

# Home-visiting interventions for families with complex and multiple problems: A systematic review and meta-analysis of out-of-home placement and child outcomes



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## ABSTRACT

Children growing up in families experiencing complex and multiple problems (FECMP) are at an increased risk of developing problems in multiple areas of life. A wide array of home-visiting interventions has been developed to address the complex care needs of these families. The aim of this study is to investigate out-of-home placement rates and child outcomes of these home-visiting interventions. A systematic review and meta-analysis was conducted using five scientific databases (PsycInfo, ERIC, SocIndex, MedLine, & Picarta). The systematic search of these databases yielded 8,377 hits. Forty-two publications reporting on 50 studies were included in the review. A random-effects survival curve meta-analysis model was estimated for out-of-home placement and random-effects meta-analysis models were estimated for children's behavioral problems and stressful experiences. Out-of-home placement increased from 7.5% at case closure to 24.3% one year after case closure. On average there was a moderate decrease in emotional and behavioral problems ( $d = 0.50$ ) and stressful experiences ( $d = 0.50$ ) during intervention, but considerable problems remained after case closure. More research is needed to investigate family and service characteristics that may explain heterogeneity in outcomes. Furthermore, there is a need to adopt a broader perspective in evaluations of home-visiting services by including outcomes related to the skills, development, and wellbeing of children.

## 1. Introduction

### 1.1. Growing up in families experiencing complex and multiple problems

Children who are exposed to multiple environmental adversities (e.g. poverty, parental substance abuse, parenting problems, parental depression) are at an increased risk of developing problems in many areas of life. A review by Evans, Li, and Whipple (2013) showed that exposure of children to an accumulation of adverse factors was related to a wide array of negative developmental outcomes such as poor academic achievement, behavioral problems, poor social competency, and delays in cognitive development. Because of their exposure to an accumulation of environmental adversities children growing up in families experiencing complex and multiple problems are considered to be a group of special interest within the context of child welfare and protection (Kolthof, Kikkert, & Dekker, 2014). Several studies have suggested that problems occurring simultaneously often sustain and enhance each other, resulting in persistent problems across generations

(Bailey, Hill, Oesterle, & Hawkins, 2009; Evenboer, Reijneveld, & Jansen, 2018; Ghesquière, 1993; Kolthof et al., 2014; Spratt, 2009, 2011; Spratt & Devaney, 2009).

In scientific literature a variety of terms (e.g. multi-problem, multi-stressed, troubled, high risk families) have been used to describe more or less similar populations experiencing problems in multiple areas of life (Ghesquière, 1993; Spratt, 2009; Tausendfreund, Knot-Dickscheit, Schulze, Knorth, & Grietens, 2016). In this paper the term *families experiencing complex and multiple problems (FECMP)* is used to denote families that are characterized by an accumulation of problems in different domains of life (e.g. parenting, mental health, housing, finances) that are interrelated, sustain, and enhance each other. Furthermore, this term does not only encompass factors within the family, but also includes factors outside the family such as socio-economic disadvantage and problems related to care provision.

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## 1.2. Family-focused home-visiting interventions for FECMP

Several challenges can be identified in meeting the complex care needs of families experiencing complex and multiple problems. In many cases, families are involved with multiple care services simultaneously, often with problematic coordination between services (Mehlkopf, 2008a, 2008b; Spratt, 2011; Tausendfreund et al., 2016; Van Den Berg, Van Der Goot, & Jansen, 2008). Furthermore, many interventions fail to take into account the complexity of the problems these families experience (Van Yperen, Van Der Steege, & Batelaan, 2006; Spratt, 2011). Finally, the relation between care workers and families with complex and multiple problems is often problematic. Often families have had many negative experiences with services, resulting in negative attitudes towards care workers and care avoidance in families, and care paralysis in care workers (Morris, 2013; Schout, de Jong, & Zeelen, 2011; Tausendfreund et al., 2016).

Home-visiting interventions are a prevalent approach to meet the complex needs of families experiencing complex and multiple problems (Loeffen & Pasveer, 2004; Tausendfreund et al., 2016; Tully, 2008). The use of the term home-visiting suggests a homogeneous approach of home-based family interventions, but in reality the term is used to describe a variety of approaches that share some essential common characteristics. A main characteristic of home-visiting interventions is that care is provided in the family's home environment which provides care workers with the opportunity to engage in ecological diagnostics, provide support that is more directly applicable to daily life, and improve their relationship with the family. Many home-visiting programs are characterized by a high intensity of care contacts, small caseload sizes and flexible care provision (Loeffen & Pasveer, 2004; Tausendfreund et al., 2016; Tully, 2008).

## 1.3. Types of home-visiting interventions

Although most home-visiting interventions share these main characteristics, there are some notable differences between programs. One of the main differences between different types of home-visiting interventions is the scope of the activities of the intervention. Visscher et al. (2019, p. 10) emphasize there is a distinction between “interventions for families with multiple problems [that] contained a more unique and varying set of practice elements” and “interventions [that] focus more on the family system and less on broader networks”. Families experiencing complex and multiple problems are not only characterized by problems within the family, but also by considerable socio-economic difficulties and challenges in care provision. Therefore, they constitute a target group that is distinct from families whose problems can be characterized as severe parenting and behavioral problems (Bodden & Deković, 2016; Visscher et al., 2019; Visscher et al., 2020). In line with this distinction, this review is restricted to interventions containing a more comprehensive set of care activities for FECMP (multi-domain services).

Several reviews are available on home-visiting services for families with severe parenting and behavioral problems such as Triple P (Sanders, Kirby, Tellegen, & Day, 2014) and Parent Management Training Oregon (Michelson, Davenport, Dretzke, Barlow, & Day, 2013). Some interventions focused on families experiencing parenting problems and/or behavioral problems (e.g. delinquency or anti-social behavior) do contain a more comprehensive set of care activities. However, the target groups of these interventions are usually described as families experiencing severe parenting problems, delinquency, substance abuse or anti-social behavior. Although many of these families can be characterized as FECMP, the target groups of these interventions are not exclusively characterized by problems in multiple areas of life. Therefore, interventions such as Multi-Systemic Therapy (Van der Stouwe, Asscher, Stams, Deković, & Van Der Laan, 2014), Functional Family Therapy (Baldwin, Christian, Berkeljon, & Shadish, 2012; Hartnett, Carr, Hamilton, & O'Reilly, 2017), and Multi-dimensional Family Therapy (Filges, Andersen, & Jørgensen, 2018) are also

excluded from this review.

Furthermore, there are many interventions that provide pre-natal, post-natal and early childhood home-visiting services and to FECMP. A HomeVEE report has shown that many early childhood programs also specifically address the needs of FECMP and evaluations have specifically addressed several child outcomes (Sama-Miller, Akers, Mraz-Esposito, Coughlin, & Zukiewicz, 2017). Child outcomes of these programs (e.g. Nurse Family Partnership, Healthy Start) have been reviewed by Peacock, Konrad, Watson, Nickel, and Muhajarine (2013). In literature on care provision for FECMP the need for actively including children has been emphasized by several authors (Alberth & Bühler-Niederberger, 2015; Munro, 2011; Tausendfreund, 2015). Although many pre-natal, post-natal and early childhood interventions focus on improving child outcomes, they are limited – due to the young age of the children – in actively involving children in care. Therefore, these interventions are excluded from this review.

In this review home-visiting interventions for FECMP characterized by a varying set of practice elements in multiple domains (e.g. Families First, Intensive Family Treatment, Ten for the Future) are included (Visscher et al., 2019). Some reviews have been conducted on these multi-domain home-visiting interventions. However, existing reviews are either not up to date (e.g. Dagenais, Bégin, Bouchard, & Fortin, 2004), focused on outcomes at the family level (e.g. Al et al., 2012), or limited to a specific country (e.g. Veerman, Janssens, & Delicat, 2005; Visscher et al., 2019). To our knowledge there is currently no up-to-date review of child outcomes of multi-domain home-visiting programs for FECMP.

## 1.4. Outcomes of home-visiting interventions

A central aim of many home-visiting interventions is to preserve the family by preventing out-of-home placement of children. In line with this aim, home-visiting interventions are sometimes referred to as family preservation services or placement prevention services. Due to the accumulation of adverse factors in families enrolled in home-visiting programs, children growing up in these families are at an increased risk of being placed out of home. Several studies have shown the negative relation between out-of-home placement and children's development and wellbeing (Berger, Cancian, Font, & Noyes, 2009; Kääriälä & Hiilamo, 2017). However, due to differences in family characteristics it is difficult to assess whether this negative relation represents pre-existing differences or is the result of placement itself. By controlling for pre-existing differences between cases Berger et al. (2009) found that differences in outcomes between placed and non-placed children are likely due to differences in family circumstances rather than placement itself.

As families experiencing placement often experience problems in multiple areas of life, home-visiting services often use multiple proximal and intermediate goals to prevent out-of-home placement. In line with placement prevention being the central goal of home-visiting services, most evaluation studies of home-visiting interventions focus on the effectiveness of these services in preventing out-of-home placement (see for example Al et al., 2012). However, the utility of out-of-home placement as an indicator for service effectiveness has been criticized. Critics of out-of-home placement as an indicator for service effectiveness have argued that out-of-home placement is not necessarily a negative outcome in every case. Furthermore, they emphasize that placement is a poor indicator of family functioning and child wellbeing (Courtney, 1997; Maluccio, 2002; Maluccio & Whittaker, 1997). Maluccio and Whittaker (1997) emphasized that – also when preventing out-of-home placement is the central aim of interventions – there is a need to move beyond a focus on out-of-home placement as the only outcome of home-visiting services.

Besides evaluating the effect of home-visiting services in preventing out-of-home placement, several studies on home-visiting services have included measures related to child and family outcomes. For example,

some reviews have examined the effect of home-visiting on family functioning (Al et al., 2012; Dagenais et al., 2004). Measures related to family functioning are predominantly focused on parenting factors and family interactions (Al et al., 2012). As indicated in paragraph 1.3, several scientific studies and government reviews have emphasized the need for child-focused intervention in families with complex and multiple problems (Inspectie Jeugdzorg, 2016; Munro, 2011; Thoburn, Cooper, Brandon, & Connolly, 2013; Tausendfreund, 2015). Some studies have addressed child outcomes of home-visiting programs as well. Veerman et al. (2005) reviewed the outcomes of Dutch home-visiting interventions on children's emotional and behavioral problems. They found that Dutch home-visiting interventions showed a moderate effect in decreasing children's emotional and behavioral problems. At the child level, this review focusses specifically on children's emotional and behavioral problems. To our knowledge, a broader review of child outcomes of home-visiting services for families with complex and multiple problems is currently not available.

### 1.5. Aim of the study

The aim of this review is to investigate which child outcomes have been reported in studies on home-visiting interventions for families with complex and multiple problems and assess to what extent these interventions are effective in improving these outcomes. Furthermore,

**Table 1**  
Inclusion criteria for article selection.

Criterion	Description	Examples of excluded interventions
<i>Home-visiting services</i>	Only services provided in the home environment of families were included.	Foster care; Residential care; outpatient care; school support
<i>Family-focused services</i>	Only services that included all family members in treatment were included. This excluded any type of services provided to individual family members and services that did not include children in treatment.	Individual psychotherapy; Cognitive Behavioral Therapy (CBT); parent training
<i>Multi-domain services for families experiencing complex and multiple problems</i>	Only interventions targeting families experiencing problems in multiple areas of life were included. This excluded interventions that exclusively focused on specific target groups or problem domains (e.g. delinquent youth, substance abusing youth; behavioral problems) even when these interventions used a broader systemic approach.	Multi-Systemic Therapy (MST); Functional Family Therapy (FFT); Multi-Dimensional Family Therapy (MDFT)
<i>No early childhood</i>	Interventions that specifically focused on early childhood (0 to 5 years old) were not included.	Healthy Families America; Nurse Family Partnership
<i>Professional services</i>	Only services provided by professional care workers were included. This excluded any type of non-professional/volunteer services.	Community Mothers Program; Volunteer services
<i>Child outcomes</i>	Only child outcomes were included in the review. This excluded all parent outcomes, interactional outcomes, family outcomes, and socio-economic outcomes.	Parental stress; Parent-child interaction; Income; Employment
<i>Out-of-home placement</i>	Although is not considered to be a child outcome based on the criterion outlined above, we included studies on out-of-home placement as preventing placement is central to the program theory of many included interventions.	
<i>Year of publication</i>	Only interventions published since the year 2000 were included.	

out-of-home placement rates are analyzed including follow-up measurements until a year after case closure. By including follow-up measurements not only placement during intervention is assessed, but stability of family preservation after case closure can be assessed as well. The central research questions in this study are:

- (1) Which child outcomes are reported in studies evaluating home-visiting interventions for families with complex and multiple problems?
- (2) To what extent are home-visiting interventions for families with complex and multiple problems effective in preventing out-of-home placement?
- (3) To what extent are home-visiting interventions for families with complex and multiple problems effective in improving child outcomes?

## 2. Method

The report of this review and meta-analysis adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (Moher, Liberati, Tetzlaff, Altman, & the PRISMA group, 2009).

### 2.1. Eligibility criteria

As indicated in the introduction, home-visiting is used as a service delivery model in a variety of interventions. The aim of the selection procedure was to select articles reporting child outcomes and/or out-of-home placement rates of multi-domain home-visiting services for FECMP. Therefore, we used several eligibility criteria to restrict article selection to interventions providing services in multiple areas of life to address the needs of FECMP. Articles published since 2000 were included in the review. Although there were no restrictions to country of origin, only articles published in English and Dutch were included in the review. To avoid selection bias there were no restrictions to sample size to avoid excluding interventions that were more likely to be evaluated in small studies. Only interventions including children (5–18 years old) in services were included. Pre-natal and early childhood interventions (0–5 year) were excluded; studies without restrictions to the age of children were included in the review (see Table 1).

### 2.2. Search strategy

Five electronic databases were used to locate articles: PsycInfo, ERIC, SocIndex, Medline, and Picarta. Various descriptions of home-visiting programs (e.g. home-visiting, family preservation) in combination with target group descriptions (e.g. multi-problem families, multi-stressed families) were used as search terms. Furthermore, names of specific interventions included in earlier reviews (e.g. Homebuilders, Families First) were used. The selection of interventions included as search terms was based on earlier research on families with complex and multiple problems and intensive home-visiting programs (Veerman et al., 2005). A complete overview of search terms is provided in Table 2.

**Table 2**  
Search terms.

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Home visit\* AND (multi-problem OR multi-problem OR multi problem OR multi-stressed OR multi stressed OR multi-stressed OR multi-challenged OR multi-challenged OR multi challenged OR vulnerable OR troubled OR poverty OR poor OR chronic OR disadvantaged OR complex OR longstanding OR multiple risk\* OR abuse OR deprived OR multiple needs)

Home-based care AND (multi-problem OR multi-problem OR multi problem OR multi-stressed OR multi stressed OR multi-stressed OR multi-challenged OR multi-challenged OR multi challenged OR vulnerable OR troubled OR poverty OR poor OR chronic OR disadvantaged OR complex OR longstanding OR multiple risk\* OR abuse OR deprived OR multiple needs)

Placement prevention  
Family Preservation  
Intensieve Pedagogische Thuishulp  
Homebuilders  
Families first  
“wraparound care”  
“Ten for the Future” OR “Tien voor Toekomst”  
“Intensieve Orthopedagogische Gezinsbegeleiding”  
“Gezin Centraal”  
“Praktische Pedagogische Gezinsbegeleiding”  
HouVast  
“Intensieve Ambulante Gezinsbegeleiding”  
“Jeugdhulp Thuis”  
“Signs of Safety”  
“Voorwaardelijke interventie in gezinnen”  
“samen1plan”

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### 2.3. Study selection

A systematic search of the databases resulted in 8,377 hits. Studies in English and Dutch were included in the search procedure. First, all articles were assessed by the first author based on their title (*step 1; title selection*). In the title selection 7,649 articles were excluded of which 607 were duplicates. Secondly, all studies included in the title selection were assessed by the first author based on a quick reading of the abstracts (*step 2; abstract screening*). To avoid the exclusion of articles that should be included without second assessment a liberal approach to the inclusion of articles was adopted in these phases. Decisions to exclude specific interventions were made collaboratively by all authors. The studies included in the next phase were assessed by reading the abstracts and method sections. This was done by the first author and a group of graduate students to assess inter-rater reliability (*step 3a; abstract selection*). Agreement between the first and second assessor was 77%. For articles with no agreement between the first and second assessor, a third assessment was given by the second author. This assessment was binding in deciding which articles were included in the review (*step 3b; third assessment*).

Besides articles retrieved from the search query, three articles were included from grey literature (*step 4; other sources*). After abstract selection articles were retrieved by snowball selection of review studies that adhered to the inclusion criteria (*step 5; snowball reviews*) and snowball selection from included articles (*step 6; snowball selected articles*). Articles included in later stages of the review are marked in Fig. 1 with an asterisk (in total  $n = 16$ ). All these articles were also assessed by graduate students and were all included in the review. Finally, all selected articles were assessed by a full reading of the publication (*step 7; full article selection*). During this stage several articles were excluded, mostly due to the fact that outcomes could not be extracted from studies reliably. All decisions to exclude articles were made collaboratively by all authors. Forty-two publications were included.

### 2.4. Quality appraisal

To assess the quality of studies and the risk of within study bias, eight questions based on quality checklists by the Higgins et al. (2011)

and Viswanathan, Berkman, Dryden, and Hartling (2013) were used:

1. Did the study use an observational, quasi-experimental or experimental design? (**design**)
2. Was the study sample selected in a way that may decrease the sample's representativeness of the population? (**selection bias**)
3. Were participants allocated to research groups in a way that may decrease the comparability of these groups? (**allocation bias**)
4. Did the study use validated research instruments? (**instrumentation bias**)
5. Was the intervention implemented as intended? (**implementation bias**)
6. Were the methods of analysis suitable for the study design? (**statistical conclusion bias**)
7. Were all relevant outcomes reported? (**selective reporting bias**)
8. Were the conclusions reasonable given the design, analysis and limitations of the study? (**reporting bias & statistical conclusion bias**)

A study could be rated as low risk of bias (+), moderate risk of bias (+/-), high risk of bias (-) or unknown risk of bias (?). A more elaborate description of the quality assessment criteria is provided in Appendix A. For studies with a one-group design the question regarding allocation bias was not applicable. The quality appraisal of the studies is shown in Table 3. Quality assessment was first performed by the first author and secondly discussed with all authors to resolve differences in assessment.

### 2.5. Data extraction and coding

For every study in the review standardized effect sizes were calculated for out-of-home placement, behavioral problems and stressful experiences (see analysis). Several study level covariates related to intervention and target group characteristics were selected and coded. Based on literature concerning the program theories of home-visiting interventions (Loeffen & Pasveer, 2004; Tausendfreund et al., 2016; Tully, 2008) duration (weeks of intervention), intensity (hours of intervention/week) and caseload (< 5 cases; 5–10 cases; 10 > cases) were selected as intervention characteristics. Furthermore, age of the child (years), ethnicity (% of non-caucasian)<sup>1</sup>, gender (% boys), number of children (children in household) and single parent families (% single parent) were used as target group characteristics.

### 2.6. Analysis

For each study the reported outcomes were extracted and categorized. Standardized effect sizes were calculated for all outcomes. Meta-analytic models were estimated for out-of-home placement, children's emotional and behavioral problems, and children's stressful experiences.

The meta-analytic models were estimated using the *Metafor* package in R (Viechtbauer, 2010). To assess the out-of-home placement rates of home-visiting interventions we used survival curve random effects meta-analysis based on a Weibull distribution of survival rates at multiple time points. This meta-analytical technique can be used to combine survival estimates (i.e. children not placed out of home at a

<sup>1</sup> Note: Although not preferred by the APA Guidelines for unbiased language we operationalized ethnicity by distinguishing Caucasian and non-Caucasian participants (APA, 2012). Many studies did not report the ethnicities of their sample specific enough to reliably distinguish them in this meta-analysis. Although we concur that the classification 'non-Caucasian' is not sufficiently specific, we deem the inclusion of this variable informative due to known differences of ethnic groups in the context of family preservation (see for example Kirk & Griffith, 2008).



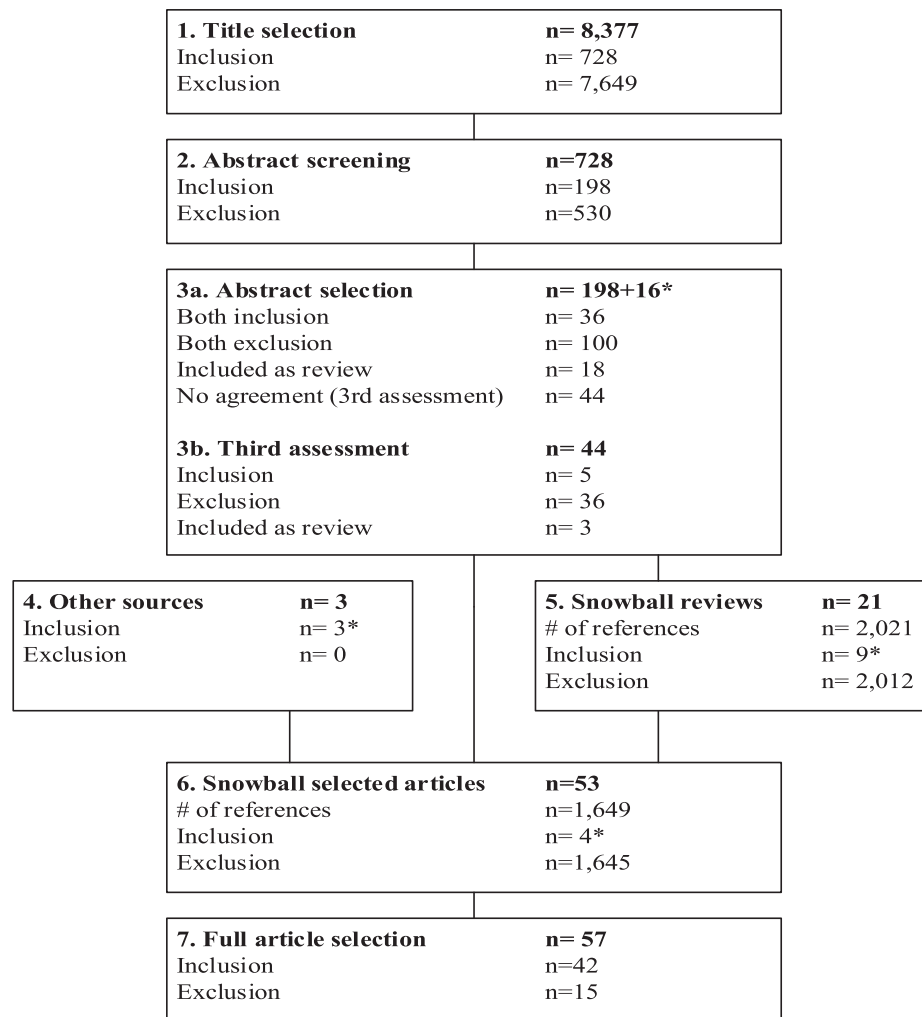


Fig. 1. Study selection process.

certain time point) with a limited number of measurements (Arends, Hunink, & Stijnen, 2008; Dear, 1994). For children's emotional and behavioral problems and stressful experiences random-effects meta-analytic models were estimated. For these outcomes Cohens  $d$  (Cohen, 1992) was used as effect size. The effect sizes included in the meta-analyses provided information on the *size of change*. To analyze the *severity* of children's emotional and behavioral problems and stressful experiences at *intake* and *case closure* we used descriptive statistics of pre- and post-test scores. Case intake and closure are defined as the first and last session of the intervention; sessions denoted as 'follow up' were considered to take place after case closure.

The calculation of Cohen's  $d$  for pre-test post-test designs requires knowledge of the correlation between measurements. Not all studies provided sufficient information to calculate these correlations. For studies with insufficient information for the calculation of these correlations a correlation of  $r = 0.5$  was assumed (based on studies with observed correlations). Sensitivity analyses were performed with correlations of  $r = 0.2$  and  $r = 0.8$ . Models were estimated using Restricted Maximum Likelihood Estimation (REML). Other estimators (Full maximum likelihood, Siddik-Jonkman, Dersimonian-Laird) were used to assess the sensitivity of outcomes for different estimation procedures. (Viechtbauer & Cheung, 2010). Furthermore, the trim and fill method was used to assess the robustness of findings (Peters, Sutton, Jones, Abrams, & Rushton, 2006).

Studies were weighted using their sampling variances (Borenstein, 2009; Hedges & Vevea, 1998; Shadish & Haddock, 2009). The Q-test

(significance test for homogeneity of effect sizes) and  $I^2$  (proportion of total variation due to heterogeneity of studies) were used to assess the heterogeneity of effect sizes (Higgins & Thompson, 2002; Viechtbauer, 2007). Several studies in the sample compared multiple types of home-visiting services; for these publications outcomes and predictors were coded separately for each type of services. Since these interventions are often provided by the same care organizations and investigated by the same research team, there is dependency between observations. To assess the influence of dependency of measurements within these studies, multilevel models were estimated as well. As no practically significant differences were found in the multilevel models only the models without multi-level structure are reported. Study effect sizes, confidence intervals, and combined effect size estimates were visually represented in a forest plot (Lewis, 2012).

To assess the influence of publication bias, Egger's regression was used and funnel plots were inspected (Peters et al., 2006). The trim and fill method (Duvall & Tweedie, 2000) was used to assess the sensitivity of model findings to publication bias. To assess robustness of findings, a failsafe  $n$  statistic was calculated to indicate how many studies with null-findings were necessary to half the effect size estimate (Orwin, 1983). Furthermore, regression diagnostics (studentized residuals, dffit, Cooks distance, covariance ratio and hat) were performed to analyze the influence of outliers on model estimates (Viechtbauer & Cheung, 2010). Outcomes of sensitivity analyses were only reported when model outcomes deviated from the original analysis.

To explain heterogeneity of effect sizes, intervention and target

**Table 3**  
Quality appraisal scores.

	design	selection	allocation	instrument	implementation	analysis	outcomes	Conclusion
1. Al, Stams, Asscher, and Van Der Laan (2014)	-	-	na	+	+	+/-	?	+
2. Bagdasaryan (2005)	-	+/-	na	+/-	+	+	+/-	+
3. Baxter (2010)	-	+	na	+/-	+	+/-	+/-	+/-
4. Berry et al. (2000)	-	+	na	+/-	+	+/-	+/-	+
5. Biehal (2005)	+/-	?	-	+	?	+/-	+	+
6. Bitonti (2002)	-	+	na	-	?	+/-	+/-	+/-
7. Blythe and Jayaratne (2002)	+	+	+	+	+	+/-	+/-	+
8. Cash and Berry (2003)	-	?	na	+/-	+	+	+	+/-
9. Coleman and Jenson (2000)	-	+	na	+	+	+	+/-	+
10. Damen and Veerman (2013)	-	+	na	+	+	+	+/-	+
11. Damen and Veerman (2015)	-	+	na	+	+	+	+/-	+
12. Damen, Veerman, and Janssen (2002)	-	-	na	+	+/-	+/-	+	+
13. De Kemp et al. (2001)	-	+/-	na	+	+	+	+	+
14. De Kemp et al. (2003)	-	?	na	+	?	+/-	+	+
15. De Veld, Vermeulen, and Janssens (2008)	-	?	na	+	?	+/-	+/-	+
16. Department of Health and Human Services (2001)	+	+	+	+/-	+/-	+	+/-	+
17. Diamond, Morris, and Caudill (2011)	+/-	+	-	+	?	+	+/-	+
18. Escaravage (2014)	-	+/-	na	-	?	+	+/-	+
19. Fluke, Edwards, Kutzler, Kuna, and Tooman (2000)	-	+	na	+/-	?	+	-	+
20. Forrester, Copello, Waissbein, and Pokhrel (2008)	+/-	+	+/-	+/-	+	-	+/-	+/-
21. Forrester, Holland, Williams, and Copello (2016)	+/-	-	-	+	?	-	+	+/-
22a. Huebner (2008)	+/-	+	-	+	+	+/-	+	+
22b. Huebner (2008)	+/-	+	-	+	+	+/-	+	+
23. Huebner, Robertson, Roberts, Brock, and Geremia (2012)	+/-	-	-	+	+	+	+/-	+/-
24. Hurley et al. (2012)	-	+	na	+	+	+	+	+
25. Kemper (2004)	-	?	na	+	+	+/-	+	+
26. Kirk and Griffith (2004)	+/-	+	-	+	+	+	-	+
27. Kirk and Griffith (2008)	+/-	+	-	+	+	+	-	+
28. Lewis (2005)	+	?	+	+/-	+	+/-	+/-	+/-
29. Littell (2001)	-	?	na	+/-	?	+	+/-	+
30. Littell and Schuerman (2002)	-	?	na	+/-	?	+	+	+
31. Nelson and Nash (2008)	-	+	na	+	?	+	+	+
32. Niemi, Karjalainen, and Korhonen (2006)	-	+	na	-	?	-	-	-
33. Nederlands Instituut voor Zorg en Welzijn (2001)	-	+	na	+	+	+/-	+	+
34. Orobio de Castro, Veerman, Bons, and de Beer (2002)	-	+	na	+	+	+	+	+
35. Tausendfreund, Knot-Dickscheit, Post, Knorth, and Grietens (2014)	-	+/-	na	+	+	+	+	+
36. Ten Brink et al. (2001)	-	+	na	+	+	+/-	+	+
37. Tyuse et al. (2010)	+	+/-	na	+	?	+/-	+	-
38. Van Puyenbroeck et al. (2009)	-	?	na	+	+	+/-	+	+
39. Veerman, de Kemp, Ten Brink, Slot, and Scholte (2003)	-	+/-	na	+	+	+/-	+	+
40. Veerman, De Meyer, and Roosma (2007)	-	?	na	+	+	+/-	+/-	+
41. Walton (2001)	-	?	na	+/-	+	+/-	+/-	+
42. Woolfall et al. (2008)	-	+	na	+	+	+/-	+	+/-

+ small risk of bias; +/- medium risk of bias; -high risk of bias; ? Unknown risk of bias; na not applicable

group characteristics were included as covariates in the meta-analytic model. Separate meta-regression models were estimated for each predictor. However, due to the limited number of observations for each outcome, interpretation mainly focused on practical significance of the estimates instead of statistical significance. Predictors were centered to aid interpretation and comparison with the model without predictors. Quality appraisal scores were not included as a predictor in the meta-analyses. However, differences in outcomes and predictors between studies with different amounts of risk of bias were investigated using descriptive statistics. For all outcomes and covariates a missing data analysis was performed, comparing cases with observed data and cases with missing data on all other variables. Results of the quality appraisal and missing data analysis are only reported when practically significant differences were observed.

Finally, other outcomes were only reported in a few studies. Due to the limited amount of available data these estimates were not combined in a meta-analysis but reported in a qualitative description of study outcomes.

### 3. Results

#### 3.1. Intervention and target group characteristics

Most studies included in the review used a one-group observational

**Table 4**  
Target group and intervention characteristics.

	K	Unit	mean	med	sd	Min	Max
Duration	41	Days	116.7	42.0	132.2	26.0	469.0
Intensity	25	Hours/week	8.0	8.1	4.6	1.0	16.6
Age	37	Years	9.2	9.7	2.5	5.2	15.0
Avg. no. of children	20	Children	2.3	2.3	0.7	1.2	3.5
Gender	31	% boys	57.5	55.0	12.8	31.0	100.0
Ethnicity	27	% minority	34.9	30.0	25.8	0.0	100.0
Single parent	22	% single parent	44.3	42.9	13.8	23.0	79.0

Note: Several publications contained information on multiple types of home-visiting or reported on multiple studies. Outcomes were coded separately for different types of home-visiting and different studies. The reported number of studies (k) and statistics treat these studies as separate and refer to studies instead of publications.

design (k = 40); several studies (k = 7) use a quasi-experimental design. Only a few studies use an experimental design with random allocation of treatment groups (k = 3). In Table 4 the main characteristics of the interventions and target groups are represented. Although the mean duration of interventions is approximately four months, a dichotomous distinction between short- and long-term services is a better representation of care duration. As not all studies reported on all

**Table 5**  
Child outcomes reported in studies on home-visiting.

Category	Outcomes (k)	Publications
Out-of-home placement	Case closure (27)	Al et al. (2014); Bagdasaryan (2005); Berry et al. (2000); Cash and Berry (2003); Damen and Veerman (2013); Damen and Veerman (2015); Damen et al. (2002); De Kemp et al. (2001); Department of Health and Human Services (2001); Escaravage (2014); Fluke et al. (2000); Fluke et al. (2008); Huebner et al. (2001); Hurley et al. (2012); Kemper (2004); Kirk and Griffith (2004); Kirk and Griffith (2008); Kirk and Griffith (2008); Littrell (2001); Nederlands Instituut voor Zorg en Welzijn (2001); Ten Brink et al. (2001); Veerman et al. (2003); Woolfall et al. (2008)
	6 months follow up (13)	Berry et al. (2000); Biehler (2005); Blythe and Jayaratne (2002); De Kemp et al. (2003); Escaravage (2014); Fluke et al. (2000); Huebner (2008); Kirk and Griffith (2004); Kirk and Griffith (2008); Nederlands Instituut voor Zorg en Welzijn (2001); Veerman et al. (2003); Walton (2001)
	12 months follow up (14)	Berry et al. (2000); Bitonti (2002); De Kemp et al. (2001); De Kemp et al. (2003); Department of Health and Human Services (2001); Fluke et al. (2000); Huebner (2008); Kirk and Griffith (2004); Kirk and Griffith (2008); Littrell (2001); Littrell and Schuerman (2002); Nelson and Nash (2008); Niemi et al. (2006); Veerman et al. (2003)
	Other follow up (8)	Baxter (2010); De Kemp et al. (2001); Department of Health and Human Services (2001); Forrester et al. (2008); Forrester et al. (2016); Kemper (2004); Veerman et al. (2003)
Emotional and Behavioral problems	Emotional and behavioral problems (24)	Al et al. (2014); Berry et al. (2000); Biehler (2005); Damen et al. (2002); De Kemp et al. (2001); De Kemp et al. (2003); De Veld et al. (2008); Hurley et al. (2012); Kemper (2004); Lewis (2005); Orobio de Castro et al. (2002); Tausendfreund et al. (2014); Ten Brink et al. (2001); Tyuse et al. (2010); Van Puyenbroeck et al. (2009); Veerman et al. (2003); Veerman et al. (2007)
Child stress	Delinquent behavior (2)	Coleman and Jenson (2000); Diamond et al. (2011)
Child welfare and functioning	Stressful life events (9)	Damen et al. (2002); De Kemp et al. (2001); De Kemp et al. (2003); Ten Brink et al. (2001); Veerman et al. (2003)
	Wellbeing (5)	Berry et al. (2000); Biehler (2005); Cash and Berry (2003); Hurley et al. (2012); Tyuse et al. (2010)
	School functioning (3)	Berry et al. (2000); Hurley et al. (2012); Woolfall et al. (2008)
	Social-emotional functioning (2)	Hurley et al. (2012); Woolfall et al. (2008)
	General functioning (1)	Orobio de Castro et al. (2002)
Health	Health measures/hygiene (1)	Berry et al. (2000)

Note: reported sample sizes relate to number of studies. As some publications contain multiple studies the number of publications mentioned in the table does not add up to the number of studies.

intervention and target group characteristics there was considerable missing data for study level covariates (range 18–56%). Based on our analysis we assume that data Missing Not at Random (MNAR) is not likely. As missing data was mostly due to differences in study designs (i.e. differences in variables included in the study) most missing data was likely to be Missing At Random (MAR; Van Buuren, 2012).

3.2. Reported outcomes

The outcomes reported in the studies included in the review (k = 50) are grouped into five categories (Table 5): out-of-home placement, behavioral and emotional problems, stressful experiences, welfare and functioning, and health. Out-of-home placement is the most reported outcome measure (k = 34), followed by emotional and behavioral problems of children (k = 24). Furthermore, some studies examine the effectiveness of home-visiting services in reducing children’s exposure to stressful experiences (k = 9). Only a few studies report outcomes related to children’s functioning and wellbeing (e.g. school functioning, social-emotional function, cognitive development or general wellbeing) and health.

3.3. Out-of-home placement

3.3.1. Meta-analysis

Most studies reporting out-of-home placement rates used databases of care providers; some studies used national or statewide databases (e.g. Kirk & Griffith, 2004). The model estimates for out-of-home placement are shown in Table 6. The estimated average survival rate at case closure is 92.5%, which amounts to a placement rate of 7.5%. After six months the estimated survival rate is 86.3% (placement rate 13.7%). One year after case closure the survival rate is estimated at 75.7% (placement rate 24.3%). The test of Study level covariates (QM) shows that placement rates increased significantly during the year after case closure. The placement rates for each study are depicted in a forest plot in Fig. 2. The model shows significant residual heterogeneity (QE; Q-test for residual heterogeneity), indicating placement rates vary across studies. In an effort to explain differences in placement rates, we conducted an explorative analysis including study, intervention and target group characteristics as covariates.

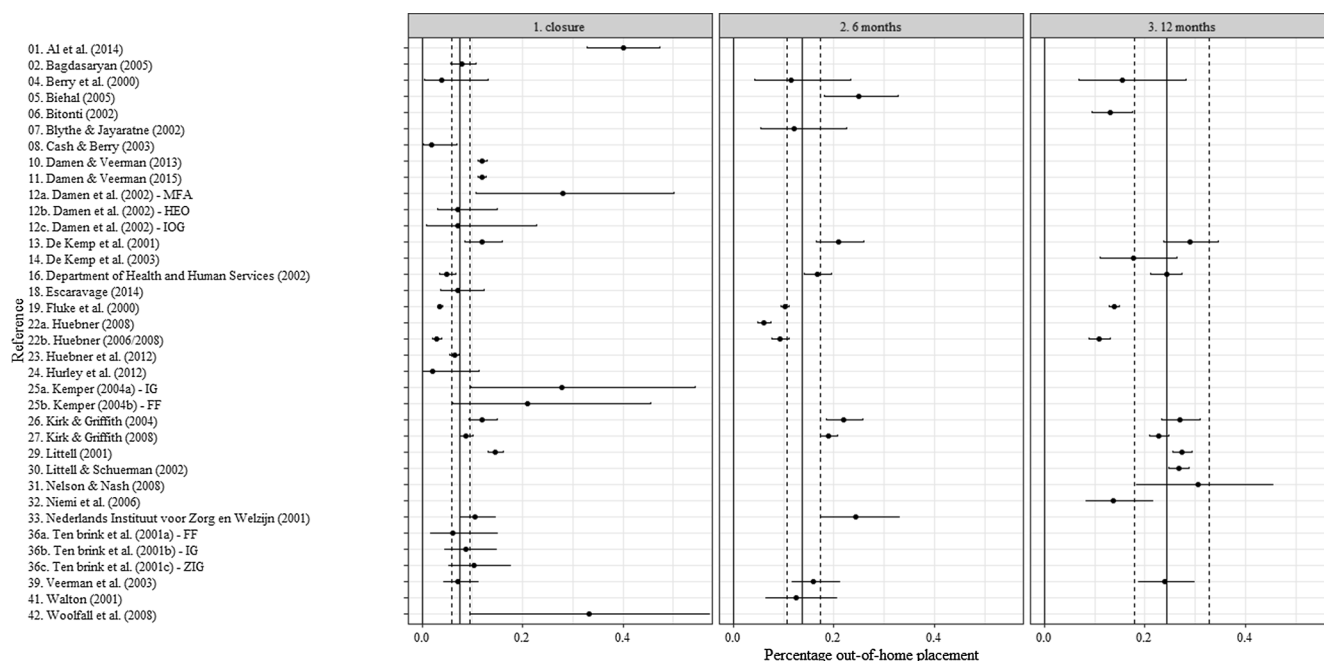
**Table 6**  
Meta-analysis model: Weibull survival rates of out-of-home placement.

Regression coefficients	Estimate (SE)	95% CI
<i>Fixed parameters</i>		
Weibull survival at closure	-2.55*	[-2.81; -2.30]
Weibull slope (6 months)	0.63*	[0.47; 0.80]
<i>Random parameters</i>		
τ <sup>2</sup> (total heterogeneity)	0.3326	[0.1760 ; 0.6955]
ρ (design effect)	0.7995	[0.4207 ; 0.9295]
<i>Heterogeneity tests</i>		
QM (test of study level covariates)		55.66 (1)*
QE (test for residual heterogeneity)		1703.75 (42)*

\* p < 0.01.

3.3.2. Comparison with treatment as usual

Five studies compare placement rates of home-visiting services with treatment as usual services (Biehler, 2005; Department of Health and Human Services, 2001; Kirk & Griffith 2004, 2008; Walton, 2001). At case closure outcomes of these studies show slightly lower placement rates for home-visiting services. However, at follow up measurements differences in placement rates decrease. At one-year follow-up no differences in placement rates are observed. In the study by the Department of Health and Human Services (2001) placement rates are higher for home-visiting services.



**Fig. 2.** Forest plot of out-of-home placement at case closure, 6 month and 12 month follow up. Dots and horizontal lines indicate placement rates and 95% confidence intervals for individual studies. Vertical lines indicate the combined meta-analysis estimates for each measurement. Dotted vertical lines indicate the 95% confidence intervals of the meta-analysis estimates for each measurement; MFA = Multifunctioneel Aanbod [multi-functional services], HEO = Hulp in Eigen Omgeving [Help in Own Environment]; IOG = Intensieve Orthopedagogische Gezinsbegeleiding [Intensive Orthopedagogical Family Support, (Z)IG = (Zeer) Intensieve Gezinsbegeleiding [(Very) Intensive Family Support], FF = Families First.

### 3.4. Emotional and behavioral problems

#### 3.4.1. Meta-analysis

Most studies reporting on emotional and behavioral problems used the Strengths and Difficulties Questionnaire (Van Widenfelt, Goedhart, Treffers, & Goodman, 2003) or the Child Behavior Checklist (Goodman & Scott, 1999). For some studies subscales on behavioral problems of family assessment scales were used. Emotional and behavioral problems at the start of intervention (pre-test) were compared with problems at case closure (post-test). On average interventions reporting on emotional and behavioral problems had a duration of 10 weeks. A mean effect of  $d = 0.50$  (95% CI: 0.43 – 0.58;  $p < .01$ ) is estimated for children's total emotional and behavioral problems. The analysis shows a significant amount of heterogeneity ( $Q(23) = 67.98$ ;  $I^2 = 63.90\%$ ;  $p < .01$ ) between study effect sizes. This indicates that children participating in home-visiting programs on average show a decrease in emotional and behavioral problems, although the extent of this change varies considerably between interventions ( $d = 0.20$  to  $d = 0.83$ ). No statistically and practically significant effects are found in the meta-regression models for service duration, intensity, age, gender, ethnicity or single parent families.

Several studies also provide outcomes for the subscales externalizing and internalizing behavioral problems ( $k = 12$ ). For externalizing problems, a mean difference between pre-test and post-test of  $d = 0.48$  (95% CI 0.40–0.56) is estimated, with no significant heterogeneity among studies ( $Q(12) = 11.76$ ;  $I^2 = 2.96\%$ ;  $p = .46$ ). For internalizing problems, a mean difference of  $d = 0.41$  (95% CI 0.33–0.49) is estimated, with no significant heterogeneity among studies ( $Q(12) = 12.90$ ;  $I^2 = 18.66\%$ ;  $p = .38$ ). No significant differences are found for intervention and target group characteristics in both of the models. Effect sizes for differences between pre-test and post-test of emotional and behavioral problems are depicted in Fig. 3.

#### 3.4.2. Problem behavior at intake and case closure

In most studies a considerable amount of problem behavior is reported at intake, with study averages falling in the clinical range. At the

individual level many cases are reported to fall in the clinical range. For example, Veerman, de Kemp, Ten Brink, Slot, and Scholte (2003) report 82% of cases with emotional and behavioral problems in the clinical range at the start of intervention. Although there is a moderate decrease in emotional and behavioral problems of children during the intervention, children still exhibit a considerable amount of problem behavior when services are terminated (see for example: De Kemp, Veerman, & Ten Brink, 2001; De Kemp, Veerman, & Ten Brink, 2003).

#### 3.4.3. Comparison with treatment as usual

Only two studies compare the effect of a home-visiting intervention on children's emotional and behavioral problems with a control group of treatment as usual services. Biehal (2005) found no difference between home-visiting services and treatment as usual services ( $d = 0.06$ ). Lewis (2005) found that children participating in home-visiting services there was a somewhat larger decrease in emotional and behavioral problems than those participating in treatment as usual ( $d = 0.18$ ).

### 3.5. Stressful life events of children

#### 3.5.1. Meta-analysis

Studies included in the meta-analytic model of stressful life events used the Questionnaire Life Events (Ten Brink, Kerkstra, Roosma, & Veerman, 2001) to measure to what extent children experienced stressful life events. Several studies compare the amount of stressful events children experienced during intervention with the number of stressful experiences in the year before intervention. A meta-analytic model of nine studies reporting the effects of home-visiting on children's stressful experiences shows that in all studies parents report less stressful events in the intervention period compared to the period before intervention. The mean difference is  $d = 0.50$  (95% CI 0.27–0.73) with significant heterogeneity between studies ( $Q(8) = 21.08$ ;  $I = 64.20\%$ ;  $p < .01$ ) (see Fig. 4).

Four studies distinguish between positive and negative stressful experiences (De Kemp et al., 2001; Ten Brink et al., 2001). For each



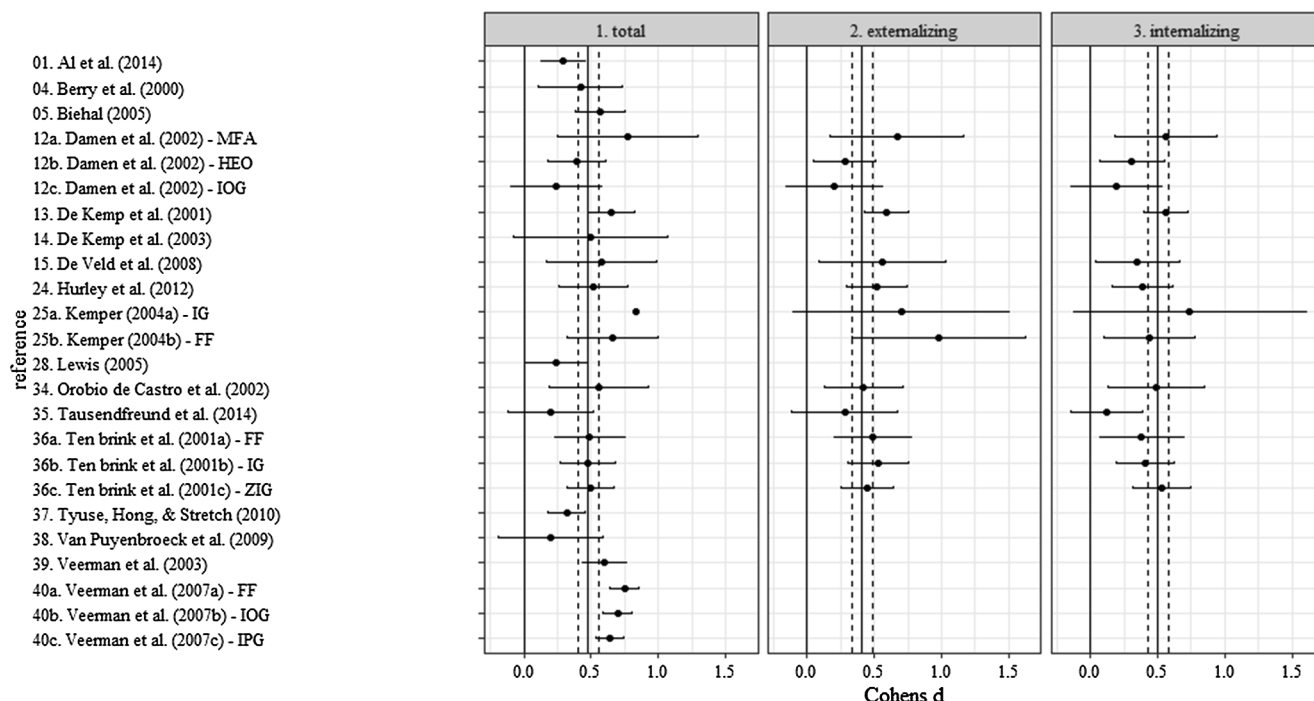


Fig. 3. Forest plot of emotional and behavioral problems.

stressful experience that was reported by children in the questionnaire they indicated whether they experienced the impact as positive (for example a birth of a sibling) or negative (for example the death of a relative). Three studies report a decrease in positive stressful experiences during intervention. One study reports an increase in positive stressful experiences. The average difference in positive stressful experiences between the year before intervention and the period of intervention is  $d = 0.41$  (95% CI  $-0.09-0.91$ ). Three studies report a decrease of negative stressful experiences during the intervention period. One study finds an increased number of negative experiences during intervention. The average effect size for negative stressful experiences is  $d = 0.27$  (95% CI  $-0.04 - 0.59$ ). No meta-regression was conducted due to the limited number of studies reporting stressful experiences.

3.5.2. Stressful experiences at case closure

At case closure many parents still report a considerable amount of stressful experiences in their children's lives, with studies reporting 17 to 82% of children scoring in the clinical range.

3.6. Other child related outcomes

Outcomes related to children's development, functioning, and welfare are only reported in a small number of studies. Hurley et al. (2012) found a small improvement in children's affective, interpersonal and intrapersonal skills after their family had participated in home-visiting services. With regard to children's wellbeing there is some evidence of improving outcomes of children participating in home-visiting interventions (Berry, Cash, & Brook, 2000; Cash & Berry, 2003; Hurley et al., 2012; Tyuse, Hong, & Stretch, 2010; Biehal, 2005). Only one study investigated children's health in home-visiting interventions. Berry et al. (2000) found that care workers observed an improvement in both physical and mental health of children. With regard to the relation of home-visiting with children's functioning at school, outcomes of studies are conflicting (Berry et al., 2000; Hurley et al., 2012; Woolfall, Sumnall, & McVeigh, 2008). Based on the limited number of studies, with conflicting outcomes, it is not possible to draw reliable conclusions on the relation between home-visiting and children's functioning and development.

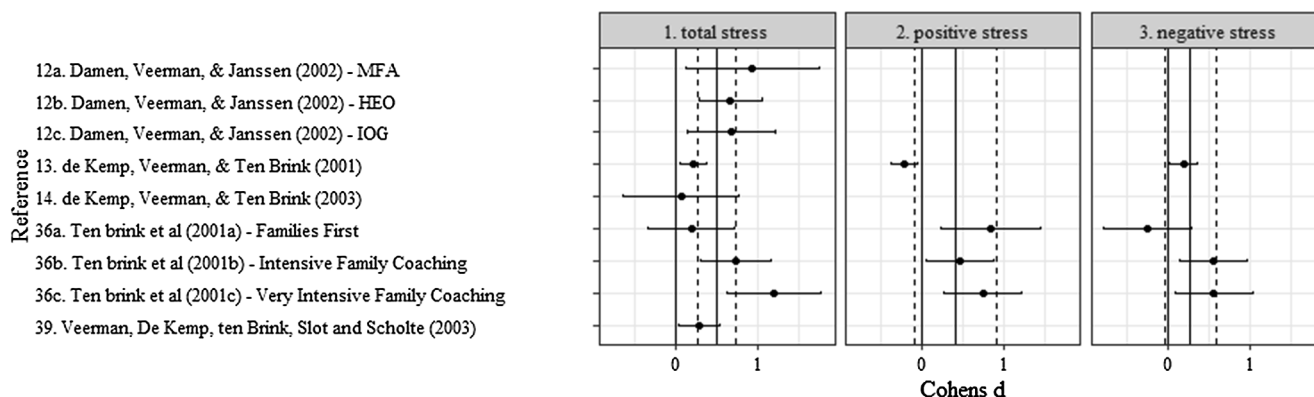


Fig. 4. Forest plot for children's stressful experiences.

## 4. Discussion

### 4.1. Scope of the review: Intervention characteristics and outcomes

The aim of this study was to investigate which child outcomes were reported in evaluation studies of multi-domain home-visiting interventions and assess to what extent these interventions were effective in improving these outcomes. The categorization of reported child outcomes shows that studies included in the review are either focused on the child as a source of problems in the family (e.g. behavioral and emotional problems) or the child as subject to negative influences from the environment (e.g. out-of-home placement, subject to environmental stressors). Only a few studies report outcomes that are related to the child as an active participating family member (e.g. psychosocial skills and functioning) or the child's developmental needs (e.g. physical, psychological and social needs).

It is likely that the scope of child outcomes reported in evaluation studies is related to the interventions and outcomes included in the review. We used the term *home-visiting* to denote a variety of programs sharing some common characteristics. As indicated in the introduction, we have limited the scope of our review to only include multi-domain home-visiting programs for FECMP. The use of search terms such as *Family Preservation* and *Placement Prevention* may have resulted in a sample of articles about home-visiting interventions where preventing out-of-home placement is central to the program theory. However, using more general search terms such as *home-visiting*, including specific interventions as search terms, and the use of snowball sampling may have added to the representativeness of our sample.

By using multiple search terms and snowball selection it is likely that most studies indicated as *home-visiting*, *family preservation*, or *placement prevention* were included in our review. Studies identified through these search terms were mostly based in the United States. In our search procedure we have also included several specific intervention names to identify program evaluations. As these programs are predominantly Dutch, this may have resulted in an overrepresentation of Dutch interventions. Furthermore, some programs from Finland, Belgium, and the United Kingdom were included in our analysis. Several interventions from other countries were identified, but were excluded as they did not meet the inclusion criteria. The lack of studies from other countries may be partly due to the fact that these intervention-based approaches are less prevalent in several countries (Boddy, Smith, & Statham, 2011). Furthermore, our choice of search terms may have failed to identify programs that meet the inclusion criteria, but use other program descriptions and are less connected to the literature of home-visiting interventions included in our review.

As indicated in our review we have excluded interventions with a narrower family-focused approach focused on parenting and behavioral problems. Reviews of these interventions more often focus on behavioral problems such as anti-social behavior, delinquency, or substance use (e.g. Hartnett et al., 2017). In the context of care provision, Tereno et al. (2017) have suggested that in home-visiting interventions for FECMP professionals often experience difficulties in addressing parenting issues and child outcomes as social support needs are often the first line of intervention. This supports the distinction between interventions for families with severe parenting and behavioral problems and FECMP. Furthermore, studies on pre-natal, post-natal and early childhood interventions – also excluded from this review – tend to center around child health and wellbeing as this is a central focus of these interventions (see for example Peacock et al., 2013). Our finding that the most reported outcome is out-of-home placement is to be expected given the scope and search terms of our review. However, even when preventing placement is central to program theories there are limitations to restricting evaluation studies to only measuring placement rates (Maluccio & Whittaker, 1997). We concur with D'Cruz and Stagnitti (2008) that “a broader focus on child welfare would address children's need for protection, as well as their more general well-being that

tends to be disregarded if only focusing on discrete incidents of maltreatment” (D'Cruz & Stagnitti, 2008, p. 158). The fact that only a small number of studies in the last decade reports on these outcomes shows that variables related to a more general concept of child welfare still tend to be disregarded in these kind of program evaluations.

### 4.2. Out-of-home placement

In our analysis of out-of-home placement the increase of out-of-home placement in the survival curve meta-analysis was considerable, with an increase of the estimated average placement rate of 7.5% at case closure to 24.3% at one year after case closure. In this study case closure was used as baseline for the survival curve model. When case intake is used as baseline, descriptive statistics suggest that children are placed out of home less often when they participate in long-term services. The higher placement rate of children in short-term services may be an indication that families are in need of more long-term services as has been proposed by Tausendfreund (2015). Further research using case intake as baseline, accounting for service duration, is needed to investigate to what extent continued service provision is related to rates of out-of-home placement. Furthermore, to assess whether home-visiting is effective in preventing out-of-home placement more studies using control groups are needed.

As Loeffen and Pasveer (2004) indicated the term home-visiting services is used to denote a wide variety of interventions sharing some common characteristics. Although we were not able to account for the heterogeneity in outcomes in our models, the significant heterogeneity of findings is an indication that the average estimates should not be too readily generalized to home-visiting in general. It is very likely that within the broad spectrum of home-visiting interventions there is a variety of approaches with varying degrees of effectiveness. To properly take into account the diversity of intervention approaches and diversity of the target group it is important to investigate service elements of interventions and the match of these elements with family's problems (Bagdasaryan, 2005; Evenboer, Huyghen, Tuinstra, Knorth, & Reijneveld, 2012; Tausendfreund et al., 2016).

### 4.3. Emotional and behavioral problems, stressful experiences and other outcomes

With regard to children's emotional and behavioral problems we found moderate differences between case intake and case closure for total problems ( $d = 0.50$ ), internalizing problems ( $d = 0.41$ ) and externalizing problems ( $d = 0.48$ ). Similarly, we found a moderate decrease for children's total number of stressful experiences ( $d = 0.50$ ), positive stressful experiences ( $d = 0.41$ ) and negative stressful experiences ( $d = 0.27$ ). Although there is a decrease in children's emotional and behavioral problems and exposure to stressful experiences, there are still considerable problems at termination of services in many cases.

The meta-analytic models for emotional and behavioral problems and stressful experiences are based on studies with pre-test post-test designs without control groups. Families are most likely to enter services at the moment they experience substantial problems. Therefore, it is possible that problems decrease during services due to regression to the mean. Without the use of control groups, it is not possible to establish whether decreases in emotional and behavioral problems and stressful experiences are due to the intervention or regression to the mean.

We found no significant effects for any of the study level covariates in any of the meta-analyses. The remaining behavioral problems and stress after termination of home-visiting services may explain the significant increase of placement rates after case closure, since it may be an indication that the living situation of children is not stable enough to adequately support child development. Although no significant differences were found for care duration, another hypothesis to be

investigated relates to the effect of closure and continuation of services.

Some studies found that home-visiting services may have a positive effect on outcomes related to children's skills and development (e.g. psychosocial skills, health, wellbeing etc.). However, since only a very limited number of studies reported on these outcomes no reliable conclusions can be drawn about the effectiveness of home-visiting services on these outcomes.

## 5. Limitations

Although the total number of studies included in the review ( $k = 50$ ) is rather large, the number of studies for each outcome is limited. This implies that an empty model could be estimated for the outcomes, but meta-regression was often not feasible. The missing data analysis showed missing data was mostly missing at random (MAR; Van Buuren, 2012). In general maximum likelihood models (as used in this study) are able to generate unbiased estimates when data is missing at random. However, because of the considerable missing data the lack significant effects observed in the meta-regression models for target group and intervention characteristics should be interpreted with caution. For some covariates significant effects were found at the study level. For example, Bagdasaryan (2005) found that a longer service duration was more likely to result in a successful case outcomes.

Several sensitivity analyses were conducted to assess the robustness of findings (different heterogeneity estimators, exclusion of influential cases, trim and fill methods, different assumptions regarding correlations among measurements and hierarchical models to account for dependency among observations). The influence of including studies with small samples in the meta-analyses was investigated as well. No practically significant differences in results were found, suggesting robust findings.

As indicated in our results most studies had observational designs. In the three studies using experimental designs randomization resulted in comparable groups. For studies with quasi-experimental designs the comparability of groups varied across studies. Overall families participating in home-visiting services showed more severe problems than those in control groups with treatment as usual.

Finally, this review focused solely on out-of-home placement and child outcomes. Two of the main characteristics of families with complex and multiple problems are that problems occur on multiple levels (individual, family, context, society) and that problems are interrelated and sustain each other (Ghesquière, 1993; Holwerda, Reijneveld & Janssen, 2014; Tausendfreund, 2015). As we restricted our study to child outcomes and did not include variables on other levels, estimated effects in our meta-analytic models may be confounded by changes at the family level. For example, the decrease in emotional and behavioral problems may be the result of changes in parenting abilities rather than a direct effect of the intervention.

## 6. Implications and recommendations

Our review indicates that children participating in multi-domain home-visiting services show a moderate decrease in emotional and behavioral problems and experience less stressful life events. However, many children still experience problems at case closure and a considerable group of children is placed out of home in the year after case closure. This implies that, although children participating in home-visiting interventions show improvement on several outcomes, many children still experience out-of-home placement in the year following case closure. Furthermore, there is considerable heterogeneity in outcomes between children and interventions. More research is needed to investigate which intervention approaches are effective and identify suitable target groups for services.

With regard to future evaluations of home-visiting interventions we recommend that service elements should be well-defined and taken into

account in evaluation studies. Furthermore, we recommend future evaluations to consider a broader spectrum of child outcomes besides out-of-home placement. It would be valuable to take outcomes related to children's skills, wellbeing and needs in future research on home-visiting, since these outcomes may provide information about differential effectiveness of services. Furthermore, information on these outcomes may help to shape intervention practice. For example, the study by Hurley et al. (2012) found positive effects of home-visiting on children's social-emotional skills and functioning. Tausendfreund (2015) suggested that providing more direct support to children in families with complex and multiple problems, for example through a dual care worker approach (Tausendfreund, 2015; Thoburn et al., 2013), may be beneficial.

Furthermore, several authors have called for more long-term and collaborative approaches to care for families with complex and multiple problems (Tausendfreund, 2015; Tausendfreund et al., 2016). This review partially supports this notion by showing that at case closure considerable problems are still present in children and placement increases significantly during the year after case closure. Although no differences in placement rates were found at case closure between short and long-term services, there are indications that prolonged service provision may prevent placement.

By identifying target group characteristics, intervention elements and evaluating multiple outcomes, effective intervention approaches can be identified and matched to suitable target groups. This requires not only knowledge of different home-visiting approaches, but also a comparison across service types (e.g. less intensive interventions such as parent training or more invasive intervention such as foster care or residential care). A comparative approach of interventions, both within and outside the home-visiting framework, may help to move from a child protection versus family preservation dichotomy towards a discourse where child protection and family preservation are subsidiary to a more holistic concept of child and family welfare (Courtney, 1997; Maluccio & Whittaker, 1997).

## 7. Submission declaration

The authors state that some descriptive results of this review were published in a Dutch-language book on families with complex and multiple problems. The editors of this book have permitted the publication of this article in a peer reviewed journal. The article in its current form (including model estimations and discussion of results) has not been published and is not submitted for publication elsewhere.

## CRedit authorship contribution statement

**A.G. (Arjen) Assen:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Writing - review & editing, Visualization. **J. (Jana) Knot-Dickscheit:** Conceptualization, Methodology, Investigation, Writing - review & editing, Supervision. **W.J. (Wendy) Post:** Conceptualization, Methodology, Formal analysis, Writing - review & editing, Supervision. **H. (Hans) Grietens:** Conceptualization, Methodology, Writing - review & editing, Supervision.

## Declaration of Competing Interest

The authors are currently involved in an evaluation of care services that is partly funded by the service provider evaluated in the study by Tausendfreund et al. (2014). The authors state that there are no other interests of conflict.

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## Appendix A

### Design

*Did the study use an observational, quasi-experimental, or experimental design?*

Studies using one-group observational designs were considered to have a high risk of bias (–) as no comparison with a control group was possible. Studies using quasi-experimental designs were considered to have moderate risk of bias (+/–) and randomized designs were considered to have low risk of bias (+).

### Selection

*Was the study sample selected in a way that may decrease the sample's representativeness of the population?*

Selection bias was assessed using the description of the selection procedure and mechanisms of drop-out and missingness of studies. Studies using data from entire populations, or with negligible drop-out and non-participation were considered to have low risk of bias (+). When studies reported drop-out or non-participation related to outcomes of interest studies were considered to have moderate (+/–) or high (–) risk of bias, depending on the extent to which selection decreased representativeness of the population.

### Allocation

*Were participants allocated to research groups in a way that may decrease the comparability of these groups?*

This criterion was not applicable for one-group designs. All randomized studies used proper randomization procedures (e.g. coin toss or binomial sequence) and had comparable groups. Hence they were considered to have low risk of bias (+). Allocation bias was assessed for studies with natural allocation by assessing whether the allocation procedure resulted in incomparable groups. Studies without reported differences of practical significance were considered to have moderate risk of bias (+/–). Studies showing practically significant differences – for example with more severe cases in home-visiting services – were considered to have a high risk (–) of allocation bias.

### Instrumentation

*Did the study use validated research instruments?*

Studies using instruments with positive psychometric assessments for the population of the study were considered to have low risk of bias (+). Studies were considered to have medium (+/–) or high (–) risk of instrumentation bias when unvalidated instruments were used, or notable limitations with regard to the instrument were reported. For example, several studies using existing databases reported difficulties in retrieving the appropriate information.

### Implementation

*Was the intervention implemented as intended?*

When studies indicated the intervention was implemented as intended (e.g. by measuring treatment fidelity standards) studies were considered to have low implementation bias (+). When studies reported a lack of adherence to treatment standards or problems in implementation, studies were considered to have moderate (+/–) or high (–) risk of bias.

### Statistical validity

*were the methods of analysis suitable for the study design?*

For this criterion we assessed whether the data analysis used in the study was appropriate for the study design and the data that was collected. When the analysis was appropriate studies were rated as having low risk of bias (+). Studies were rated as having moderate risk of bias (+/–) or high risk of bias (–) when analyses were not suitable for the data. Examples of bias in statistical analysis was not correcting for observed differences in group characteristics or the use of linear regression models on censored data.

### Selective reporting

*Were all relevant outcomes reported?*

For this criterion studies were rated as having low risk of bias (–) when all relevant child and family characteristics and outcomes were reported. When important outcomes or characteristics were not reported studies were rated as having moderate (+/–) or high (–) risk of bias.

### Conclusion

*Were the conclusions reasonable given the design, analysis and limitations of the study?*

For this criterion it was assessed whether the conclusions of studies were reasonable given their limitations. Examples of aspects rated in this criterion were generalizability of findings, assessment of possibly confounding variables, and assessment of the influence of selection, allocation and missing data on the conclusions of studies.

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