JAMA | US Preventive Services Task Force | EVIDENCE REPORT

Primary Care Interventions to Prevent Child Maltreatment
Updated Evidence Report and Systematic Review for the US Preventive Services Task Force

Meera Viswanathan, PhD; Jenifer Goldman Fraser, PhD, MPH; Huiling Pan, BA; Marcia Morgenlander, MD, MPH; Joni L. McKeeman, PhD; Valerie L. Forman-Hoffman, PhD, MPH; Laura C. Hart, MD, MPH; Adam J. Zolotor, MD, DrPH; Kathleen N. Lohr, PhD; Sheila Patel, BSPH; Daniel E. Jonas, MD, MPH

IMPORTANCE Child maltreatment, also referred to as child abuse and neglect, can result in lifelong negative consequences.

OBJECTIVE To update the evidence on interventions provided in or referable from primary care to prevent child maltreatment for the US Preventive Services Task Force.

DATA SOURCES PubMed, Cochrane Library, EMBASE, and trial registries through December 18, 2017; references; experts; literature surveillance through July 17, 2018.

STUDY SELECTION English-language fair- and good-quality randomized clinical trials that (1) included children with no known exposure to maltreatment and no signs or symptoms of current or past maltreatment, (2) evaluated interventions feasible in a primary care setting or that could result from a referral from primary care, and (3) reported abuse or neglect outcomes or proxies for abuse or neglect (eg, injury with a specificity for abuse, visits to the emergency department, hospitalization).

DATA EXTRACTION AND SYNTHESIS Two reviewers independently assessed titles/abstracts, full-text articles, and study quality; a third resolved conflicts when needed. When at least 3 similar trials were available, random-effects meta-analyses were conducted.

MAIN OUTCOMES AND MEASURES Direct measures (including reports to child protective services and removal of the child from the home) or proxy measures of abuse or neglect; behavioral, emotional, mental, or physical well-being; and harms.

RESULTS Twenty-two trials (33 publications) were included (N = 11 132). No significant association was found between interventions and reports to child protective services within 1 year of intervention completion (10.6% vs 11.9%; pooled odds ratio [OR], 0.94 [95% CI, 0.72-1.23]; 10 trials [n = 2444]) or removal of the child from the home within 1 to 3 years of follow-up (3.5% vs 3.7%; pooled OR, 1.09 [95% CI, 0.16-7.28]; 4 trials [n = 609]). No statistically significant associations were observed between interventions and outcomes for emergency department visits in the short term (<2 years), hospitalizations, child development, school performance, and prevention of death. Nonsignificant results from single trials led to a conclusion of insufficient evidence for injuries, failure to thrive, failure to immunize, school attendance, and other measures of abuse or neglect. Inconsistent results led to a conclusion of insufficient evidence for long-term (≥2 years) outcomes for reports to child protective services (ORs range from 0.48 to 1.13; 3 trials [n = 1690]), emergency department visits (1 of 2 trials reported significant differences) and internalizing and externalizing behavior symptoms (3 of 6 trials reported reductions in behavior difficulties). No eligible trials on harms of interventions were identified.

CONCLUSIONS AND RELEVANCE Interventions provided in or referable from primary care did not consistently prevent child maltreatment. No evidence on harms is available.

JAMA. 2018;320(20):2129-2140. doi:10.1001/jama.2018.17647

Editorial page 2085

Related article page 2122 and JAMA Patient Page page 2160

Supplemental content

Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author: Meera Viswanathan, PhD, RTI International, 3040 E Cornwallis Rd, Research Triangle Park, NC 27709 (viswanathan@rti.org).

© 2018 American Medical Association. All rights reserved.

Child abuse and neglect, also referred to as child maltreatment—words or actions that cause or fail to protect children from harm, potential harm, or the threat of harm[1]—is associated with negative physical and emotional health outcomes that persist and can lead to serious disorders throughout the life course.[2-6] Injuries may include brain injuries, blindness, and fractures[7] and can lead to disability or death.[8] The goal of interventions to prevent child maltreatment is to reduce or eliminate exposure to abuse and neglect, improve well-being, and reduce mortality.

This review was conducted to inform the US Preventive Services Task Force (USPSTF) in its update of the 2013 recommendation on interventions relevant to US primary care to prevent child maltreatment.[9] In 2013, the USPSTF concluded that the evidence[10] was insufficient (I statement) to assess the balance of benefits and harms.

Methods

Scope of the Review

The analytic framework and key questions (KQs) that guided the review are shown in **Figure 1**. Detailed methods, evidence tables, sensitivity analyses, and contextual information are available in the full evidence report at http://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/child-maltreatment-primary-care-interventions1.

Data Sources and Searches

PubMed, the Cochrane Library, and EMBASE were searched for English-language articles published from November 1, 2011, through December 18, 2017. ClinicalTrials.gov, Cochrane Clinical Trials Registry, and the World Health Organization International Clinical Trials Registry Platform were also searched. To supplement systematic electronic searches (eMethods 1 in the Supplement), reference lists of pertinent articles and studies suggested by reviewers were reviewed. Since December 18, 2017, ongoing surveillance was conducted through article alerts and targeted searches of journals to identify major studies published in the interim that may affect the conclusions or understanding of the evidence and the related USPSTF recommendation. The last surveillance was conducted on July 17, 2018, and identified no eligible studies.

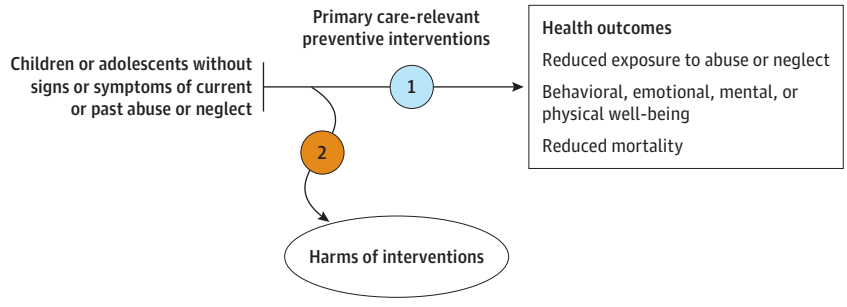
Study Selection

Two investigators independently reviewed titles, abstracts, and full-text articles using prespecified inclusion criteria for each KQ (eTable 1 in the Supplement); disagreements about inclusion were resolved by discussion.

To be eligible, study samples had to have a majority of children (>50%) without known exposure to maltreatment and no signs or symptoms of current or past maltreatment. Studies of symptomatic children undergoing diagnostic evaluation for conditions related to abuse or neglect or asymptomatic children with known exposure to child maltreatment were excluded. All interventions that were feasible in a primary care setting or for which a primary care clinician could give a referral were eligible, with the exception of community-wide programs. Eligible comparators included usual care, delayed interventions, and active interventions that allow for assessment of the independent contribution of the primary care–feasible or primary care–referable preventive intervention.

Studies needed to report at least 1 direct or proxy measure of abuse or neglect to be eligible. Direct measures included those reflecting physical, sexual, or emotional abuse perpetrated by a parent or caregiver; physical (eg, failure to thrive), emotional, dental or medical (eg, lack of immunizations or well-child visits), or educational neglect; reports to Child Protective Services (CPS); and removal of the child from the home. Proxy measures included injuries (eg, fractures, bruises, burns, nonaccidental injuries [injuries with a high specificity for abuse,[12] regardless of whether the injury was intentional]), visits to the emergency department, and hospitalizations. Parent-reported measures of abuse or neglect were summarized in response to

Figure 1. Analytic Framework: Primary Care Interventions to Prevent Child Maltreatment



Key questions

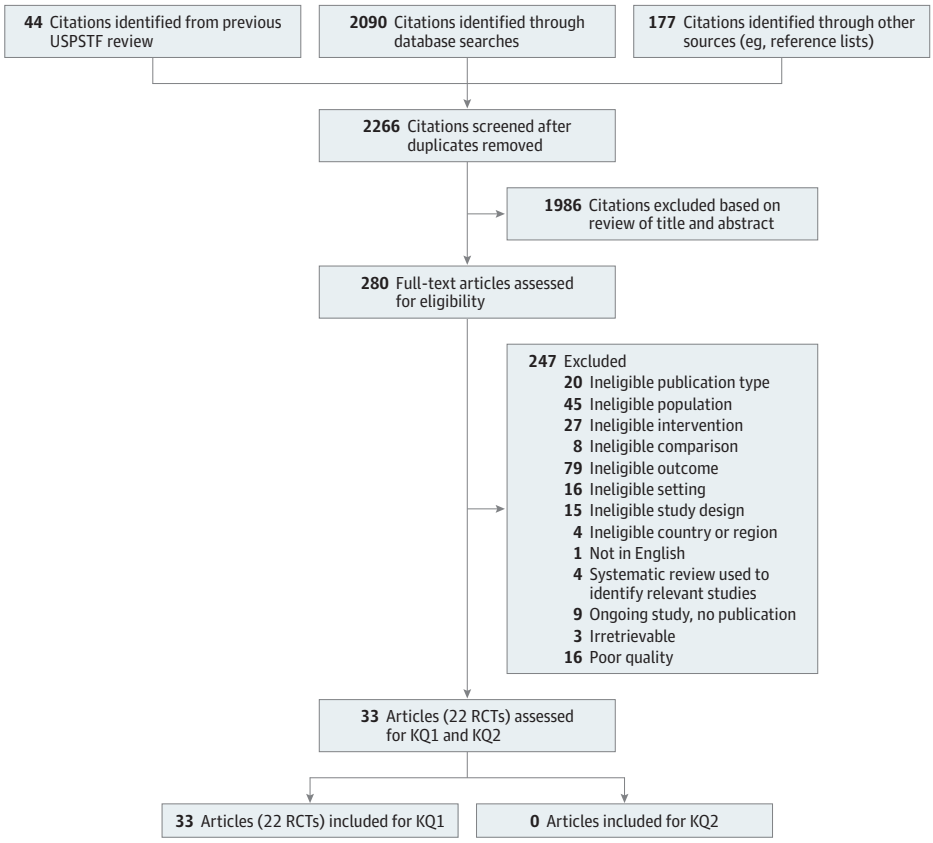
1 Do primary care-feasible or -referable interventions to prevent child maltreatment reduce exposure to abuse or neglect; improve behavioral, emotional, physical, or mental well-being; or reduce mortality among children and adolescents without obvious signs or symptoms of abuse or neglect?

2 What are the harms of primary care-feasible or -referable interventions to prevent child maltreatment?

Evidence reviews for the US Preventive Services Task Force (USPSTF) use an analytic framework to visually display the key questions that the review will address to allow the USPSTF to evaluate the effectiveness and safety of a preventive service. The questions are depicted by linkages that relate interventions and outcomes. Refer to the USPSTF Procedure Manual for further details.[11] KQ indicates key question.

© 2018 American Medical Association. All rights reserved.

Figure 2. Summary of Evidence Search and Selection



KQ indicates key question; RCT, randomized clinical trial; USPSTF, US Preventive Services Task Force.

a contextual question (eResults 2 in the Supplement). For studies that reported direct or proxy measures of abuse or neglect (other than self-report), behavioral, emotional, mental, or physical well-being outcomes were also assessed.

Randomized clinical trials (RCTs) and systematic reviews were eligible for all KQs; observational study designs were also eligible for harms of screening (KQ2). Only studies that had been published in English and conducted in the 49 countries categorized as very highly developed by the 2015 Human Development Index were included.[13]

Data Extraction and Quality Assessment

For each included study, 1 investigator extracted information about design, population, intervention, and outcomes, and a second investigator reviewed the information for completeness and accuracy. Two independent investigators assessed the quality of each study as good, fair, or poor, using predefined criteria developed by the USPSTF (eMethods 2 in the Supplement)[14] and others[15] for assessing the risk of bias of trials. Individual study quality ratings are reported in eTables 2 through 6 in the Supplement.

Data Synthesis and Analysis

Findings were qualitatively synthesized for each KQ in tabular and narrative formats. Studies were included in the main analysis if they met all study selection criteria and were fair or good quality; this included studies from the prior review that informed the USPSTF 2013 recommendation that continued to meet the study selection criteria for this update.[16] Qualitative and quantitative sensitivity analyses were conducted by adding poor-quality studies. When at least 3 independent and similar RCTs were available, random-effects models using the inverse-variance–weighted method of DerSimonian and Laird was used to estimate pooled effects for pooled odds ratios (ORs). Statistical heterogeneity was assessed using the I^2 statistic.[15] All quantitative analyses were conducted using Comprehensive Meta Analysis (Version 3.3) software.[17]

All testing was 2-sided and assumed statistical significance if the 95% confidence intervals of pooled estimates did not cross the null value. The strength of evidence for each outcome was assessed as high, moderate, low, or insufficient using methods developed for the USPSTF (and the Evidence-based Practice Center program), based on the quality of studies, consistency of results between studies, precision of findings, and risk of reporting bias for each intervention comparison and major outcome of interest.[14,18]

Results

Twenty-two RCTs (N = 11 132) of good or fair quality, from 33 publications, were included (**Figure 2**). **Table 1** summarizes study characteristics, and eTables 7 through 11 in the Supplement provide

© 2018 American Medical Association. All rights reserved.

Table 1. Characteristics of Studies of Interventions to Prevent Child Maltreatment

Characteristics and Subcharacteristics	No. of Studies (%) (N = 22)
Study Quality	
Good	4 (18)
Fair	18 (82)
Population Characteristics	
Timing of enrollment	
Enrolled in prenatal period or immediately after birth	13 (59)
Mixed enrollment	1 (5)
Enrolled after the perinatal period	8 (36)
Maltreatment reported at baseline	
Yes	6 (27)
No	16 (73)
Risk status	
Parent identified to be at risk	12 (55)
Child identified to be at risk because of birth status (premature or low birth weight)	2 (9)
Participants not specifically identified to be at risk	7 (32)
Age of mothers	
Most or all younger than 20 y	7 (32)
≥20 y on average	15 (68)
Intervention Characteristics	
Home visit component	
Yes	21 (95)
No	1 (5)
Clinical personnel involved in care	
Yes	17 (77)
No	5 (23)
Usual-Care Comparator	
Yes	19 (86)
No	3 (14)
Geographic Setting	
United States of America	16 (73)
United Kingdom	3 (14)
Canada	1 (5)
Australia	1 (5)
New Zealand	1 (5)

details. The evidence base spans more than 3 decades; the earliest included study recruited participants in 1976[19] and the most recent through 2010.[20] Twenty-one of 22 trials (95%) had a home visiting component; some trials present results from attempting a similar model of home visiting interventions in different settings (eg, the Healthy Families intervention in Alaska[21,22] and New York[23,24]; replications[20,25] of the Nurse Family Partnership[26-32]). Fifteen trials (68%) recruited mothers younger than 20 years, on average. Nineteen trials (86%) included a usual-care comparator. Sixteen trials (73%) were conducted in the United States. In other respects, however, the evidence base is heterogenous in study populations (time of enrollment, age of infant, experience of maltreatment) and interventions (number, intensity, and duration of components; use of clinical personnel).

Regarding enrolled populations, 13 trials enrolled mothers before or immediately after birth; the mean age of children in the 9 other trials ranged from younger than 6 months to 8 years. One study enrolled fathers. Six trials (27%) reported on whether participants had experienced maltreatment at baseline; other trials either did not specify or enrolled women during pregnancy.

Twelve trials (55%) identified participants or children to be at risk. Risk factors varied across studies and included infant health status or child emotional or behavioral concerns, maternal depression or other mental health problems, presence or history of intimate partner violence, parental substance abuse history, and demographic and socioeconomic characteristics of the mother or family (eg, adolescent parent, poverty, marital status).

Regarding interventions, only 1 trial[33] did not feature home visits. It focused on behavioral therapy for male patients entering outpatient alcohol treatment who had legal guardianship of at least 1 child aged 8 to 12 years. For the trials with home visit components, the content, use of other components, personnel, intensity, and duration varied. Although the specific intervention goals of the home visiting program varied by trial, trials described the following activities: assessing family needs; developing a relationship between the home visitor and the client; providing information, referral, and parenting education; promoting child health, safety, and development; providing clinical care; enhancing family functioning and supporting positive child-parent interactions; building supportive social networks; and creating family plans to support parental life course development and self-sufficiency. Five trials reported home visit services without a clinical component or personnel.[21-24,34-37] Sixteen trials provided home visits in the context of clinical support, which included nurses or mental health professionals supervising home visitors, serving as home visitors, or providing comprehensive pediatric service as an intervention component.[19,20,25-28,38-50]

Of the 21 home visit trials, 8 had nurses as home visitors,[20,25-28,39,41,42,45,46,49] 1 had mental health clinicians as home visitors,[47] 6 had paraprofessional home visitors,[19,21-24,36,38,40] 3 included home visitors with early childhood expertise,[43,45-47] 3 included social workers,[25,41,42,45,46] and 1 had peer home visitors.[48] The remaining trials did not specify the training of the home visitors.[34,35,37,44,50,51]

The duration of the intervention ranged from 3 months[19,33] to 3 years.[41,42,45,46] The planned number of home visits, when reported, ranged from 5 sessions[49] to 41 sessions.[34,35]

Benefits of Interventions

Key Question 1. Do primary care–feasible or primary care–referable interventions to prevent child maltreatment reduce exposure to abuse or neglect; improve behavioral, emotional, physical, or mental well-being; or reduce mortality among children and adolescents without obvious signs or symptoms of abuse or neglect?

Direct or Proxy Measures of Abuse or Neglect

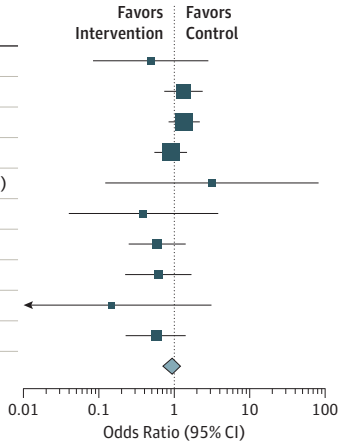
Reports to Child Protective Services | Thirteen trials (14 publications)[19,21,23,25,28,33,34,36,37,39,41,42,44,47] reported on reports to CPS, and 1 trial[20] reported on safeguarding actions (eTable 12 and eTable 13 in the Supplement). All eligible trials reported their first results during the intervention (1 year from baseline), at the end

© 2018 American Medical Association. All rights reserved.

Figure 3. Pooled Results: Reports to Child Protective Services and Removal of the Child From the Home

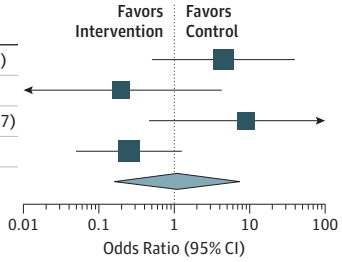
A Reports to Child Protective Services

Source	Comparison	Follow-up	No. of Reports/ Total No. of Children: Intervention	Control	Odds Ratio (95% CI)
Brooten et al,[39] 1986	Home visits	18 mo	2/39	4/40	0.49 (0.08-2.82)
Duggan et al,[21] 2007	Home visits	1 y	30/151	25/158	1.31 (0.73-2.35)
DuMont et al,[23] 2008	Home visits	1 y	41/524	32/536	1.35 (0.84-2.17)
Fergusson et al,[41] 2005	Home visits	3 y	36/184	44/207	0.90 (0.55-1.47)
Finello et al,[44] 1998	Home health	6 mo	1/20	0/20	3.15 (0.12-82.16)
Lam et al,[33] 2009	Combined	12 mo	3/20	3/10	0.39 (0.04-3.77)
Lowell et al,[47] 2011	Home visits	2 y	NA	NA	0.59 (0.25-1.39)
Olds et al,[28] 1986	Combined	2 y	12/181	16/161	0.61 (0.22-1.65)
Sadler et al,[25] 2013	Home visits	2 y	0/44	2/34	0.15 (0.01-3.15)
Silovsky et al,[37] 2011	Home visits	2 y	10/48	18/57	0.57 (0.23-1.39)
Pooled estimate Random-effects meta-analysis: I^2 = 6.3%; P = .64			135/1211	144/1223	0.94 (0.72-1.23)



B Removal of child from home

Source	Time Point, mo	No. of Children Removed/ Total No. of Children: Intervention	Control	Odds Ratio (95% CI)
Brayden et al,[38] 1993	36	5/141	1/122	4.45 (0.51-38.61)
Brooten et al,[39] 1986	12	0/39	2/40	0.19 (0.01-4.19)
McIntosh et al,[35] 2009	12	4/68	0/63	8.86 (0.47-167.97)
Quinlivan et al,[49] 2003	12	2/65	8/71	0.25 (0.05-1.22)
Pooled estimate Random-effects meta-analysis: I^2 = 61.8%; P = .93		11/313	11/296	1.09 (0.16-7.28)



The size of the boxes indicates the relative contribution of each study to the pooled estimate; error bars, 95% CIs for each study's estimate of effect; centers of diamonds, pooled estimates; width of diamonds, 95% CIs for pooled estimates. A, For studies with multiple groups, the pooled estimates average the treatment effect from active groups and are reported as "combined."

Finello et al reported results from a combination of home health and home visits, home health alone, and home visits alone. Because that trial reported cases only for the home health group, the pooled analysis includes the home health group only. Lowell et al did not report number of events per group; the total N analyzed for both groups is 117. NA indicates not available.

of the intervention, or within 1 year of completion of the intervention. Four trials reported outcomes at 1 or more time points after the first analysis of results. The timing of these reports varied: within 6 months of the initial results,[44] 1 year[23,47] to 2 years[47] after the initial results, or over the longer term (6 years after the initial results,[23] when the child was 7 years of age[24]; 13 years after the initial results, when the child was 15 years of age[30-32]). The pooled OR from 10 trials, all having reported results within 1 year of completion, suggested association between the intervention and reports to CPS (OR, 0.94 [95% CI, 0.72-1.23]; I^2 = 6.3%) (**Figure 3**). Trials reporting additional results within 6 months[44] or 1 year[23,47] of the original results also reported no statistically significant differences between the groups.

Trials measuring outcomes for later time points provided mixed results.[24,30-32,47] No patterns emerged regarding features of the intervention or characteristics of the study sample across the trials showing benefit.

Removal of Child from Home | Five trials[34,35,38,39,48,49] reported on outcomes related to removal of the child from the home. Four of 5 trials contributed to a pooled analysis of removal of the child from the home across time points ranging from 12 months to 3 years after baseline (eTable 14 in the Supplement).[34,35,38,39,49] The results show no statistically significant associations between study groups and the outcome (3.5% [11/313] vs 3.7% [11/296]; pooled OR, 1.09 [95% CI, 0.16-7.28]; I^2 = 61.8%; 4 trials [n = 609]) (Figure 3).

Other Measures of Abuse or Neglect | Two RCTs[38,40] reported on study-specific measures of abuse (eTable 15 and eTable 16 in the Supplement). These measures included physical abuse,[38] neglect,[38] and results from the Framingham Safety Survey about household hazards.[40] One trial reported no statistically significant differences, finding 13 of 141 cases (9.2%) of physical abuse in the intervention group vs 8 of 122 (6.6%) in the comparator group (risk ratio [RR], 1.4 [95% CI, 0.58-3.62]).[38] The same study[38] reported 15 of 141 cases (10.6%) of neglect in the intervention group vs 5 of 122 (4.1%) in the comparator group (RR, 2.79 [95% CI, 0.98-7.91]).[38] The other trial reported a statistically significant difference (P = .03), but the clinical importance of differences in the Framingham Safety Survey score is unclear.[40] That trial reported mean values on the Framingham Safety Survey

© 2018 American Medical Association. All rights reserved.

score of 1.72 (intervention) vs 1.68 (comparator); higher scores represent greater safety.

Injuries With a High Specificity for Abuse or Neglect | One trial found no statistically significant differences in the rates of nonaccidental injuries (0/64 for the intervention vs 1/71 for the comparator; calculated RR, 0.37 [95% CI, 0.02-8.91]) (eTable 17 in the Supplement).[49]

Emergency Department Visits | Eleven trials reported on emergency department visits (eTable 18 and eTable 19 in the Supplement).[19-22,26-32,34,35,41-46,50,51] The timing of outcome measurement varied substantially across trials, ranging from 6 months to more than 4 years. In addition, outcome measures varied and included (1) mean number of all-cause emergency department visits; (2) mean number of emergency department visits for accidents, injuries, and ingestions; (3) number of children seen in the emergency department; (4) number of children seen for accidents or injuries; (5) number of children seen for injuries or ingestions, and (6) total emergency department visits. These variations precluded pooling. Several trials presented outcomes at multiple periods. The results were generally inconsistent in direction of effect.

Hospitalization: Findings | Twelve trials reported on hospitalization outcomes (eTable 20 and eTable 21 in the Supplement).[19-22,26,29,34,39,41,42,44,46,49,51] Because of substantial heterogeneity in outcome definitions and periods of interest, results could not be pooled. Outcomes varied in degree of specificity to child abuse and neglect and included (1) number of children with hospital admission as a result of an injury that was "referred for independent investigation by the Family and Children's Services staff and concluded to have arisen as a result of a nonaccidental injury to the neonate"[49]; (2) number of children hospitalized because of child abuse and neglect[41]; (3) proportion of children hospitalized because of injury or ingestion[20]; (4) number of children hospitalized for ambulatory care–sensitive conditions; (5) number of children rehospitalized (at 14 days and 18 months, the original cause was not specified); (6) number of children with all-cause hospitalization; (7) mean number of all-cause hospitalizations; (8) total counts of hospital visits; (9) mean number of hospital days; and (10) types of injuries reported among those hospitalized. Results were not statistically significant for 7 outcomes. One of 5 trials that reported on the number of children with all-cause hospitalization demonstrated a significant reduction, but only for 1 of 4 outcome measures.[44] One of 2 trials found a lower mean number of hospital days,[29] and 1 trial found lower overall rates of hospital admission for unintentional injury at a 9-year follow-up.[42] These results suggest an overall lack of benefit for the active intervention group(s).

Failure to Thrive | One trial reported on failure to thrive. It found no statistically significant differences between study groups for this outcome (0% [0/39] vs 2.5% [1/40]; RR, 0.34 [95% CI, 0.01-8.14]) (eTable 22 in the Supplement).[39]

Failure to Immunize | One trial reported on failure to immunize. It found no statistically significant differences between study groups in the rate of no vaccinations at 6 months (calculated RR, 0.49 [95% CI, 0.16-1.52]) (eTable 23 in the Supplement).[49]

Behavioral, Emotional, Mental, or Physical Well-being

Internalizing and Externalizing Behavior | Six trials reported on internalizing (depression, anxiety) and externalizing (disruptive, aggressive, or delinquent) behavioral outcomes in children (eTable 24 and eTable 25 in the Supplement).[21-24,26,27,41,42,45-47] The evidence included substantial heterogeneity in the timing and type of outcome measurement, and findings were inconsistent. Three of 6 trials found a reduction in behavioral difficulties in children in primary care interventions to prevent child maltreatment.[21,22,41,42,47]

Social, Emotional, and Other Developmental Outcomes Not Otherwise Categorized | Five trials evaluated discrete social, emotional, or other developmental outcomes separately from overall measures of externalizing or internalizing problems (eTable 26 and eTable 27 in the Supplement).[24,27,34,35,45-47] The heterogeneity of outcomes precluded meta-analysis, but all trials reported results that were not statistically significant.

Child Development as Measured by the Bayley Scales of Child Development | Four trials[21,22,26-32,34] reported on child development as measured by the Bayley Scales of Child Development (eTable 28 and eTable 29 in the Supplement). The results generally indicated no statistically significant differences between intervention and control groups, with the exception of 1 trial.[22] This trial found a statistically significant difference in the Bayley Mental Development Index among children in the experimental group (mean score, 88 vs 84.8; difference, 3.2 [95% CI, 1.2-5.2]; <85 is the threshold for mild delay).[22] The mean difference between the 2 groups was not statistically significant for the psychomotor index.

Other Developmental Outcomes | Three trials reported no consistent differences in other developmental outcome measures (infant development tests, parent concerns about infant development) (eTable 30 and eTable 31 in the Supplement).[20,28,46]

School Performance and Attendance | One trial found no statistically significant differences in school performance at 9 years of age.[27] One trial[24] reported on school attendance; children at age 7 years in the intervention group were less likely to report skipping school than children in the usual-care group (2.35% [9/388] vs 6.47% [26/405]; RR, 0.36 [95% CI, 0.17-0.76]) (eTable 32 and eTable 33 in the Supplement). The same study reported no statistically significant differences using maternal reports of skipping school.

Death | Four trials of fair quality reported on the outcome of child death (eTable 34 in the Supplement); outcome specification and follow-up times varied and precluded quantitative synthesis.[26,27,34,39,49] No study reported statistically significant differences in the rates of child death between intervention and usual-care groups. One trial reported mortality at the 6-month follow-up,[49] 1 at 12 months,[34] and 1 at 18 months.[39] Another trial reported child deaths at the 9-year follow-up.[26,27] One trial included deaths attributed to sudden infant death syndrome.[39] One trial included only those deaths for which a child protection concern was known and an open

© 2018 American Medical Association. All rights reserved.

Table 2. Summary of Evidence of Interventions to Prevent Child Maltreatment[a]

Outcome	Population, Intervention	No. of Studies (No. of Observations)	Summary of Findings by Outcome	Consistency and Precision	Body of Evidence Limitations (Including Reporting Bias)	Strength of Evidence	Applicability
KQ1: Benefits of Primary Care–Feasible or Primary Care–Referable Interventions							
Reports to CPS	Caregivers of children at risk of maltreatment	14 (4958)	Reports at or within 1 y of trial completion: 11.1% vs 11.8%; OR, 0.94 (95% CI, 0.72-1.23); I^2 =6.3%; 10 2434 participants Mixed results for long-term follow-up[b]	Consistent, imprecise (short-term outcomes) Inconsistent, imprecise (long-term outcomes)	Heterogeneity across studies in type of intervention; no evidence of reporting bias	Low for no benefit for short-term outcomes Insufficient for long-term outcomes	Unclear whether findings apply to subgroups defined by parent risk factors
Removal of the child from home	Infants and toddlers <3 y	5 (885)	At 0-3 y: 11/313 (3.51%) vs 11/296 (3.71%); OR, 1.09 (95% CI, 0.16-7.28); I^2 = 61.8%; 4609 participants At birth (for intervention started in pregnancy) in 1 study: calculated OR, 1.55 (95% CI, 0.61-3.94)[c]; 225 participants	Inconsistent, imprecise	Heterogeneity across studies in timing of outcome; no evidence of reporting bias	Low for no benefit	Unclear whether findings apply to subgroups defined by parent risk factors
Other measures of abuse or neglect	Caregivers (mothers or families)	2 (461)	Abuse[d]: 13/141 (9.2%) vs 8/122 (6.6%); RR, 1.4 (95% CI, 0.58-3.62); 1263 participants Neglect:[e] 15/141 (10.6%) vs 5/122 (4.1%); RR, 2.79 (95% CI, 0.98-7.91); 1 trial, 263 participants Significantly higher safety scores in intervention group; 1 trial, 147 participants	Inconsistent, imprecise	Heterogeneity across studies in outcome measures; no evidence of reporting bias	Insufficient	Unclear whether findings apply to subgroups defined by parent risk factors
Injuries with a high specificity for abuse	Adolescent mothers	1 (136)	Nonaccidental injuries: 0/64 (0%) vs 1/71 (1.4%); calculated RR, 0.37 (95% CI, 0.015-8.91)	Consistency unknown (single trial), imprecise	Single small trial; no evidence of reporting bias	Insufficient	Unclear whether findings apply to subgroups defined by parent risk factors
Visits to the ED	Children	11 (5732)	2 of 7 studies reported a statistically significant difference in mean number of all-cause ED visits the first 2 y of follow-up; all other studies reported results that are not statistically significant[f] 1 of 2 studies reported statistically significant results at 2- to 4-y follow-up for each of the following: mean number of all-cause ED vists; mean number of ED visits for accidents, injuries, and ingestions; and number of children seen for accidents or injuries 2 studies found no statistically significant differences for number of children seen in the ED; 1 study found no statistically significant difference in the proportion of children seen for injuries and ingestions 1 of 2 studies reported statistically significant differences at long-term follow-up	Inconsistent, imprecise	Heterogeneity across studies in outcome measures; no evidence of reporting bias	Low for no benefit for short-term outcomes, insufficient for long-term outcomes	Unclear whether findings apply to subgroups defined by parent risk factors

(continued)

© 2018 American Medical Association. All rights reserved.

Table 2. Summary of Evidence of Interventions to Prevent Child Maltreatment[a] (continued)

Outcome	Population, Intervention	No. of Studies (No. of Observations)	Summary of Findings by Outcome	Consistency and Precision	Body of Evidence Limitations (Including Reporting Bias)	Strength of Evidence	Applicability
Hospitalization	Infants	12 (5491)	1 of 5 studies showed a reduction in number of children with all-cause hospitalization, but only for 1 of 4 outcome measures 1 of 2 studies found a lower mean number of hospital days 1 trial found lower overall rates of hospital admission for unintentional injury at 9-y follow-up All other outcomes not statistically significantly different[g]	Consistent, imprecise for results less than 3 y; inconsistent, imprecise for long-term follow-up	Heterogeneity outcome measures; each outcome/timing only presented in a single study; no evidence of reporting bias	Low strength of evidence of no benefit	Unclear whether findings apply to subgroups defined by parent risk factors
Failure to thrive	Infants	1 (79)	0/39 (0%) vs 1/40 (2.5%); RR, 0.34 (95% CI, 0.01-8.14)	Consistency unknown (single trial), imprecise	Single small trial; no evidence of reporting bias	Insufficient	Unclear whether findings apply to subgroups defined by parent risk factors
Failure to immunize	Adolescent mothers	1 (136)	No vaccinations at 6 mo: 4/71 (5.6%) vs 9/65 (13.8%); calculated RR, 0.49 (95% CI, 0.16-1.52)	Consistency unknown (single trial), imprecise	Single small trial; no evidence of reporting bias	Insufficient	Unclear whether findings apply to subgroups defined by parent risk factors
Internalizing and externalizing behavior symptoms	Caregivers of children at risk of maltreatment	6 (5529)	3 of 6 trials reported reductions in behavior difficulties[h] Other outcomes not statistically significantly different[i]	Inconsistent, imprecise	Small number of trials; heterogeneity of outcome measures; no evidence of reporting bias	Insufficient	Home-based intervention targeting high-risk families may be effective in decreasing behavior problems
Other social, emotional, and developmental outcomes	Infants and toddlers <3 y	4 (3965) children	0 of 5 studies reported statistically significant differences on a variety of social, emotional, and developmental measures[j]	Consistent, imprecise	Heterogeneity outcome measures; each outcome and timing only presented in a single study; no evidence of reporting bias	Low strength of evidence of no benefit for children <3 y	Unclear whether findings apply to subgroups defined by parent risk factors; one intervention may not be readily generalizable to other (pediatric practice) settings
Bayley Scales of Development	Caregivers and families	4 (1638) caregivers and families	1/4 trials reported higher scores in the intervention group (mean difference between groups, 3.2 [95% CI, 1.2-5.2])	Consistent, imprecise	Outcomes measured at different ages; no evidence of reporting bias	Low for no benefit	All studies focused on at-risk caregivers and families
Other measures of development	Pregnant mothers	3 (3204)	1 of 3 trials reported statistically significant differences on other development outcomes, but for subset of reported outcome measures and timing	Consistent, imprecise	Heterogeneity in outcome measures; no evidence of reporting bias	Low for no benefit	Unclear whether findings apply to subgroups defined by parent risk factors
School performance	School-aged children	1 (1139)	1 study found no statistically significant difference on various school performance measures	Consistency unknown (single trial), imprecise	Single trial; no evidence of reporting bias	Low for no benefit	Single study, applicability to other settings and ages unclear
School attendance	School-aged children and their families	1 (1184)	Self-reported school attendance at age 7 y: 9/388 (2.35%) vs 26/405 (6.47%); RR, 0.36 (95% CI, 0.17-0.76) No statistically significant difference in maternal reports of skipping school	Consistency unknown (single trial), imprecise	Single trial; inconsistent self-report and maternal report; no evidence of reporting bias	Insufficient	Single study, applicability to other settings and ages unclear

(continued)

© 2018 American Medical Association. All rights reserved.

Table 2. Summary of Evidence of Interventions to Prevent Child Maltreatment[a] (continued)

Outcome	Population, Intervention	No. of Studies (No. of Observations)	Summary of Findings by Outcome	Consistency and Precision	Body of Evidence Limitations (Including Reporting Bias)	Strength of Evidence	Applicability
Death	Pregnant or postpartum women; 3 studies included only women at risk for maltreatment; all studies included home visiting	4 (1065)	0/4 trials reported statistically significant differences in death	Consistent, imprecise	Heterogeneity in included studies; no evidence of reporting bias	Low for lack of effect on outcome of death	Unclear whether findings apply to subgroups defined by parent risk factors
Composite maltreatment outcome[k]	Mothers of newborns	1 (136)	2/65 (3.1%) vs 9/71 (12.7%); RR, 0.24 (95% CI, 0.05-1.08) Adjusted RR, 0.22 (95% CI, 0.02 to 0.98); *P* = .04	Consistency unknown (single trial), imprecise	Single small trial; no evidence of reporting bias	Insufficient	Unclear whether findings apply to subgroups other than teenaged first-time mothers
KQ2: Harms of Primary Care–Feasible or Primary Care–Referable Interventions							
Harms	NA	0 (0)	No eligible studies	NA	NA	Insufficient	NA

Abbreviations: CPS, child protective services; ED, emergency department; KQ, key question; NA, not applicable; OR, odds ratio; RR, relative risk.

[a] All bodies of evidence were rated as fair quality.

[b] Long-term CPS reports: adjusted OR, 0.48 (95% CI, 0.23-1.00) in one study (3-year follow-up, 157 participants); adjusted OR, 1.13, *P* > .10 in second study (5-year follow-up, 1173 participants); *P* = .04 in another study (13-year follow-up, 216 participants, no effect size provided).

[c] Calculations based on number randomized.

[d] Defined as hitting with the hand or objects, biting, burning with objects or by immersion, twisting, shaking, throwing or pushing so as to cause a fall, or hair pulling; identified from review of public agency documents from the Tennessee Department of Human Services.

[e] Defined as abandonment, leaving a child with an inappropriate caretaker, gross failure to seek medical care, failure to provide shelter or nutrition, or gross failure to provide for normal intellectual development; identified from review of public agency documents from the Tennessee Department of Human Services.

[f] Outcomes with no statistically significant results include mean number of ED visits for accidents and injuries (1 study), proportion of children with ED visits for injuries and ingestions (1 study), number of children using the ED (2 studies), and total ED visits (1 study).

[g] Outcomes with no statistically significant results include number of hospitalizations attributable to nonaccidental injury to the neonate (1 study), number of children hospitalized because of child abuse and neglect (1 study), proportion of children hospitalized for injuries and ingestions (1 study), number of children hospitalized for ambulatory-care sensitive conditions (1 study), number of children rehospitalized (1 study), mean number of all-cause hospitalizations (3 studies), and total count of hospital stays (1 study).

[h] One study reported statistically significant differences on each of the following: mean and proportion of children with higher externalizing behaviors at 12 months; internalizing behaviors at 2 years and 3 years; behavior problems at 5, 6, and 9 years; and more maternal concerns on the child behavior checklist.

[i] Outcomes with no statistically significant results include internalizing behaviors at 6 and 12 months (1 study); child behavior at 2 years (1 study), 30 to 33 months and 5.5 years (1 study), and 7 years (1 study); and internalizing and externalizing behaviors at 9 years (1 study).

[j] Outcomes included dysregulation, sleep problems, social skills, attention and social problems, school-related conduct outcomes, and infant social and emotional adjustment.

[k] Defined as infant death, severe nonaccidental injury, and involuntary foster care placement.

© 2018 American Medical Association. All rights reserved.

verdict was reached.[34] The other 2 trials included all deaths in the period specified for follow-up. Overall rates of death were low (0% to 3.0%), even though eligible studies included at-risk children.

Composite Outcome | One trial reported on a composite outcome comprising infant death, severe nonaccidental injury, and involuntary foster care placement (eTable 35 in the Supplement).[49] The investigators did not find a statistically significant risk before adjusting for covariates (3% [2/65] vs 12.7% [9/71]; RR, 0.24 [95% CI, 0.05-1.08]). When adjusted for baseline covariates, the RR was 0.22 (95% CI, 0.02-0.98).[49]

Harms of Interventions

Key Question 2. What are the harms of primary care–feasible or primary care–referable interventions to prevent child maltreatment?

No studies met the inclusion criteria.

Discussion

The findings for this evidence review are summarized in **Table 2**. The evidence for the effect on short-term outcomes of primary care–feasible and primary care–referable interventions to prevent child maltreatment, reports to CPS, emergency department visits, and hospitalizations showed no statistically significant benefit in terms of child maltreatment outcomes or proxy measures. Few studies reported long-term outcomes; results from these studies are not consistent. Sensitivity analyses that included poor-quality studies did not change the results (eResults 1, eFigure 1 and eFigure 2, eTables 37-55 in the Supplement).

Furthermore, interpretation of some outcomes can be challenging. Lower rates of all-cause emergency department visits or hospitalization may represent changes in patterns of health care utilization as a result of the intervention rather than lower rates of abuse or neglect.

The evidence was also inconclusive for other outcomes, based primarily on the limited number of trials reporting on each outcome and lack of statistically significant results. These include injuries, failure to thrive, failure to immunize, internalizing and externalizing behavior symptoms, school attendance, and other measures of abuse or neglect. The evidence also suggests no statistically significant benefit for removal of the child from the home, child development, school performance, and prevention of death. No eligible studies on harms of interventions were identified. Results for parent-reported measures of exposure to abuse or neglect (eResults 2, eTables 56-71 in the Supplement) also did not suggest consistent benefit.

The evidence consisted entirely of RCTs and almost entirely of interventions that included home visits. Trials generally focused on young mothers and drew from vulnerable populations. Some interventions, such as the Nurse Family Partnership (Memphis, Tennessee; Elmira, New York) and Healthy Families, were tested in multiple settings. Nevertheless, the 21 included home-visit trials differed substantially in other respects, such as the populations of interest, baseline risk of maltreatment, intervention intensity and duration, and outcomes measured. These underlying characteristics may explain variations in the effectiveness of the intervention, but the evidence base for each outcome was not extensive enough to identify any patterns. Additionally, the unaccounted effects of enhanced surveillance in preventive interventions, particularly in the context of home visiting programs, can result in increased identification of maltreatment. This is an important source of bias inherent in child maltreatment prevention research.

Limitations

This study had several limitations. First, inclusion in the review was restricted to studies focused on preventive interventions for children who had not yet experienced maltreatment and to individual rather than community-wide interventions. Therefore, the conclusions of this systematic review do not apply to the effectiveness of interventions to prevent the recurrence of child maltreatment for children who have experienced maltreatment or to community-wide interventions.

Second, in general, information about the type and severity of parent mental health problems was underreported. The resulting gap in the evidence precludes a fuller understanding of the salient factors affecting the effectiveness of the interventions.

Third, the focus of this review was on direct or proxy measures of abuse or neglect and their sequelae. It does not address the effectiveness of home visiting and other interventions for the other outcomes also measured in many of the included trials (eg, maternal outcomes, family functioning).

Fourth, there are limitations in the evidence that relate primarily to the considerable diversity of the interventions and the uncertainties stemming from such heterogeneity. Although all but 1 of the included trials had a home visiting component, several aspects of this particular activity differed. These aspects included the nature and theoretical basis of the interventions delivered during the home visits, credentials of the home visiting staff, and intensity and duration of the intervention.

Fifth, all trials involved implementing multiple components. Complex, multicomponent interventions need to report the theoretical foundation for the intervention to help interpret the results and reproduce successful interventions. Study authors generally did not provide a theory of change or logic model that identified components essential to the success of the intervention. Without theoretical or contextual information on critical intervention components, the review cannot comment on how successful interventions are different from unsuccessful interventions.[52]

Sixth, the question of applicability of the findings to other pediatric or caregiver populations (eg, with lower or higher risk profiles) and other settings (eg, with fewer resources) remains uncertain.

Seventh, although some child maltreatment prevention studies reported positive outcomes, the results do not consistently indicate benefit when sorted by outcome. Chance positive findings cannot be ruled out. Some studies reported on outcomes that may be important but are distal or unrelated to child maltreatment outcomes (such as interpregnancy interval).

Conclusions

Interventions provided in or referable from primary care did not consistently prevent child maltreatment. No evidence on harms is available.

© 2018 American Medical Association. All rights reserved.

ARTICLE INFORMATION

Author Affiliations: RTI International–University of North Carolina at Chapel Hill Evidence-based Practice Center (Viswanathan, Pan, Forman-Hoffman, Lohr, Patel, Jonas); RTI International, Research Triangle Park, North Carolina (Viswanathan, Pan, Forman-Hoffman, Patel); ZERO TO THREE, Washington, DC (Fraser); Department of Family Medicine, School of Medicine, University of North Carolina at Chapel Hill (Morgenlander, Zolotor); Department of Psychiatry, School of Medicine, University of North Carolina at Chapel Hill (McKeeman); Nationwide Children's Hospital, Columbus, Ohio (Hart); Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill (Hart, Jonas); Department of Medicine, University of North Carolina at Chapel Hill (Jonas).

Author Contributions: Dr Viswanathan had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Viswanathan, Fraser, Forman-Hoffman, Hart, Zolotor, Jonas.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Viswanathan, Fraser, Pan, McKeeman, Forman-Hoffman, Zolotor, Lohr, Patel.
Critical revision of the manuscript for important intellectual content: Viswanathan, Fraser, Morgenlander, Forman-Hoffman, Hart, Zolotor, Lohr, Jonas.
Statistical analysis: Viswanathan, Pan, Hart.
Obtained funding: Viswanathan, Jonas.
Administrative, technical, or material support: Viswanathan, Fraser, Pan, McKeeman, Forman-Hoffman, Hart, Zolotor, Patel.
Supervision: Viswanathan.

Conflict of Interest Disclosures: Dr Hart reported receiving a National Research Service Award Primary Care Research Fellowship (grant T32-HP14001). No other disclosures were reported.

Funding/Support: This research was funded under contract HHSA-290-2015-0001-I, Task Order 5, from the Agency for Healthcare Research and Quality (AHRQ), US Department of Health and Human Services, under a contract to support the USPSTF.

Role of the Funder/Sponsor: Investigators worked with USPSTF members and AHRQ staff to develop the scope, analytic framework, and key questions for this review. AHRQ had no role in study selection, quality assessment, or synthesis. AHRQ staff provided project oversight, reviewed the report to ensure that the analysis met methodological standards, and distributed the draft for peer review. Otherwise, AHRQ had no role in the conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, or approval of the manuscript findings. The opinions expressed in this document are those of the authors and do not reflect the official position of AHRQ or the US Department of Health and Human Services.

Additional Contributions: We acknowledge the following individuals for their contributions to this project: AHRQ staff (Justin Mills, MD, MPH; Iris Mabry-Hernandez, MD, MPH; and Tracy Wolff, MD); current and former members of the US Preventive Services Task Force who contributed to topic deliberations; RTI International–University of North Carolina EPC staff (Lynn Whitener, DrPH; Carol Woodell, BSPH; Rachel Weber, PhD; Linda J. Lux, MPA; Catherine A. Grodensky, MPH; Sharon Barrell, MA; and Loraine Monroe). USPSTF members, peer reviewers, and federal partner reviewers did not receive financial compensation for their contributions.

Additional Information: A draft version of the full evidence report underwent external peer review from 7 content experts (Charles Wilson, MSSW; M. Denise Dowd, MD, MPH; Joanne N. Wood, MD, MSHP; Ken Epstein, PhD, LCSW; Ron Prinz, PhD; Beverly Fortson, PhD; Joanne Klevens, MD, PhD, MPH) and 1 anonymous reviewer. Comments from reviewers were presented to the USPSTF during its deliberation of the evidence and were considered in preparing the final evidence review.

Editorial Disclaimer: This evidence report is presented as a document in support of the accompanying USPSTF Recommendation Statement. It did not undergo additional peer review after submission to *JAMA*.

REFERENCES

1. Leeb RT, Paulozzi LJ, Melanson C, Simon TR, Arias I. Child Maltreatment Surveillance: Uniform Definitions for Public Health and Recommended Data Elements. Version 1.0. Centers For Disease Control and Prevention website. https://www.cdc.gov/violenceprevention/pdf/cm_surveillance-a.pdf. Published January 2008. Accessed December 28, 2015.

2. Lewis TL, Kotch J, Wiley TR, et al. Internalizing problems: a potential pathway from childhood maltreatment to adolescent smoking. *J Adolesc Health*. 2011;48(3):247-252. doi:10.1016/j.jadohealth.2010.07.004

3. Long-Term Consequences of Child Abuse and Neglect. Child Welfare Information Gateway website. https://www.childwelfare.gov/pubPDFs/long_term_consequences.pdf. Published 2013. Accessed February 10, 2016.

4. Goodwin RD, Stein MB. Association between childhood trauma and physical disorders among adults in the United States. *Psychol Med*. 2004;34(3):509-520. doi:10.1017/S003329170300134X

5. Power C, Pinto Pereira SM, Li L. Childhood maltreatment and BMI trajectories to mid-adult life: follow-up to age 50 y in a British birth cohort. *PLoS One*. 2015;10(3):e0119985. doi:10.1371/journal.pone.0119985

6. Gilbert R, Widom CS, Browne K, Fergusson D, Webb E, Janson S. Burden and consequences of child maltreatment in high-income countries. *Lancet*. 2009;373(9657):68-81. doi:10.1016/S0140-6736(08)61706-7

7. Keenan HT, Runyan DK, Marshall SW, Nocera MA, Merten DF, Sinal SH. A population-based study of inflicted traumatic brain injury in young children. *JAMA*. 2003;290(5):621-626. doi:10.1001/jama.290.5.621

8. Keenan HT, Hooper SR, Wetherington CE, Nocera M, Runyan DK. Neurodevelopmental consequences of early traumatic brain injury in 3-year-old children. *Pediatrics*. 2007;119(3):e616-e623. doi:10.1542/peds.2006-2313

9. Moyer VA; U.S. Preventive Services Task Force. Primary care interventions to prevent child maltreatment: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2013;159(4):289-295. doi:10.7326/0003-4819-159-4-201308200-00667

10. Nelson HD, Selph S, Bougatsos C, Blazina I. *Behavioral Interventions and Counseling to Prevent Child Abuse and Neglect: Systematic Review to Update the U.S. Preventive Services Task Force Recommendation*. Rockville, MD: Agency for Healthcare Research and Quality; 2013. Report 13-05176-EF-1.

11. US Preventive Services Task Force (USPSTF). USPSTF Procedure Manual: Section 3: Topic Work Plan Development. USPSTF website. https://www.uspreventiveservicestaskforce.org/Page/Name/section-3-topic-work-plan-development. Published July 2017. Accessed October 30, 2018.

12. Office of Juvenile Justice and Delinquency Prevention (OJJDP). Recognizing When a Child's Injury or Illness Is Caused by Abuse: A Portable Guide to Investigating Child Abuse. OJJDP website. https://www.ojjdp.gov/pubs/243908.pdf. Published July 2014. Accessed October 30, 2018.

13. United Nations Development Programme (UNDP). Human Development Report 2015: Work for Human Development: Table 1: Human Development Index and its components. UNDP website. http://hdr.undp.org/en/composite/HDI. Accessed July 18, 2017.

14. US Preventive Services Task Force (USPSTF). Methods and Processes. USPSTF website. https://www.uspreventiveservicestaskforce.org/Page/Name/methods-and-processes. 2015. Accessed July 18, 2018.

15. Higgins JP, Green S. Cochrane Handbook for Systematic Reviews of Interventions. Version 5.1. Cochrane website. https://training.cochrane.org/handbook. Updated 2011. Accessed August 24, 2016.

16. West SL, Gartlehner G, Mansfield AJ, et al. *Comparative Effectiveness Review Methods: Clinical Heterogeneity*. Rockville, MD: Agency for Healthcare Research and Quality; 2010. AHRQ publication 10-EHC070-EF.

17. Biostat. *Comprehensive Meta Analysis, Version 3.3.070*. Englewood, NJ: Biostat; 2014.

18. Agency for Healthcare Research and Quality. *Methods Guide for Effectiveness and Comparative Effectiveness Reviews*. Rockville, MD: Agency for Healthcare Research and Quality; 2011. AHRQ publication 10(11)-EHC063-EF.

19. Siegel E, Bauman KE, Schaefer ES, Saunders MM, Ingram DD. Hospital and home support during infancy: impact on maternal attachment, child abuse and neglect, and health care utilization. *Pediatrics*. 1980;66(2):183-190.

20. Robling M, Bekkers M-J, Bell K, et al. Effectiveness of a nurse-led intensive home-visitation programme for first-time teenage mothers (Building Blocks): a pragmatic randomised controlled trial. *Lancet*. 2016;387(10014):146-155. doi:10.1016/S0140-6736(15)00392-X

21. Duggan A, Caldera D, Rodriguez K, Burrell L, Rohde C, Crowne SS. Impact of a statewide home visiting program to prevent child abuse. *Child Abuse*

© 2018 American Medical Association. All rights reserved.

Negl. 2007;31(8):801-827. doi:10.1016/j.chiabu.2006.06.011

22. Caldera D, Burrell L, Rodriguez K, Crowne SS, Rohde C, Duggan A. Impact of a statewide home visiting program on parenting and on child health and development. *Child Abuse Negl*. 2007;31(8):829-852. doi:10.1016/j.chiabu.2007.02.008

23. DuMont K, Mitchell-Herzfeld S, Greene R, et al. Healthy Families New York (HFNY) randomized trial: effects on early child abuse and neglect. *Child Abuse Negl*. 2008;32(3):295-315. doi:10.1016/j.chiabu.2007.07.007

24. Dumont K, Kirkland K, Mitchell-Herzfeld S, et al. *A Randomized Trial of Healthy Families New York (HFNY): Does Home Visiting Prevent Child Maltreatment*. Rensselaer, NY: New York State Office of Children & Family Services and The University of Albany, State University of New York; 2010.

25. Sadler LS, Slade A, Close N, et al. Minding the Baby: enhancing reflectiveness to improve early health and relationship outcomes in an interdisciplinary home visiting program. *Infant Ment Health J*. 2013;34(5):391-405. doi:10.1002/imhj.21406

26. Kitzman H, Olds DL, Henderson CR Jr, et al. Effect of prenatal and infancy home visitation by nurses on pregnancy outcomes, childhood injuries, and repeated childbearing: a randomized controlled trial. *JAMA*. 1997;278(8):644-652. doi:10.1001/jama.1997.03550080054039

27. Olds DL, Sadler L, Kitzman H. Programs for parents of infants and toddlers: recent evidence from randomized trials. *J Child Psychol Psychiatry*. 2007;48(3-4):355-391. doi:10.1111/j.1469-7610.2006.01702.x

28. Olds DL, Henderson CR Jr, Chamberlin R, Tatelbaum R. Preventing child abuse and neglect: a randomized trial of nurse home visitation. *Pediatrics*. 1986;78(1):65-78.

29. Olds DL, Henderson CR Jr, Kitzman H. Does prenatal and infancy nurse home visitation have enduring effects on qualities of parental caregiving and child health at 25 to 50 months of life? *Pediatrics*. 1994;93(1):89-98.

30. Olds DL, Eckenrode J, Henderson CR Jr, et al. Long-term effects of home visitation on maternal life course and child abuse and neglect: fifteen-year follow-up of a randomized trial. *JAMA*. 1997;278(8):637-643. doi:10.1001/jama.1997.03550080047038

31. Eckenrode J, Ganzel B, Henderson CR Jr, et al. Preventing child abuse and neglect with a program of nurse home visitation: the limiting effects of domestic violence. *JAMA*. 2000;284(11):1385-1391. doi:10.1001/jama.284.11.1385

32. Zielinski DS, Eckenrode J, Olds DL. Nurse home visitation and the prevention of child maltreatment: impact on the timing of official reports. *Dev Psychopathol*. 2009;21(2):441-453. doi:10.1017/S0954579409000248

33. Lam WK, Fals-Stewart W, Kelley ML. Parent training with behavioral couples therapy for fathers' alcohol abuse: effects on substance use, parental relationship, parenting, and CPS involvement. *Child Maltreat*. 2009;14(3):243-254. doi:10.1177/1077559509334091

34. Barlow J, Davis H, McIntosh E, Jarrett P, Mockford C, Stewart-Brown S. Role of home visiting in improving parenting and health in families at risk of abuse and neglect: results of a multicentre randomised controlled trial and economic evaluation. *Arch Dis Child*. 2007;92(3):229-233. doi:10.1136/adc.2006.095117

35. McIntosh E, Barlow J, Davis H, Stewart-Brown S. Economic evaluation of an intensive home visiting programme for vulnerable families: a cost-effectiveness analysis of a public health intervention. *J Public Health (Oxf)*. 2009;31(3):423-433. doi:10.1093/pubmed/fdp047

36. Easterbrooks MA, Bartlett JD, Raskin M, et al. Limiting home visiting effects: maternal depression as a moderator of child maltreatment. *Pediatrics*. 2013;132(suppl 2):S126-S133. doi:10.1542/peds.2013-1021K

37. Silovsky JF, Bard D, Chaffin M, et al. Prevention of child maltreatment in high-risk rural families: a randomized clinical trial with child welfare outcomes. *Child Youth Serv Rev*. 2011;33(8):1435-1444. doi:10.1016/j.childyouth.2011.04.023

38. Brayden RM, Altemeier WA, Dietrich MS, et al. A prospective study of secondary prevention of child maltreatment. *J Pediatr*. 1993;122(4):511-516. doi:10.1016/S0022-3476(05)83528-0

39. Brooten D, Kumar S, Brown LP, et al. A randomized clinical trial of early hospital discharge and home follow-up of very-low-birth-weight infants. *N Engl J Med*. 1986;315(15):934-939. doi:10.1056/NEJM198610093151505

40. Bugental DB, Schwartz A. A cognitive approach to child mistreatment prevention among medically at-risk infants. *Dev Psychol*. 2009;45(1):284-288. doi:10.1037/a0014031

41. Fergusson DM, Grant H, Horwood LJ, Ridder EM. Randomized trial of the Early Start program of home visitation. *Pediatrics*. 2005;116(6):e803-e809. doi:10.1542/peds.2005-0948

42. Fergusson DM, Boden JM, Horwood LJ. Nine-year follow-up of a home-visitation program: a randomized trial. *Pediatrics*. 2013;131(2):297-303. doi:10.1542/peds.2012-1612

43. Larson CP. Efficacy of prenatal and postpartum home visits on child health and development. *Pediatrics*. 1980;66(2):191-197.

44. Finello KM, Litton KM, deLemos R, Chan LS. Very low birth weight infants and their families during the first year of life: comparisons of medical outcomes based on after care services. *J Perinatol*. 1998;18(5):365-371.

45. Guyer B, Barth M, Bishai D, et al. Healthy Steps: The First Three Years: The Healthy Steps for Young Children Program National Evaluation. https://ztt-healthysteps.s3.amazonaws.com/documents/139/attachments/2003_HS_National_Evaluation_Report.pdf?1539967824. 2003. Accessed July 24, 2017.

46. Minkovitz CS, Strobino D, Mistry KB, et al. Healthy Steps for Young Children: sustained results at 5.5 years. *Pediatrics*. 2007;120(3):e658-e668. doi:10.1542/peds.2006-1205

47. Lowell DI, Carter AS, Godoy L, Paulicin B, Briggs-Gowan MJ. A randomized controlled trial of Child FIRST: a comprehensive home-based intervention translating research into early childhood practice. *Child Dev*. 2011;82(1):193-208. doi:10.1111/j.1467-8624.2010.01550.x

48. Marcenko MO, Spence M. Home visitation services for at-risk pregnant and postpartum women: a randomized trial. *Am J Orthopsychiatry*. 1994;64(3):468-478. doi:10.1037/h0079547

49. Quinlivan JA, Box H, Evans SF. Postnatal home visits in teenage mothers: a randomised controlled trial. *Lancet*. 2003;361(9361):893-900. doi:10.1016/S0140-6736(03)12770-5

50. Wiggins M, Oakley A, Roberts I, et al. The Social Support and Family Health Study: a randomised controlled trial and economic evaluation of two alternative forms of postnatal support for mothers living in disadvantaged inner-city areas. *Health Technol Assess*. 2004;8(32):1-120. doi:10.3310/hta8320

51. Wiggins M, Oakley A, Roberts I, et al. Postnatal support for mothers living in disadvantaged inner city areas: a randomised controlled trial. *J Epidemiol Community Health*. 2005;59(4):288-295. doi:10.1136/jech.2004.021808

52. Kelly MP, Noyes J, Kane RL, et al. AHRQ series on complex intervention systematic reviews—paper 2: defining complexity, formulating scope, and questions. *J Clin Epidemiol*. 2017;90:11-18. doi:10.1016/j.jclinepi.2017.06.012

© 2018 American Medical Association. All rights reserved.