR 4.6, CI [0.78, 26.0].</p>
<p>Group Well Child Care (GWCC) [33]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=111); control (n=109, standard care)</li> <li>• Assessment: baseline, 10-15 months (Washington, USA)</li> </ul>	<p><u>Child</u> Age: 4-15 months  <u>Parent</u> (Vulnerable)                  Age: 55-60% 20-29; 23-25% &lt;20                  Gender: 100% female (mothers)                  Race/ethnicity: 42-44% African American, 28-31% White                  Education: 36-37% &gt;12 years, 27-34% grade 12                  Household Income: 43-46% &lt;\$500/month</p>	<p>.CPS referral (<i>CPS record</i>)                  .Enrollment in substance abuse treatment program (<i>Researcher developed tool</i>)</p>	<p>Slightly greater GWCC intervention had rates for referral to CPS, 8.8% versus 8.3% standard control; this difference was not significant, p=0.85. There was also no difference in mothers' enrollment in substance abuse treatment program, with positive outcome rates 26% (GWCC) and 14% (standard control), p&gt;0.99.</p>
<p>Triple P-Positive Parenting Program [61]</p>	<ul style="list-style-type: none"> <li>• RCT: cluster randomized</li> <li>• Intervention (n=15), control (n=15, wait-list)</li> <li>• Assessment: baseline, post-intervention, 6 months (Brisbane, Australia)</li> </ul>	<p><u>Child</u> Age, mean: 37-43 months [SD=10.3-10.8]                  Gender: 44-64% male  <u>Parent</u> (Requested advice about child behavior development)                  Age (mother, father): 34-35 years [SD=3.9-5.5], 35 years [SD=3.1-6]                  Gender: Mostly mothers                  Education (mother, father): 0-25%, 27-40% not high school grad                  Financial difficulty: 57-69%</p>	<p>.Maternal depression                  .Maternal anxiety (<i>DASS</i>)</p>	<p>Parents in the intervention group had reduced mean depression scores from pre-to posttest (5.83(SD=7.36) to 2.58 (SD=3.68). Parents on waiting list also had reduced mean depression score (5.08(SD=6.83) to 4.75(SD=6.31). However, the changes between groups over time were not statistically significantly different, p=0.08. Intervention parents had reduced mean anxiety scores as well (2.17(SD=3.81) to 0.67(SD=0.98); waitlist parents had slightly reduced mean anxiety score, 2.75(SD=5.58) to 2.08(SD=3.12) and this difference over time between groups was statistically significant, p=0.03.</p>
<p>Child abuse prevention education package [62]</p>	<ul style="list-style-type: none"> <li>• RCT: individually randomized</li> <li>• Intervention (n=30), control (n=30, no intervention)</li> <li>• Assessment: baseline, 6 weeks (North Iran)</li> </ul>	<p><u>Child</u> Age, mean: 5.1-5.2 years [SD=3.3-3.6]  <u>Parent</u> (at risk for abusing child)                  Age, mean: 29 years [SD=6.1-7.1]                  Gender: 100% female                  Education: 60-63% diploma</p>	<p>.Physical aggression toward child                  .Emotional abuse toward child                  .Child abuse (<i>Conflict Tactics Scale for Parent and Child</i>)</p>	<p>Baseline emotional abuse toward child not significantly different between groups, 31.1 [SD=6.6] vs 30.5 [SD=7.3]. Post-intervention score greater for control than intervention 30.1[7] vs. 23.1[7.8], p=0.001, with reduction for intervention. Pre-intervention physical aggression toward child not significantly different between groups, 17.4 [2.6] vs 17.2 [4.9]. Post-intervention scores greater for control vs. intervention, 17[4.9] vs. 13.9[5.8], p=0.03, with reduction for intervention. Overall child abuse score in intervention significantly declined from 30.2 [1.20] pre-intervention to 23.3[1.5] post-intervention, p&lt;0.001; control group did not differ from pre-to post intervention in overall child abuse.</p>
<p>Abbreviations: AOR: Adjusted Odds Ratio; AUD: Australian Dollars; CI: Confidence Interval; CPS: Child Protective Services; K: Thousand; n: Sample Size; p: p-value; RCT: Randomized Controlled Trial; RR: Relative Risk; SD: Standard Deviation; SES: Socioeconomic Status; USA: United States of America; USD: US Dollars</p>				

parenting programs, home visits, and mental health therapy (i.e., interpersonal psychotherapy (IPT), child-parent psychotherapy (CPP)). Programs focused on improving parent mental health and well-being, and child health and development; BHC specifically aims to decrease risk of child maltreatment. Families received care under these models for at least 1 year, up to a maximum of

3 years [46,49,63].

Finally, three interventions were implemented through other modalities. All program participants were identified through primary care settings. The Period of PURPLE Crying intervention (to prevent shaken baby syndrome) was a self-completed parent education program. Depressed mothers were randomized to

**Table 3:** Home visiting programs that have addressed adversity-related outcomes.

Intervention	Goal	Pediatric engagement	Modality	Time	Resources
Colorado Adolescent Maternity Program (CAMP) [51]	.Enhance parental emotional well-being and life course development .Promote optimal parenting behavior maternal competency and nurturing behavior	Programmatic support by pediatrician	.Home visits by nurse, and phone calls .Clinical appointments from treatment team of diverse health care providers in obstetrics, pediatrics, adolescent medicine, social work, nutrition	.1-2 hour weekly home visits and phone calls for 16 postpartum weeks (and reduce thereafter) .Monthly clinical appointments for first 6 months; every other month for 6 months; 3 month intervals until child is 2	.Home visiting lesson plans, instructional handouts, developmentally appropriate games, information about career opportunities .Integrated professional services: extensive counseling, anticipatory guidance, medical, educational, and social service referrals
Home visiting program [57]	Improve child and maternal health and wellbeing	Programmatic support by pediatrician	.Home visits by nurse, with support from pediatrician and social worker	.Weekly home visits for first 6 weeks, fortnightly until 3 months, then monthly until 6 months postpartum	(Article does not specify resources used)
Home visiting program [48]	Improve maternal health and child developmental outcomes	Programmatic support by pediatrician	.Home visits by nurse .Primary health care at multidisciplinary clinic from primary healthcare provider, social worker, and specialty staff	.1 hour biweekly home visits for 18 months postpartum (and 2 visits before birth) .Clinical appointments at 1, 2, 4, 6, 8, 10, 12, 15, 18 months; evaluation visits at 3, 6, 12, 18 months	.Carolina Preschool Curriculum, and Hawaii Early Learning Program curriculum guides for parent-child interaction and intervention information .Handouts and activities about normal child development
Mothers' AdvocateS In the Community (MOSAIC) [52]	.Reduce partner violence through social support, advocacy, mentoring .Improve women's health .Strengthen mother-child bonding	Referral from provider (child health nurse, general practitioner)	.Home visits by non-professional peer mentor who is a mother	.Weekly home visits for up to 12 months	.Training (5-day) for mentors on befriending, domestic violence advocacy, working with depression, parenting support, safety and self-care; ongoing training and support provided
Nurse-Family Partnership (NFP) [36-38]	.Improve pregnancy outcomes by promoting healthy prenatal behaviors .Improve child health and development by promoting parents' competent care .Encourage maternal life course development	Integrated at public system of pediatric care (likely referral based)	.Home visits by nurses	.Home visits during pregnancy, 1 postpartum hospital visit, 1 postpartum home visit and home visits through the child's second birthday; records show mean 7 visits (range 0-18) during pregnancy and 26 visits (range 0-71) completed during first 2 years	.Program protocols based on epidemiology, and theoretical frameworks (human ecology, attachment, self-efficacy)

cognitive behavioral therapy (CBT), either led by a nurse or psychologist, or managed by their provider. Aside from CPP and IPT in BHC, this was the only program to focus on mental health treatment. Lastly, one intervention featured nurse case management for 18 months to support abused mothers through anticipatory guidance, support, and referral [55,56,64]. Programs with models, and other types of programs are further detailed in Table 7.

### Impact of interventions

Intervention program types varied in their effectiveness at achieving adversity-related outcomes. Overall, three of seven studies evaluating home visiting programs and parenting group programs, respectively, were effective at achieving

some relevant outcome. All studies (n=6) evaluating screening models and 6 of 7 studies assessing training programs were successful at accomplishing at least one relevant outcome. Below, intervention impacts are grouped and detailed by type of adversity. Intervention effects were considered favorable if the intervention group saw a statistically significant difference in relevant outcome(s) compared to comparison group(s) at follow-up. This approach provides a conservative measure of understanding successful impact of interventions on adversity and related outcomes.

**Childhood maltreatment:** Thirteen studies evaluated child maltreatment and related outcomes after implementing various types of intervention programs. In general, programs were able



**Table 4:** Screening model programs that have addressed adversity-related outcomes.

Intervention	Goal	Pediatric engagement	Modality	Time	Material
Mothers experiencing domestic violence (MOVE) [47]	.Increase rates of screening, disclosure, safety planning, referrals for domestic violence	Takes place at and with maternal and child health (MCH) primary care provider	.Mother completes MOVE checklist at clinic .Provider reviews results and implements care model as needed	.Screening completed at 3 or 4 months child health visit	.MOVE screening checklist included revised and broader questions about intimate partner violence .Care model includes clinical pathway and guidelines, nurse mentors, domestic violence regional liaisons, (referral, consultation) to services, i.e. home visiting
Positive Parenting [58]	.Identify mental health problems .Promote a healthy parent and child relationship .Reduce violence participation	Takes place at primary care pediatric setting with pediatric provider	.Parent completes PSC-17 at clinic .Providers reviewed positive screens (1+ positive subscale or total score) and refers family to Positive Parenting program or other services .Positive Parenting is telephone-based, delivered by parent educator; includes parent self-study component	.Screening completed at medical visit .Positive Parenting consists of 15-30 minute weekly telephone sessions at parent's convenience	.PSC-17 is 17-item screening tool to identify child psychosocial problems .Positive Parenting, parent training curriculum developed by University of Minnesota, University of Wisconsin Extension Services, emphasizes parent nurturance, discipline, child autonomy .Curriculum focused on 13 lessons from which parents select for training .Parents receive manual and 2 video tapes on role-playing with group discussions
The Safe Environment for Every Kid (SEEK) Model [39, 40]	.Prevent child maltreatment by enhancing pediatric primary care to address key risk factors .Provide resources for parents	Takes place at primary care pediatric setting with pediatric provider	.Parent completes Parent Screening Questionnaire (PSQ) in waiting room .Pediatric resident provider reviews results .Residents and parents choose whether to involve a social worker who provides guidance, referrals to community agencies	.Screening and discussion completed at routine healthcare visit	.Two half day trainings for resident providers and regular booster trainings .PSQ is a 20-item screening tool to identify risk factors for maltreatment .Resources for providers include parent handouts, pocket cards, handbook on local resources
TickiT screening tool [59]	.Prompt discussion about youth violence between providers and youth patients	Takes place at primary care pediatric setting with pediatric provider	.Adolescent completes electronic screening in waiting room .Providers reviews and discusses results and resources with adolescent	.Screening and discussion completed at annual visit; median time to complete 8.4 minutes	.TickiT is an electronic screening tool on adolescent behavioral health; questions on youth violence were added. .Youth violence tool kit with provider and patient education material and referral sources for providers .Handout to train providers how to interpret screening results
WE CARE [50]	.Increase discussion and referrals for family psychosocial problems	Takes place at primary care pediatric setting with pediatric provider	.Parent completes screening at routine visit before seeing provider .Provider reviews results with parent, and provides referral if indicated by parent	.Screening and discussion completed at routine visit; approximate time to complete survey is less than 5 minutes	.WE CARE Survey assesses 10 psychosocial risk factors .Providers receive 20 minute training on intervention material and booster sessions .WE CARE Family Resource Book, consisting of 1-page tear-out sheets with community resources for each psychosocial problem, were placed in exam rooms

to improve outcomes indirectly related to maltreatment rather than prevent maltreatment. For example, VIP consultation and HS model programs saw reduced physical punishment among parents versus comparison groups [44,63]. Parents of teenagers in the PSQ plus Positive Parenting screening program also reported significantly less corporal punishment at follow-up versus standard care; however, youth participants did not [58]. Additionally, parental knowledge and information sharing about infant shaking proved intervention effectiveness through the PURPLE self-study program [64]. Overall, the SEEK screening model and a child abuse educational parenting group were

most effective at specifically addressing child maltreatment. Psychological aggression and emotional abuse were lower for intervention than control groups in two of three studies [39,40,62]. While physical assault and aggression were generally lowered for SEEK participants, there were conflicting results with respect to minor physical assault in two different samples [39,40,62]. With CPS reports as a measure of maltreatment, three of 4 studies found no difference in reports between intervention and comparison groups [33,39,40,46]. Additionally, Olds et al [36-38] found no difference in foster care placement between NFP home visiting intervention and control groups. Unfortunately, findings were unfavorable for high risk groups;

**Table 5:** Consultation and training programs that have addressed adversity-related outcomes.

Intervention	Goal	Pediatric engagement	Modality	Time	Resources
Behavior-Modification Program [60]	.Manage infant sleep problems .Reduce maternal depression	Takes place at pediatric primary care setting with pediatric provider	.One-one one structured consultation and discussion with well-child nurse	.Routine well child visit at 8 months old .Ongoing consultations as needed	Training for nurses on didactic teaching, role-play, problem solving, instruction of 2 intervention strategies (graduated extinction, adult fading) .Structured consultation sheet to assess sleep problems and develop individualized sleep management plan .Handouts on normal sleep patterns, managing problem overnight feeding and pacifiers
Motivating Our Mothers (MOM) [54]	.Motivate mothers to seek further depression assessment and possible care	Takes place at pediatric primary care setting	.One-on-one structured verbal motivational interaction at visit with research assistant .Semi-structured telephone interaction as a motivational "booster" by research assistant	.Routine well child visit .Screening and 5-minute discussion .Follow up call consists of 15-minute interaction after 2 days	.Pamphlet and structured verbal motivational interactions focused on destigmatizing depression through alternative terminology and highlighting prevalence, relating depression to maintaining child health, parenting resources and mental health resources
Triple P-Positive Parenting Program [61]	.Reduce family risk factors associated with poor child behavior .Prevent child behavioral, emotional, and developmental problems .Enhance parent knowledge, skills, confidence	Takes place at pediatric primary care setting with pediatric provider	.Individual family consultation in pediatric setting by child health nurse	.Three or four weekly 30-minute consultations .3-4 week break before fourth session, if needed	.Primary Care Triple P Protocol .Providers attended training and met accreditation requirements .Parent resources material included 26 parenting tip sheets and 3 video resources on child developmental and behavioral problems, a consultation flip chart as visual aid to demonstrate steps for strategies .Structured sessions included development of goals, parenting plan, and personal coping plan
Video Interaction Project (VIP) [43, 44, 45]	.Decrease parental stress and depressive symptom .Promote positive parenting and reduce rates of physical punishment	Takes place at pediatric primary care setting	.One-on-one sessions with parent-child dyad by child development specialist .At home practice for parents	.Between 11-15 sessions for 25-45 minutes from birth-2 or 3 years at primary care visits	.5-10 minute video-recording of parent-child interaction (playing or reading) .Personalized pamphlet with mother's observations about child and goals for interacting with child
Preventive Intervention Project [53]	.Increase parental knowledge about depression; encourage family members to share experiences .Remove blame, confusion about mood disorders	.Takes place at children's hospital .Program designed for use in pediatric office	.One-on-one meetings with parents and children (separately), family meetings and telephone calls with psychologists, social workers, and nurses,	.6-11 sessions with refresher sessions every 6-9 months	.Providers were trained through simulation technique, attended supervision and case review meetings weekly .Psychoeducational materials on mood disorders, risk, and resilience .Material related to family's personal experiences

drug-abusing mothers were at similar risk of child abuse potential in home visiting intervention and comparison groups [48]. Additionally, despite lower incidence of child neglect among adolescent mothers in the CAMP home visiting intervention group as compared to standard care, there was no difference in child abuse and child abandonment [51].

**Parental mental health, substance abuse, and criminal involvement:** Household factors such as parental mental health, substance abuse and incarceration were also evaluated, especially parent mental health which was assessed in 20 studies. Outcomes related to mental health were more promising than

the reduction of parental mental health outcomes. Beardslee et al. [53], found an increase in children's understanding of parent mental illness when families received clinician-facilitated versus lecture format consultation; increased understanding was associated with improvement in child behavior although there was no intervention impact on child internalizing symptoms. Among depressed mothers receiving the specialized MOM versus standard consultation for depressive symptoms, a greater proportion sought provider-referred resources at follow-up [54]. Johnston and colleagues [63] however found no difference in mother-initiated discussion of sadness with a pediatric provider through the HS model. When attempting to reduce the prevalence

**Table 6:** Parenting groups that have addressed adversity-related outcomes.

Intervention	Goal	Pediatric engagement	Modality	Time	Material
Educational package on child abuse prevention [62]	.Promote competent care and reduce child abuse through parent skill-building	.Enrollment at pediatric setting (routine child health visit) .Intervention led by pediatric nurse	.Lecture-style parent group format with sessions led by pediatric nurse .Question and answer segment included	.2-hour sessions, twice a week, for 4 weeks .16 total hours	.Presentations utilized an educational package with specific weekly topic .Session topics included: nurturance, child care and management, parent-child relationship, child physical and development needs, discipline, and problem solving
Group Well Child Care (GWCC) [32, 33]	.Facilitate parental education and competence on child-rearing, and increase social support	Takes place at pediatric primary care with pediatric provider	.Interactive parent group format with sessions led by nurse practitioner .Provider observed parent-child interactions and provided appropriate role-modeling and advice	.30-60 minute visits when child 4, 5, 6, 8, 10, 12, and 15 months old .Approximately 3.5-7 total hours	.GWCC curriculum included topics to be covered at each visit .Topics included general parenting, nutrition, development, anticipatory guidance
Toddlers Without Tears [41, 42]	Prevent child behavior problems and promote positive behavioral development	Takes place at primary care pediatric setting with pediatric provider	.Parent group format with sessions led by well-child provider and parenting expert .One session consisted of 1:1 discussion with well child provider at clinic	.2 hour sessions when child was 12, 15 months (parenting groups) at various times .15 minute discussion when child was 8 months (one-on-one) .Approximately 4.25 hours	.Program was highly structured with scripted manual, and parent handouts .8 month visit included 4 handouts for parents on normal child behavior .12 month group session focused on developing positive relationship, and child behavior .15 month group session focused on discipline strategies
Incredible Years programme [34, 35]	.Improve mental health of children and their parents .Support parents in addressing child behavior and discipline	.Enrollment at pediatric setting (children's general practices); some sessions took place at health center	.Interactive, parent group format with sessions led by health visitor and nurse .At-home practice for parents to complete homework and report back progress	.2 hour weekly for 10 weeks at different times .20 total hours	.Training for providers by Family Nurturing Network .Sessions focused on experiential learning and video vignettes, including role play, and rehearsal .Topics including parent-child interaction, behavior, discipline

**Table 7:** Models of care and other programs that have addressed adversity-related outcomes.

Intervention	Goal	Pediatric engagement	Modality	Time	Material
Building Healthy Children (BHC) [46]	Address mental health, domestic violence and relationship challenges and decrease risk of child maltreatment	(Partially) takes place at pediatric setting	.Families received highly integrated model of services based on needs assessment screening. .Services include assigned outreach worker, social worker, home visits, programs including Parents as Teachers (PAT), Child-Parent Psychotherapy (CPP), Interpersonal Psychotherapy (IPT)	.CPP for 12 months .IPP for 12 weeks .PAT twice a month .Weekly home visits until child turns 3 or family goals achieved	.Needs assessment .Manuals and guides for services including PAT .Individualized service plan for families
Healthy Steps for Young Children (HS) [63]	Improve parenting practices, parent well-being, and child health and development	(Partially) takes place at pediatric setting	.Families received a model of services from a Healthy Steps Specialist (HSS): home visits, support over phone, developmental assessments, developmental assessments, risk-based services, parenting classes, a literacy program	.3 home visits at 20, 27, & 34 weeks (prenatal period) .6 well-child pediatric visits (2, 4, 6, 10, 15, 24 months)	.HSS received training and education in early childhood development topics .Other material included: Assessments, screening tools, Reach Out and Read literacy program

Program of Resources, Information and Support for Mothers (PRISM) [49]	Reduce maternal depression and isolation, improve physical health, and promote local support for mothers	Takes place at pediatric setting with pediatric provider	.Mothers received a model of care, including referrals, from primary care providers serving children and mothers (child and maternal health nurses and general practitioners)	.Model implemented for 2 years	.Communication skills training for providers .Information resources and local support opportunities
Cognitive-behavioral therapy (CBT) [55]	Evaluate effectiveness of model care pathways in mothers screening high for depression	(Partially) takes place at pediatric setting	Mothers screening positive for depression received post-natal depression (PND) management from their general practitioner (GP); some mothers received adjunct CBT by a maternal and child health nurse or psychologist	.6 weekly sessions for 6 weeks (CBT) .Ongoing management with GP	.GP training (45-60 minutes) with psychologist and manual including PND Management Guide, and psychiatrist consultation as needed .Nurses received CBT for PND training (half-day) and The Overcoming Postnatal Depression manual (also for psychologist)
The Period of PURPLE Crying (PURPLE) [64]	Prevent shaken baby syndrome (SBS) by educating caregivers	(Partially) enrolled at pediatric settings	.Parents received materials a home visit or at clinic after completion of pediatric visit; intervention is entirely self-study	.12 minutes to watch video .Additional time to review booklet	.11-page booklet and DVD by National Center on Shaken Infant Syndrome .Diary instructions and sample page . Materials reinforce normality of crying, teaches 3 action-step technique, and sharing information with other caregivers
Nurse case management [56]	.Reduce severity and frequency of abuse of mothers and improve child behavior	Takes place at pediatric setting	.Nurse case management which included supportive care, anticipatory guidance, guided referrals for needs	.20 minute sessions at 6, 12, 18, 24 months .Brochure overview took 20 minutes	.March of Dimes protocol .Brochure with a 15-item safety plan

of parent depression, five of 17 studies found significant improvements in depression scores among intervention groups versus control; these programs consisted of two consultation programs (behavioral intervention and VIP), PSQ and Positive Parenting screening model, a home visiting program, and IY parenting group [34-38,41-43,45,49,52,55,57,58,60,61,63]. Within an evaluation of VIP, the number of intervention sessions attended was associated with reduced maternal depressive symptoms ([44]). Anxiety was studied less often (n=6 studies) than depression [34,35,41-43,55,61]. Only one study, utilizing Triple P, through consultation and training, showed a significant reduction in anxiety for parents in the intervention versus the waitlist group [34,35,41-43,61].

Maternal substance abuse and criminal outcomes were explored in seven studies. In the NFP home visiting intervention, there was no difference between intervention and comparison groups on maternal substance use across the three time points; however, a greater proportion of NFP mothers reported significantly less role impairment due to substance use at the 12 year follow-up [36-38]. Additionally, although there was no significant intervention effect on outcomes such as appointment compliance, emotional and verbal responsivity, stress levels, and child cognitive or motor skills over time, a greater number of home visits was associated with greater likelihood of mothers being drug-free and having appointment compliance [48]. When directly targeting these adversities, programs, including HS model, and GWCC parenting group found no difference in maternal drug use and or enrollment in substance abuse program [33,48,63]. Additionally, the 9- and 12-year follow-up studies of the NFP assessed maternal arrest and incarceration and found no significant differences between intervention and comparison group [37,38].

**Domestic violence:** Seven studies assessed outcomes that were related to domestic violence (DV). One-third of intervention programs reduced mother-reported domestic violence for intervention versus comparison group, specifically through the MOSAIC home visiting program, whereas NFP and HS were less effective [36-38,52,63]. Evaluation of the MOVE modified domestic screening protocol in Australian maternal and child health settings demonstrated greater rates of DV disclosure and relationship problems than standard control. There were no differences in other factors such as prevalence of being asked about DV, preference for sharing with provider, or feelings of discomfort about being asked [47]. Additionally, McFarlane and colleagues [56] assessed outcomes in children of physically and sexually abused mothers and found that child behavioral outcomes improved from baseline, regardless of whether nurse case management or standard abuse assessment was utilized; outcomes were most favorable for young versus teenage youth.

**Youth violence and other outcomes:** Intervention studies assessed youth violence-related outcomes in older youth and utilized screening models; overall, these were effective in achieving favorable outcomes. Youth who participated in screening followed by the Positive Parenting program (as needed) reported lower prevalence of bullying victimization at follow-up compared to those in the control condition, although there was no significant differences in bullying, physical fighting, or attitude toward violence; interestingly, findings from parents' reports were conflicting from their children's reports [58]. Additionally, Riese and colleagues [59] implemented the electronic TickiT screening tool modified with youth violence questions and youth reported more discussions with their provider about youth violence, however there was no difference in reported helpfulness, when compared to youth receiving



standard screening. Finally, Garg et al. [50] evaluated feedback following administration of the WE CARE psychosocial screening tool in comparison to standard care. Intervention parents reported greater numbers of discussion of psychosocial topics, had fewer unmet discussion needs, received more referrals, reported greater recollection of referrals, and more reported follow-up with referred resources [50].

## DISCUSSION AND CONCLUSION

Pediatric providers have addressed multiple childhood adversities through various types of programs and with various levels of engagement. The vast majority of RCT studies attempted to prevent or reduce the adversity itself and were somewhat ineffective. While many samples consisted of high risk groups, few studies focused exclusively on adversity-exposed youth. These studies addressed outcomes such as child mental and behavioral health and were overall effective at achieving outcomes. Additionally, although long-term impacts on maltreatment are unknown, several programs saw favorable results in addressing related concepts such as corporal punishment, infant shaking, and response to adversity-related screening. Unfortunately, studies did not apply a framework that is cognizant of the accumulation of multiple early life stressors, nor did studies target biological health impacts of adversity, despite a considerable amount of relevant research that demonstrates poor health outcomes for exposed youth, as well as the role of adversity in treatment implications [9,65-68].

Despite challenges in addressing child adversities, a few strategies can be highlighted and adopted for pediatric practice based on the evidence. Interventions that utilized screening models, including screening for psychosocial problems, youth and domestic violence, and parental depression, were overall successful in increasing discussion, disclosure and referral, pointing to screening models as a promising area for pediatric intervention exploration. Other studies confirm that patients are receptive to discussing sensitive topics with their providers [26,69]. Furthermore, consultation or training programs, often one-on-one and led by specialists in the clinical setting, seemed to be more effective than parenting group or home visiting programs. Programs that specifically targeted the issue of child maltreatment in program framework, such as the SEEK model, seemed to be more effective than programs targeting general parenting and child development topics [39,40,62]. These programmatic elements should be considered for the development of future programs attempting to address child adversity in pediatric settings. Of equal importance is the need for evaluation and documentation of clinical processes to understand how best to incorporate adversity-focused programs in the pediatric primary care context, and how such programs can be sustainable and cost-effective.

This review also calls for response to important questions for future research. Most child adversity outcomes did not improve in some well-regarded interventions such as the NFP, perhaps pointing to the need for a more tailored approach to addressing this problem [36-38,61]. In the case of CPP, a promising mental health therapy that has improved outcomes of maltreated youth, the service as part of the larger BCH model did not see differences in incidence of child maltreatment versus standard

control, perhaps pointing challenges of preventing adversity, as well as the need for a more focused analysis of CPP effectiveness in this model [46,70,71]. Dosage of intervention programming is also important to explore. In some programs, including VIP and home visiting [44,48], greater engagement rendered improved outcomes for families. However, Milgrom and colleagues [55] found that CBT, an effective mental health treatment, was equally effective in improving maternal mental health, whether managed by a physician (usual care), or led by a nurse or psychologist (who provided six CBT sessions) [55,70,72]. These considerations warrant further attention in order to support the development of best practices.

Several service gaps in the intervention sciences must also be noted. Researchers and practitioners should expand and specialize adversity-related programs for adolescent groups. Adolescent-reported experiences, as revealed by Borowsky and colleagues [58], can differ from parent reports. Furthermore, older youth may be more receptive to intervention components which in turn can improve their outcomes [53]. Next, as identified by Flynn [30], the role of the paternal caregiver in interventions is clearly lacking; fathers play a key role in the child's safety and well-being in and out of the home environment and should be included in intervention efforts. Research demonstrates that childhood adversities may be common in rural settings with added stigmatization of disclosure along with limited resources, [73], therefore specialized approaches must be considered for rural populations.

Despite several lessons, this review has some limitations. It is possible that relevant studies did not include keywords in abstracts and are therefore not included. To remedy this, we explored several review articles as well as reference lists to identify sources referenced by others. Additionally, the pediatric primary care setting can be identified through alternate terminology. For example, Australian-based studies took place at maternal and child health centers which are community based centers that provide primary care services for women and their children through age six [52]. Next, we excluded non-English language studies and did not assess for publication bias, which may have resulted in a less comprehensive understanding of the impacts of pediatric-engaged interventions on childhood adversity. Furthermore, this review focuses on those studies that utilized a randomized controlled trial study design. An RCT approach reduces the risk of bias and is considered a gold standard in evaluation research, however, by including only randomized studies, many promising interventions may have been excluded. The set of studies in this review may also be limited, particularly through self-report bias of parent reports of topics that are highly sensitive and personal to disclose. Additionally, almost half of the studies evaluated outcomes in one year or less. This facet points to a need to understand sustainability of intervention effects. While lessons and recommendations are grounded in evidence, providers should consider limitations of generalizability of intervention programs due to study design, and differences in study settings and samples before replication.

Addressing childhood adversity is a complex task that requires substantial investment and ongoing investigation. Considering the high prevalence of child adversity and challenges

in preventing it, providers must do more to serve already exposed youth in a holistic manner by addressing mental, behavioral as well as physical health outcomes. Stakeholders should work toward effective models for screening, parent trainings, and programs that utilize an adversity-focused framework. In tandem, researchers should work toward addressing a number of gaps as described earlier. While childhood adversity as a point of intervention among pediatric providers is still in its early stages, a continuous and deliberate revisiting of and contribution to the evidence can support pediatric providers to in making marked progress to improve the well-being of children.

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