murdoch children's research institute

Social Ventures Australia
Funding • Investment • Advice

BAIN & COMPANY

RESTACKING THE ODDS

RESTACKING THE ODDS

TECHNICAL REPORT

Sustained Nurse Home Visiting: An evidence-based review of indicators to assess quality, quantity, and participation.

Version 1.0

Carly Molloy
Ruth Beatson
Sharon Goldfeld
Nicholas Perini
Christopher Harrop

THE TEAM

Restacking the Odds is a collaboration between three organisations, each with relevant and distinctive skills and resources:

- *Murdoch Children's Research Institute (MCRI)* brings deep knowledge and credibility in the area of health and educational research, along with a network of relevant relationships
    - Prof Sharon Goldfeld –Director Centre for Community Child Health and Theme Director Population Health, Royal Children's Hospital and Murdoch Children's Research Institute
    - Dr Carly Molloy – Senior Research Officer and Senior Project Lead, Murdoch Children's Research Institute
- *Bain & Company* brings expertise in the development of effective strategies that deliver real results
    - Chris Harrop – a senior partner, and a member of Bain's worldwide Board of Directors

- *Social Ventures Australia (SVA)* brings expertise in providing funding, investment and advice to support partners across sectors to increase their social impact
    - Nick Perini – Director, SVA Consulting.

Suggested citation: Molloy C., Beatson R., Goldfeld S., Perini N., Harrop C. Restacking the Odds – Technical Report: Sustained Nurse Home Visiting: An evidence-based review of the relevant measures to assess quality, quantity, and participation. Melbourne, Australia, 2020.

TABLE OF CONTENTS

LIST OF FIGURES **5**

LIST OF TABLES **5**

LIST OF ABBREVIATIONS **6**

EXECUTIVE SUMMARY **7**

Restacking the Odds: Project Background 7
Introduction: Sustained Nurse Home Visiting 8
Aim 9
Method 9
Peer-reviewed Literature *10*
Ranking the Evidence *10*
Expert Evaluation of Draft Indicators *10*
Findings 11
Quality Indicators *11*
Participation Indicators *11*
Quantity Indicators *12*
Conclusion *12*
Implications *13*

INTRODUCTION **14**

Background: Restacking The Odds 14
Sustained Nurse Home Visiting 15
Aim 16

METHOD **17**

Defining the Research Question 17
Search Strategy & Search Terms 18
Paper Selection 18
Information Management 19
Coding Protocol 20
Evaluation of the Evidence 20
Identification of Critical Components 21

RESULTS **23**

RESULTS PART 1: EFFECTIVE PROGRAMS 24
Identifying Effective SNHV Programs *24*
Systematic Reviews 24
Program-Specific Reviews 24
Individual Randomised Controlled Trials 24
Program Summaries *36*
Child Outcomes *46*
Short-Term Child Outcomes 46
Child Physical Health 46
Child Psychosocial Outcomes 50
Long-Term Child Outcomes 53
Parent Outcomes *57*
Short-Term Maternal Outcomes 57
Maternal Physical Health 57
Maternal Parenting Outcomes 60
Maternal Psycho-Social Outcomes 67
Maternal Life-Course 71

Long-Term Maternal Outcomes 73
Sustained Nurse Home Visiting Programs: Summary Evidence *77*
RESULTS PART 2: EFFECTIVE COMPONENTS 82
Overview of meta-analyses *82*
Quality *84*
Content components 84
Process components 86
Provider components 89
Participation *95*
Program Commencement, Duration, And Completion 96
Number of Visits 97
Duration of Visits 97
Timing/Frequency of Visits (intended only) 98
Quantity *100*
CONCLUSIONS 103
SUMMARY 103
SNHV Quality Indicators *103*
SNHV Participation Indicators *104*
SNHV Quantity Indicators *104*
STRENGTHS OF THE APPROACH 105
LIMITATIONS OF THE APPROACH 105
GAPS IN THE LITERATURE AND DIRECTIONS FOR FUTURE RESEARCH 106
IMPLICATIONS 107
REFERENCES 109
APPENDICES 115
APPENDIX A: SEARCH STRATEGY AND KEY TERMS 115
APPENDIX B: STUDY QUALITY RATING METHODOLOGY 116
APPENDIX C: OVERALL RANKING OF THE EVIDENCE 119
APPENDIX D: DETAILS OF CHILD OUTCOMES BY PROGRAM 120
APPENDIX E: DETAILS OF PARENT OUTCOMES BY PROGRAM 127
APPENDIX F: META-ANALYSES OVERVIEWS 138
APPENDIX G: QUALITY, PARTICIPATION AND QUANTITY SNHV INDICATORS 140

LIST OF FIGURES

Figure 1: Five fundamental strategies 8
Figure 2: PRISMA flow diagram of initial literature search and study selection 23

LIST OF TABLES

Table 1: Study inclusion and exclusion criteria 19
Table 2: Characteristics of included SNHV studies 25
Table 3: Program descriptions 36
Table 4: Child physical health – short-term outcomes (birth to preschool) 46
Table 5: Sub-group analyses on child physical health (birth to preschool) 47
Table 6: Child psychosocial outcomes (birth to preschool) 50
Table 7: Sub-group analyses on child psychosocial health (birth to preschool) 50
Table 8: Long term child outcomes from NFP trials 53
Table 9: Maternal Short-term physical health outcomes 58
Table 10: Short term parenting outcomes 60
Table 11: Sub-groups with positive parenting effects 62
Table 12: Maternal psycho-social outcomes – short term 67
Table 13: Sub-group effects on maternal psycho-social outcomes 68
Table 14: Maternal life-course – short term outcomes 71
Table 15: subgroup effects on early maternal life outcomes 72
Table 16: Long term maternal outcomes 74
Table 17: Overview of findings for SNHV programs with child and parent outcomes 77
Table 18: List of SNHV programs by evidence ranking 80
Table 19: Overview of most effective components identified in meta-analyses 82
Table 20: Components related to specific outcomes from 3 meta-analyses 83
Table 21: Content components of SNHV programs by evidence ranking 84
Table 22: Comparison of process components by SNHV program evidence ranking 86
Table 23: Provider components of SNHV programs by evidence ranking 89
Table 24: Proposed quality indicators for SNHV services. 93
Table 25: Participation components by program and evidence ranking 95
Table 26: Proposed participation indicators for SNHV programs 99
Table 27: Proposed quantity indicators for SNHV services 101
Table 28: Program by Critical Factors for Implementation Decisions 101

LIST OF ABBREVIATIONS

AFDC	Aid to Families with Dependent Children
CHW	Community Health Worker
CRCT	Cluster Randomised Controlled Trial
CSW	Clinical Social Worker
FNP	Family Nurse Partnership
IPV	Intimate Partner Violence
LGA	Local Government Area
MECSH	Maternal and Early Childhood Sustained Home-visiting
NHV	Nurse Home Visiting
NFP	Nurse Family Partnership
QALY	Quality Adjusted Life Years
RCT	Randomised Controlled Trial
SES	Socio-economic Status
SIDS	Sudden Infant Death Syndrome
SNHV	Sustained Nurse Home Visiting
TANF	Temporary Assistance for Needy Families

EXECUTIVE SUMMARY

Restacking the Odds: Project Background

Too many children are born into circumstances that do not provide them with a reasonable opportunity to make a good start in life. Disadvantaged circumstances for children lead to developmental inequities in physical health, social-emotional wellbeing, and academic learning. These inequities emerge in early childhood and often continue into adulthood, contributing to unequal rates of low educational attainment, poor mental and physical health and low income. In some cases, this experience is part of a persistent cycle of intergenerational disadvantage. Inequities constitute a significant and ongoing social problem and – along with the substantial economic costs – have major implications for public policy.

Research has shown that to redress these developmental inequities, effort delivered during early childhood (from pregnancy to 8 years of age) has the greatest benefit. As a result, *Restacking the Odds* focuses on five key evidence-based interventions/platforms in early childhood (*see Figure 1: Five Fundamental Strategies)*:

1. Antenatal care;
2. Sustained nurse home visiting;
3. Early childhood education and care;
4. Parenting programs; and
5. The early years of school.

These five strategies are only a subset of the possible interventions relevant to early childhood, but have been selected carefully. They are notably *longitudinal* (across early childhood), *ecological* (targeting child and parent), *evidence-based*, and able to be *targeted* to benefit the 'bottom 25 per cent' (i.e., those most disadvantaged). The premise is that by 'stacking' these fundamental interventions (i.e., ensuring they are all applied for a given individual) there will be a cumulative effect - amplifying the effect and sustaining the benefit.

For each of the five strategies, the intent is to use a combination of data-driven, evidence-based and expert-informed approaches to develop measurable, best practice indicators of quality, quantity (access) and participation (reach):

Quality: Are the strategies *delivered effectively*, relative to evidence-based performance standards? A high-quality strategy is one for which there is robust evidence showing it delivers the desired outcomes. A larger number of research studies have explored aspects of this question (i.e., "what works?") compared with quantity and participation. Therefore, we pay particular attention to the quality dimension in this report.

Participation: Do the *appropriately targeted* children and families *participate* at the right dosage levels? "Participation" shows us what portion of the relevant groups are exposed to the strategy at the level required to generate the desired benefit. (For example, attending the required number of antenatal visits during pregnancy). Participation levels can be calculated whether the strategy is universal (for everyone), or targeted (intended to benefit a certain part of the population).

Quantity: Are the strategies *available locally* in sufficient quantity for the target population? "Quantity" helps us determine the quantum of effort and infrastructure needed to deliver the strategy adequately for a given population.

In this project, indicators of quality, quantity and participation are used to help identify gaps and priorities in Australian communities. This will include testing preliminary indicators in 10 communities over the next 3 years to determine which are pragmatic to collect, resonate with communities, and provide robust measures to stimulate community and government action.

The findings summarised in this report on the second strategic area - Sustained nurse home visiting - will provide essential inputs to guide subsequent work for the *Restacking the Odds* project. There is a similar report for each of the five strategies.

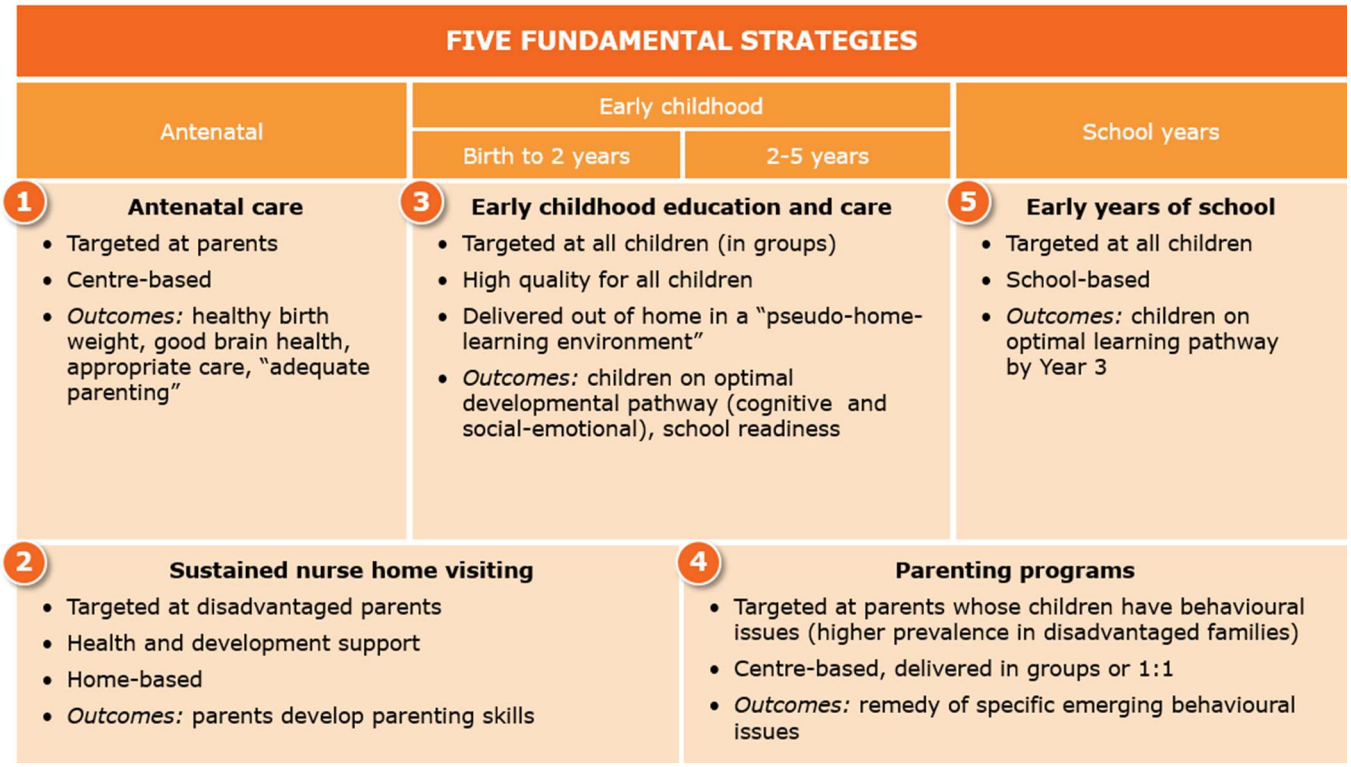

Figure 1: Five fundamental strategies

Introduction: Sustained Nurse Home Visiting

Nurse home visiting (NHV) programs aim to promote health equity through a focus on mothers living in adversity. NHV programs are used to deliver multiple services/interventions within the family's home environment. They generally target risks and protective factors related to prenatal health, sensitive and competent care-giving, and early parental life-course outcomes. Advantages to home visiting include (a) improved access, (b) more opportunities for rapport building, and (c) service tailored according to individual family needs (Goldfeld, Price, & Kemp, 2018; McDonald, Moore, & Goldfeld, 2012; Sidora-Arcoleo et al., 2010).

Results from meta-analytic reviews of home visiting programs suggest there are multiple benefits, spanning child health and development outcomes, improved parenting, and maternal life course

(Filene, Kaminski, Valle, & Cachat, 2013; Kendrick, Barlow, Hampshire, Stewart-Brown, & Polnay, 2008; Nievar et al., 2010; Peacock, Konrad, Watson, Nickel, & Muhajarine, 2013; Sweet & Appelbaum, 2004). As such, NHV programs have been widely implemented in the US (Olds et al., 2015), and are becoming increasingly popular in Australia (Schmied et al., 2011), the UK (Robling et al., 2016), Germany (Jungmann, Ziert, Kurtz, & Brand, 2009) and the Netherlands (Mejdoubi et al., 2015).

If governments are to invest significant resources in delivering NHV programs with the aim of achieving equity in health outcomes, it is important to know which programs work, for whom, and in what system contexts. An understanding of the program components that significantly improve child and parent outcomes is also critically important. Such knowledge can be used to guide the development of (a) programs with the best chance of achieving the desired outcomes and (b) measures to ensure continuous quality improvement in an Australian service system context.

In this review we focus on *sustained nurse* home visiting (SNHV). This is because earlier home visiting reviews (e.g. McDonald et al., 2012; Peacock et al., 2013) suggest effective programs tend to include a greater number of visits and are delivered over a longer duration. The rationale for focussing on nurse-delivered programs is likewise evidence-based. Indeed, there is converging evidence from systematic reviews (Gomby, 2005; Holzer, Higgins, Bromfield, Richardson, & Higgins, 2006), meta-analyses including within-study comparisons (Casillas, Fauchier, Derkash, & Garrido, 2016) and experimental investigations (Olds et al., 2002) suggesting nurse-delivered programs demonstrate improvements across more outcomes with larger effects than those delivered by paraprofessionals.

Aim

This restricted review of the evidence base for SNHV addresses questions in three key areas:

1. *Quality.* What *practices* in SNHV are significantly related to better birth outcomes or improved child or parent outcomes? What *process indicators* can be used to measure and define these practices?

2. *Participation.* What population is most likely to benefit from participation in a quality SNHV program and at what dosage-level?

3. *Quantity.* Given targeted provision, in what quantity should SNHV be available for a given population?

Method

We undertook a restricted systematic review; a research methodology that uses similar methods and principles to a comprehensive systematic review but makes concessions to the breadth and depth of the process, in order to be completed within a shorter timeframe. Rigorous methods for locating, appraising and synthesising the evidence related to a specific topic are utilised; however, the methodology places several limitations in the search criteria and in how the evidence is assessed. A separate search for the key drivers (quality, participation, quantity) was not required as all relevant SNHV programs should have been captured and information about quality, participation, or quantity was extracted from individual studies where available.

Peer-reviewed Literature

We sought to identify meta-analyses, systematic reviews and randomised controlled trials (RCTs) published between January 2008 and February 2018 from the peer-reviewed literature with the aim of identifying both (a) SNHV programs, and (b) analyses of the componentry underpinning program effectiveness. Meta-analyses and systematic reviews constitute the highest levels of evidence, based on the NHMRC evidence hierarchy as they combine the results from multiple studies to increase the power to detect effects and produce a more precise estimate of the effect of treatment by consolidating sometimes conflicting results across studies (Hoffman, 2015). RCTs on the other hand are considered the 'gold standard' way to assess a program's effectiveness.

Ranking the Evidence

Each systematic review, meta-analysis, and RCT that met the inclusion criteria was subject to a quality and bias check. Study quality includes assessment of internal validity or the degree to which the design and conduct of the study avoid bias (e.g. through randomisation, allocation concealment and blinding) and external validity or the extent to which the results of the study can be applied, or generalised, to the population outside the study. The quality and bias information was used to consider the conclusions of included studies and the potential effectiveness of each SNHV program identified.

Considering the accumulated evidence, a judgement was reached about the strength of the evidence base for each SNHV program (See Appendix C: Overall Ranking of the Evidence). The criteria was adapted from The California Evidence-based Clearinghouse for Child Welfare (CEBC, 2016). Contrary to the evidence ranking system applied for some of the other fundamental strategies identified by RSTO, replication of effects across multiple trials for each SNHV program was not a requirement to receive a Supported ranking. This is because all the recently trialled SNHV programs meeting inclusion criteria had been evaluated in only one trial. The evidence ranking was determined by two independent raters and consensus was reached in the event of any rating discrepancy

- *Supported*. Clear, consistent evidence of benefit.
- *Promising*. Evidence suggestive of benefit but more evidence needed.
- *Evidence fails to demonstrate an effect*.
- *Unknown*. Insufficient evidence or no effect.
- *Concerning practice*.

Expert Evaluation of Draft Indicators

The distilled list of indicators was vetted by two Australian experts:

- *Lynn Kemp. Professor Nursing and Director TReSI, Western Sydney University*
- *Professor Graham Vimpani, University of Newcastle, Discipline of Paediatrics and Child Health*

These experts were asked to independently comment on the developed list of supported SNHV programs and their input was sought on the indicators created for quality, quantity, and participation.

Findings

The literature search and screening process resulted in the identification of three relevant meta-analyses, one systematic review, two program-specific reviews and nineteen peer-reviewed publications covering 10 individual trials of 8 programs (n=9 RCTS, 1 CRCT). Most evaluations examined the US-based Nurse Family Partnership (NFP) or a close adaptation of it, such as the Family Nurse Partnership (FNP) in the UK or VoorZorg in the Netherlands. Other NFP-based programs included Pro Kind (Germany) and Minding the Baby (US) - both of which departed from the original NFP model more substantively. Two Australian programs were also identified; the Maternal and Early Childhood Sustained Home visiting program (MECSH) and right@home. These programs were all ranked Supported. The eighth program was an unnamed Nurse-Community Health Worker team approach to SNHV. This program was rated Promising. However, it is worth noting that the Nurse-CHW program was compared with a model of usual care that involved a substantive number of home visits. For all other programs, the usual care comparison groups did not receive sustained nurse home visits.

The development of quality, quantity, and participation indicators was informed by the identification of program components associated with effectiveness. These were identified through examination of (a) relevant home-visiting meta-analyses addressing program componentry and (b) an exploration of components characterising effective SNHV programs specifically.

Quality Indicators

Components related to program quality were divided into three categories including content (what is delivered), process (how it is delivered), and provider (by whom it is delivered). The evidence base suggests the quality of program content may be gauged by the extent to which programs include (a) information and strategies related to a comprehensive range of topics, but especially parenting issues, problem-solving, and the home learning environment, (b) visits focussing on priority outcomes as identified on referral or by parents, and (c) avenues to connect families with specific support from evidence-based programs and community engagement opportunities. The process indicators relate to (a) continuity of care, (b) translation of material to improve access to linguistically diverse groups, (c) record keeping relating to risk factors such as smoking, substance misuse, mental health, family-violence, and (d) quality assurance monitoring. Provider indicators include measures of (a) the type of training and professional development received, (b) level of supervision, (c) caseload, and (d) access to multi-disciplinary support.

Quality indicator

The SNHV program is one of the seven supported programs, or the SNHV program reaches the high quality threshold for each of the three quality domains of content, process, and nurse-provider.

Participation Indicators

There was some evidence from the included meta-analyses that home visiting programs with more intensive visiting schedules have larger effects. There was also evidence from the comparison of programs that visit frequency should be more intensive during the early perinatal period and taper off

over time. The comparison of participation components characterising effective SNHV programs showed that (a) all commenced prenatally and (b) most continued to child age 2 years (c) with at least 25 scheduled visits (d) of 60-90 minutes and (e) more frequent visitation in the antenatal and early post-partum period.

Participation indicators were developed to measure aspects of program attendance and frequency of visits. Attendance indicators include the proportion of families receiving a full program (i.e. 25 visits or retention to child age 2 years) and the proportion of families with specific risk factors (such as youth or indigenous background) accepting a program place. Visit frequency indicators relate to the proportion of all families and families living in disadvantaged areas who receive a minimum number visits during the 3rd trimester of pregnancy, the first month following birth and up to child age three months.

Participation indicator

The target population (i.e. mothers living in adversity) should attend a high quality SNHV program at the right dose. A high quality program is defined as one of the seven Supported SNHV programs or if a NHV program achieves a "high" quality threshold for each quality domain (content, process, nurse-provider). (The threshold is the estimate required to deliver a quality NHV program that will be tested in the field and re-evaluated).

Quantity Indicators

The meta-analyses and RCTs included in the review generally provided little information about what proportion of a population should receive support from a home visiting service. However, one Australian RCT suggests demand for SNHV program places will be high (~ 96% of eligible families could be expected to accept a program place, with almost 90% retention). Data from the Commonwealth Department of Social Services could be used to determine what proportion mothers in each LGA is considered to be living in adversity and eligible to receive a SNHV place.

Quantity indicators were developed to measure health infrastructure including facility density and the number of program places and hours needed to meet service demand. Quantity indicators related to health workforce capacity include the number of Maternal and Child Health Nurses and Social Care Practitioners.

Quantity indicator

The number of places offered in a local community, in Supported (high quality) SNHV programs.

Conclusion

The aim of this restricted review was to identify the key components of SNHV programs that effectively improve child and family outcomes, to inform the development of program quality, quantity, and participation indicators. A search of the academic literature was conducted and resulted in the identification of three meta-analyses which broadly assessed critical components of home visiting programs. Eight specific SNHV programs, tested in good quality RCTs and demonstrating effectiveness on at least one child or parent outcome, were also identified. The evidence base for seven programs was rated as Supported.

The results suggest that to achieve outcomes of similar magnitude to those observed in this review, SNHV programs need to satisfy several quality and participation indicators. Quality indicators relate to program content, process of delivery, and provider. The quality of program content may be gauged by the extent to which services offer comprehensive, evidence-based specific supports, that are tailored to the individual needs of each family. The quality of program delivery may be gauged by the extent to which services offer: continuity of care, translation of material to reach linguistically diverse groups, accurate record keeping and referral to additional services for mothers living in adversity compounded by multiple or severe risk factors, and quality assurance processes to ensure family needs are addressed in a timely manner. The quality of program providers may be gauged by the extent to which nurses have appropriate training and professional development, adequate supervision, reasonable caseloads, and access to multi-disciplinary support. Indicators of adequate program participation relate to the proportion of vulnerable families accepting program places and receiving the recommended number of scheduled visits both across the course of the program and during identified critical periods.

To ensure that health infrastructure and workforce capacity can meet demand, indicators were developed to calculate the number of program places and hours that would need to be funded, and the number of nurses and social workers likely to be required.

Implications

The preliminary indicators and thresholds we have selected will help identify gaps and priorities for SNHV in Australian communities. We will test them in ten communities over the next three years to determine which are pragmatic to collect, resonate with communities, and provide robust measures to stimulate community and government action. We will follow a similar path for the other four fundamental strategies that Restacking the Odds is focusing on – antenatal care, early childhood education and care, parenting programs, and the early years of school.

INTRODUCTION

Background: Restacking The Odds

Too many children are born into circumstances that do not provide them with a reasonable opportunity to make a good start in life. Disadvantaged circumstances for children lead to developmental inequities in physical health, social-emotional wellbeing, and academic learning – that is, differential outcomes that are preventable.

Inequities emerging in early childhood often continue into adulthood, contributing to unequal rates of low educational attainment, poor mental and physical health and low income. In some cases, this experience is part of a persistent cycle of intergenerational disadvantage. Inequities constitute a significant and ongoing social problem and – along with the substantial economic costs – have major implications for public policy.

The importance of early childhood and the impact of this period on long-term developmental outcomes has been well documented (Moore, Arefadib, Deery, Keyes, & West, 2017). Research has demonstrated that this period is crucial for brain development across all domains, and that both risk and protective factors encountered by the child during this time can have life-long impacts (Walker et al., 2011). In particular, exposure to multiple risk factors predicts more severe, adverse developmental consequences compared with a singular risk factor (e.g. Ferraro & Shippee, 2009; Trentacosta et al., 2008). Furthermore, research has shown that developmental interventions that isolate only one risk factor are less likely to work than those that are multi-faceted (e.g. James et al., 2016; Nigg, Allegrante, & Ory, 2002; Nigg & Long, 2012).

The premise behind the Restacking the Odds approach to intervention is that resources/assets accumulate and the benefits of multiple assets accrue, leading to more positive outcomes. In line with this premise and research on cumulative risk, we hypothesise that inequities can be reduced by using existing, evidence-based interventions and approaches from service providers of the following five strategies: antenatal care; sustained nurse home visiting; early childhood education and care; parenting programs; and the early years of school. These strategies are notably longitudinal (across early childhood), ecological (targeting child and parent), evidence-based (RCT level support), and able to be targeted (aimed at benefiting the 'bottom 25 per cent', namely the most disadvantaged). By 'stacking' these fundamental interventions (i.e., ensuring they are all applied) it is predicted that there will be a cumulative effect, amplifying the effect and resulting in sustained benefits.

In order to achieve this, the *Restacking the Odds* project seeks to use the existing evidence within the 5 fundamental strategies of early childhood, to develop best practice benchmark frameworks that better define indicators of quality, access (quantity), and reach (participation).

This report focuses on the strategy of *Sustained Nurse Home Visiting*. There is a similar report for each of the five strategies.

Sustained Nurse Home Visiting

Nurse home visiting (NHV) programs aim to promote health equity through a focus on mothers living in adversity (Avellar & Supplee, 2013; Bowen, Zwi, Sainsbury, & Whitehead, 2009). *NHV programs*, are used to deliver multiple services/interventions within the family's home environment. The overarching strategy of the most researched and well-known NHV programs is to target risks and protective factors related to prenatal health, sensitive and competent care-giving, and early parental life-course outcomes. Some of the advantages to offering support through home visiting include (a) improved access, because parents do not have to identify and seek out services or arrange for transportation, child care or time off from work, (b) more opportunities for family involvement, personalised service and rapport building, and (c) the ability for visitors to observe families in the home environment and tailor service according to identified needs (Goldfeld et al., 2018; McDonald et al., 2012; Sidora-Arcoleo et al., 2010).

Results from meta-analytic reviews of home visiting programs suggest there are multiple benefits, including improved child development outcomes (cognitive and social-emotional), prevention of potential child abuse, better parenting behaviours and parenting attitudes, and maternal education outcomes when compared with a control group (Filene et al., 2013; Kendrick et al., 2008; Nievar et al., 2010; Peacock et al., 2013; Sweet & Appelbaum, 2004). For some NHV programs, the projected benefits to individuals and society more broadly are substantial (Miller, 2015). For example, it has been estimated that by 2031, enrolments in the US-based Nurse Family Partnership from 1996 to 2013 will prevent 500 infant deaths, 10,000 preterm births, 13,000 closely timed subsequent births, 4,700 abortions, 42,000 child maltreatment incidents, 36,000 intimate partner violence incidents, 90,000 violent crimes by youth, 594,000 property and public order crimes, 36,000 youth arrests, and 41,000 person-years of youth substance abuse. The program is also expected to save three billion dollars in government welfare spending. High returns on investment have also been estimated in cost-benefit analyses conducted by other independent researchers Some estimate $18,000 for every family served (Lee, Aos, & Miller, 2008) while others calculate net returns of $2.88 to $5.70 on every dollar spent (Karoly, Kilburn, Cannon, & Rand Corp, 2005).

Given the potential benefits of NHV programs it is not surprising that they are widely implemented in the US (Olds et al., 2015) and also popular in some Australian states. In Australia, existing home visiting programs are provided as part of some state-based maternal and child health or community child health services and target families (approximately 20-25% of the population) who require extra support due to a range of risk factors such as poor socio-economic status, Aboriginal and Torres Strait Islander children, child abuse or neglect (Government of South Government of South Australia, 2005; Kemp & Harris, 2012; McDonald et al., 2012; Sivak, Arney, & Lewig, 2008) . In Victoria, all families receive a home visit from a Maternal Child Health nurse, which covers specific health education topics and health assessments (e.g. breastfeeding, how play helps learning and development, family relationships and wellbeing) to monitor a child's growth and development (Victorian Department of Education and Victorian Government Department of Education and Training, 2018).

If governments are to invest significant resources in delivering NHV programs with the aim of achieving equity in health outcomes, it is important to know which programs work, for whom, and in what system contexts. An understanding of the program components that significantly improve child and parent outcomes is also critically important. Such knowledge can be used to guide the development of (a)

programs with the best chance of achieving the desired outcomes and (b) measures to ensure continuous quality improvement in an Australian service system context.

In this review we focus on *sustained nurse* home visiting. This is because earlier home visiting reviews (e.g. McDonald et al., 2012) point to a general trend suggesting that programs demonstrating positive outcomes tend to include a greater number of visits and are delivered over a longer duration. The rationale for focussing on nurse-delivered programs is likewise evidence-based. Several systematic reviews have found that programs delivered by paraprofessionals are not generally as effective as those delivered by nurses (Gomby, 2005; Holzer et al., 2006). Similarly, a recent meta-analysis that included within-study comparisons of visitor background (combining three samples from studies of two program models) found the programs were more effective when delivered by professional than paraprofessional visitors (Casillas et al., 2016). There is also some direct empirical evidence favouring nurse delivery specifically. Indeed, in the Denver trial of the Nurse Family Partnership, the same program was delivered either by nurses or paraprofessionals (Olds et al., 2002). Results showed that when delivered by nurses, the program demonstrated significant improvements across more outcomes and the magnitude of effects was typically twice the size. Although some meta-analyses have failed to demonstrate an effect of visitor qualifications on home visiting outcomes (e.g. Nievar et al., 2010), this may be attributable to differences in the criteria used to define professionals and paraprofessionals (visitors with Bachelor-level training were included as paraprofessionals in that analysis) or between-program rather than within-program comparisons (Casillas et al., 2016).

Aim

This restricted review of the evidence base for SNHV addressed questions in three key areas:

1. *Quality.* What *best practices* in SNHV are significantly related to better birth outcomes or improved child or parent outcomes? What *process indicators* can be used to measure and define these best practices?

2. *Participation.* What are the best evidence-based indicators of the required participation in SNHV?

3. *Quantity.* Given targeted provision, in what quantity should SNHV be available for a given population?

METHOD

This literature review utilised a restricted but systematic evidence assessment. Restricted reviews, otherwise known as rapid reviews (Pluddemann, Aronson, Onakpoya, Heneghan, & Mahtani, 2018), use similar methods and principles to comprehensive systematic reviews but make concessions to the breadth and depth of the process, in order to be completed within a shorter timeframe. Rigorous methods for locating, appraising and synthesising the evidence related to a specific topic are utilised, however, the methodology places several limitations in the search criteria and in how the evidence is assessed. For example, restricted reviews often limit the selection of studies to a specific time frame (e.g., last 10 years), and limit selection of studies to published peer-reviewed, English studies (therefore excluding unpublished pilot studies, difficult-to-obtain material and/or non-English language studies). Restricted reviews can help inform policy and decision makers more efficiently by synthesising and ranking the evidence in a relatively short space of time, although it is not necessarily as exhaustive as a well-constructed systematic review or meta-analysis.

Defining the Research Question

The dual purposes of this review were: (a) to determine which SNHV programs targeted at mothers living in adversity and their children have demonstrated positive outcomes, and (b) to identify the key components (relating to quantity, quality, and participation) of such programs that appear to optimise the health of the child, mother and family.

The question was formulated within a Population Intervention Comparison Outcome (PICO)(PICO, Huang, Lin, & Demner-Fushman, 2006; Schardt, Adams, Owens, Keitz, & Fontelo, 2007) Framework. Operational definitions were established for key concepts, and specific inclusion and exclusion criteria were defined for screening studies for this review.

The population of interest for this review was mothers living in adversity and their children. Consistent with other reviews of nurse home visiting programs for mothers living in adversity and their children (Macdonald, Bennett, Higgins, & Dennis, 2010), we considered mothers to be living in adversity if they were: experiencing low Socio Economic Status (SES) (in terms of low income, receipt of welfare, unemployment, or unskilled/semi-skilled occupational status), educationally disadvantaged (i.e. non-completion of high school), young parents (<20 years of age), or sole parents.

Interventions were defined as SNHV programs if they commenced prior to the child's first birthday with an intended duration of at least 12 months from the time of enrolment and were delivered by nurses (either on their own or together with other visitors) primarily in women's own homes.

Health outcomes were defined broadly to include a suite of biopsychosocial determinants of health. Relevant child outcomes included indicators of physical health (e.g. birthweight, preterm birth, injuries, child maltreatment), cognitive and language development, and social-emotional functioning (e.g. internalising problems, behavioural disorders). Relevant parent outcomes included maternal prenatal health (e.g. gestational diabetes, pregnancy induced hypertension), birth outcomes (e.g., delivery by caesarean section), health behaviours (e.g. alcohol, tobacco, and drug use), parenting beliefs and practices (e.g. warm responsive parenting, use of harsh discipline), psychosocial health (e.g. depression, social support), and indicators of maternal life course (e.g. employment and education, arrests and

incarceration, relationship with child's father or other intimate partners). Equivalent indicators of paternal health and wellbeing were also considered relevant.

Balancing resource constraints with the extensive body of literature pertaining to SNHV programs, a decision was made to limit the review to the most rigorous and recent evaluations available. Thus, only programs identified in systematic reviews, meta-analyses, and randomised controlled or quasi-randomised controlled trials published in peer reviewed journals between January 2008 and February 2018 were included in this review. Program evaluations utilising matched comparison groups, historical comparisons, pre-test/post-test only, and case study designs were excluded. Grey literature was also excluded.

In addition to searching academic databases (as described below), the websites of several reputable evidence clearinghouses were also checked. Specifically, searches for relevant program evaluations were conducted using key words 'nurse' or 'home visit' on the following sites: Home Visiting Evidence of Effectiveness (https://homvee.acf.hhs.gov/), Blueprints for Healthy Youth Development (www.blueprintsprograms.com), California Evidence-Based Clearinghouse for Child Welfare (www.cebc4cw.org), and Promising Practices Network on Children Families and Communities (www.promisingpractices.net). These searches did not identify any programs meeting inclusion criteria other than those already sourced through the academic database search.

Search Strategy & Search Terms

The following four databases were used to identify relevant literature: Ovid MEDLINE, CINAHL (EBSCO), PsycINFO, and Cochrane Central Register of Controlled Trials. Searches were limited to articles and reports published in English between 2008 and the search date (February 2018).

The methodology underpinning this review sought first to identify guidelines, meta-analyses, or systematic reviews. The order of precedence is typically Guidelines > meta-analyses > systematic reviews. If appropriately focussed and high-quality guidelines, meta-analyses, or systematic reviews are identified, the search for primary research papers (e.g. RCTs) can be narrowed to later publication dates. In this restricted review, no guidelines were identified. As meta-analyses and systematic reviews concerned home visiting broadly defined, rather than specifically focusing on SNHV programs and their critical components, primary research studies spanning publication dates from 2008 to 2018 were also assessed.

To identify relevant literature, the search strategy had the form (social disadvantage OR synonyms) AND (mother OR synonyms) AND (home OR synonyms) AND (nurse OR synonyms) AND (systematic review OR meta-analysis OR randomised control trial OR synonyms). Key terms and synonyms used in each step of the search are presented in Appendix A: Search Strategy and Key Terms.

A supplementary search specifically aiming to identify meta-analyses of components predicting home-visiting effectiveness was also conducted using the same search terms and databases. Terms relating to nurses were dropped in this search and study design terms were limited to 'meta-analysis'.

Paper Selection

Consistent with the protocol for another systematic review of home visiting programs targeting mothers living in adversity (Macdonald et al., 2010), universally delivered programs were not eligible for inclusion in the review unless data was disaggregated and presented separately for those mothers

living in adversity. Also consistent with other systematic reviews of home visiting (Filene et al., 2013; Macdonald et al., 2010) programs were excluded if they targeted a specific population group (e.g. only women experiencing post-natal depression, women with substance abuse problems, programs targeting parents of children with specific developmental disabilities or chronic illness) or one specific outcome (e.g. smoking, breastfeeding). A decision was made not to exclude studies of programs where nurses worked together with another professional or paraprofessional visitor. However, to be included a substantial proportion of the program had to be delivered by nurses. After conducting searches, studies were evaluated according to the following inclusion and exclusion criteria:

Table 1: Study inclusion and exclusion criteria

Included:
1. Meta-analyses of components predicting effectiveness of home visiting programs 2. Systematic reviews including home-visiting programs targeting mothers living in adversity and/or their children 3. Reviews summarising the evidence base for well-established nurse home visiting programs 4. Evaluations of SNHV programs targeting mothers living in adversity and/or their children, utilising RCT or quasi-RCT designs.
Excluded:
1. Studies of programs with an intended duration of less than 12 months from enrolment 2. Studies of programs that commence later than child age 12 months 3. Studies of programs primarily delivered by paraprofessionals 4. Studies of programs delivered primarily by professionals other than nurses or midwives (e.g. psychologists, social workers). 5. Studies of programs that are not delivered primarily in the mothers' home (e.g. centre-based, group-based programs) 6. Studies of programs delivered to the general population (unless outcomes were reported separately for mothers living in adversity and/or their children) 7. Studies of programs specifically recruiting clinical subgroups (e.g. only mothers with a diagnosis of depression) 8. Studies of programs not targeting biological mothers (e.g. programs specifically targeting fathers, foster parents or kinship carers) 9. Theses, commentaries, editorials and protocol papers.

Information Management

Papers identified via filtering and key word searches were imported into EPPI-Reviewer 4 software. Further refinement was required to ensure that only high quality and relevant publications were included for data extraction. A screening process was adopted to code for eligibility using content from the title and abstract. All records were screened according the eligibility criteria and for quality control

purposes a sample of 15% was randomly selected and double-checked by a second reviewer (CM). There were no disagreements on decisions to "include" or "exclude". Full text versions of all studies identified as meeting eligibility requirements were obtained and uploaded to the software. A qualified reviewer (RB) then screened the full text papers and decided whether the paper should be included or excluded based on the inclusion and exclusion criteria. At this point 15% of the articles were randomly selected and checked by the second reviewer. Again, no discrepancies were identified. Papers meeting the inclusion criteria were subject to data abstraction. Quality and bias checks were performed for all included papers, and a subset of these (n=10) were double-coded by two independent reviewers. Discrepancies in overall ratings of quality were discussed and consensus reached.

Coding Protocol

Several papers were consulted to guide the development of a coding protocol for this restricted review. These included a previously published review of home visiting programs targeting vulnerable families (McDonald et al., 2012) and the protocol for a systematic review of home visiting programs targeting mothers living in adversity (Macdonald et al., 2010). Neither of these was specifically concerned with programs delivered by nurses or for a sustained period. The protocol for an RCT of a *SNHV* program currently under evaluation (Goldfeld et al., 2017) also proved useful for the purposes of identifying relevant program components.

Data extraction codes were constructed and organised according to the following broad categories: study design (e.g. systematic review, RCT), study scope (e.g. pilot, efficacy, effectiveness), country of evaluation, intervention and comparison group descriptions (e.g. program name, type of comparison group), delivery processes (e.g. program commencement, frequency and duration of visits), program content (e.g. health information, parenting education, facilitation of community and social services use, encouragement of participation in education and employment), fidelity of implementation, social validity, intervention cost, sample characteristics (e.g. demographic details, types of social disadvantage), provider details (e.g. demographics, qualifications, experience, training, and support), child outcomes (e.g. physical health and safety, psychosocial development), and parent outcomes (e.g. physical health and health behaviours, parenting practices, psychosocial health, and socioeconomic or life course indicators).

For many of the primary papers, a variety of study details could not be coded without reference to earlier publications or supplementary material. In these cases, the additional publications were sourced and used for data abstraction, but not counted in the total number of included publications. Earlier publications containing study details were typically protocol papers, process evaluations, or supplementary materials published online. Study details sourced from these papers primarily included details about program content, processes of delivery, and information about practitioners.

Evaluation of the Evidence

The overall strength of evidence supporting each program was ranked according to the quantity and quality of evaluations along with consistency of results. Programs with the strongest level of evidence were rated Supported, followed by those that were Promising. Programs not meeting criteria for these levels were to be categorised into three remaining levels: Fails to Demonstrate an Effect, Unknown, or Concerning Practice.

Each systematic review, meta-analysis, and RCT that met the inclusion criteria was subject to a quality and bias check. For systematic reviews/meta-analyses, the PRISMA checklist was used (Moher, Liberati, Tetzlaff, & Altman, 2009). The National Institute for Health and Care Excellence (NICE) quality and bias checklist was used for RCTs. Details of the quality rating methodology are provided in Appendix B. Study quality includes assessment of internal validity or the degree to which the design and the conduct of the study avoid bias (e.g. through randomisation, allocation concealment and blinding) and external validity or the extent to which the results of the study can be applied, or generalised, to the population outside the study. The quality and bias checklist was completed by a trained researcher.

Each study received one of the following three potential quality scores:

- ++: All or most of the checklist criteria have been fulfilled; where they have not been fulfilled, the conclusions are very unlikely to alter.
- +: Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter.
- -: Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

The quality and bias information was used to consider the conclusions of included studies and systematic reviews/meta-analyses to determine the potential effectiveness of each SNHV program identified.

In consideration of the accumulated evidence for related studies a judgement was reached about the strength of the evidence base for each SNHV program (see Appendix C for full details). The criteria were adapted from The California Evidence-based Clearinghouse for Child Welfare (CEBC, 2016). Contrary to the evidence ranking system applied for some of the other fundamental strategies identified by RSTO, replication of effects across multiple trials for each SNHV program was not a requirement to receive a Supported ranking. This is because all the recently trialled SNHV programs meeting inclusion criteria had been evaluated in only one trial. The evidence ranking was determined by two independent raters and consensus was reached in the event of any rating discrepancy.

- *Supported*. Clear, consistent evidence of benefit.
- *Promising*. Evidence suggestive of benefit but more evidence needed.
- *Evidence fails to demonstrate an effect*.
- *Unknown*. Insufficient evidence or no effect.
- *Concerning practice*.

Identification of Critical Components

The main purpose of this review was to identify the critical components of SNHV programs that optimise child and family outcomes. Ideally, such components would be identified in systematic reviews and meta-analyses. This would require sufficient numbers of high-quality RCTs conducted across many vulnerable populations with sufficient variation in implementation of candidate components and

sufficiently detailed reporting on these components. Assuming such conditions are met, a series of meta-analyses could theoretically provide strong evidence that particular components are associated with the largest and most generalisable effects. This situation is unlikely for pragmatic and ethical reasons; so too is it unlikely that many (if any) RCTs will include systematic variation of the components thought critical to program effectiveness.

For these reasons, two strategies were used to identify critical components. First, meta-analyses of home visiting programs were consulted. Only those evaluating the relationship between program components and program effectiveness were included. Meta-analyses specific to paraprofessionals were excluded, whereas those including a variety of providers (e.g. nurses, other professionals, or paraprofessionals) were included. Such analyses should identify components that are critical for most home visiting programs, and by extension also important for SNHV programs. The other strategy employed to identify critical components involved examining features that characterise programs with demonstrated effectiveness. This involved identifying effective SNHV programs and looking at what they had in common. This type of strategy has been used recently by others to identify common components in home visiting programs specifically aiming to prevent or reduce child maltreatment (Kaye, Faber, Davenport, & Perkins, 2018).

RESULTS

This section shows the number of publications identified at each stage of the search process and gives a brief overview of the types of publications ultimately included in the review. The following sections address (a) which SNHV programs are effective and (b) the critical components of effective programs. Effective components are organised according to indicators of quality, quantity, and participation.

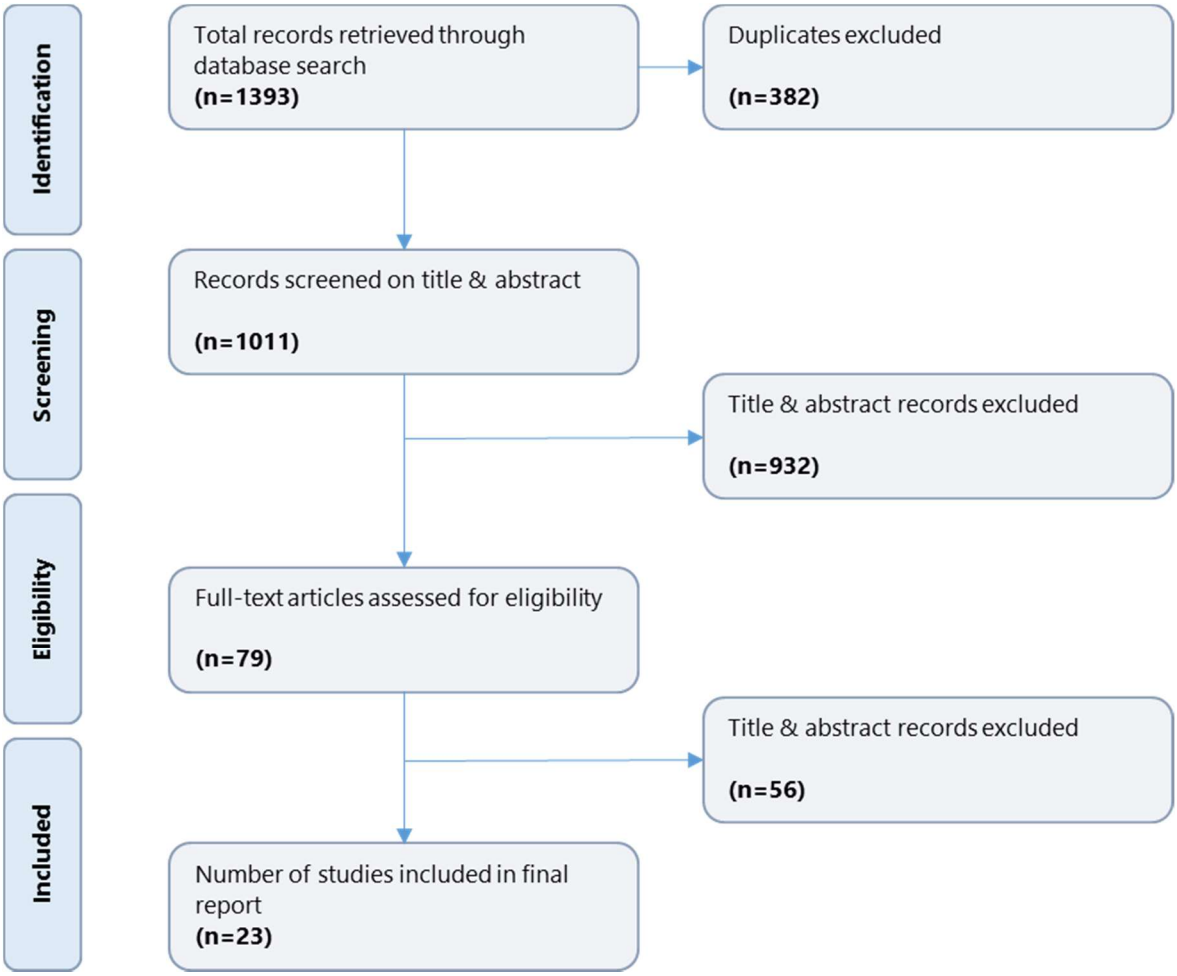

Figure 2: PRISMA flow diagram of initial literature search and study selection

As shown in Figure 2, the initial search and screening process resulted in the identification of 23 publications meeting inclusion criteria. Two additional papers were also included. One was identified in the supplementary search specific to meta-analyses (Casillas et al., 2016). The other was published after the initial search phase (Goldfeld et al., 2018), but was considered highly relevant, and therefore included post hoc. Thus, in total, there were 25 key publications including: 19 studies of 10 individual trials for 8 programs, 3 meta-analyses, 1 systematic review, and 2 program-specific reviews.

RESULTS PART 1: EFFECTIVE PROGRAMS

Identifying Effective SNHV Programs

The identification of effective programs was informed by the one systematic review, two program-specific reviews, and the individual RCTs of eight programs. Findings from each of these sources are described below.

Systematic Reviews

The aim of the included systematic review was to identify effective early preventive interventions for mental health problems in children aged 0 to 8 years (Bayer, 2009). This review included 50 randomised controlled trials of various interventions. Only two programs commencing during infancy were considered effective and applicable for the Australian context (the US-based Nurse Family Partnership, and NZ-based Early Start). Both involved sustained home visiting but only one was delivered by nurses (the NFP). This program was identified as effective for reducing adolescent behaviour problems, mother subsequent pregnancies, and parenting abuse, while increasing maternal workforce participation, (at 15-year follow up). No other SNHV programs were explicitly identified (names and details of programs considered ineffective were not provided).

Program-Specific Reviews

Two program-specific reviews were identified in the search for effective SNHV programs (Miller, 2015; Olds, 2008). Both reviews concerned the same program (Nurse Family Partnership). The Olds (2008) review summarised positive findings from three NFP trials (known as the Elmira, Memphis, and Denver trials). The Miller et al. (2015) review also included findings from these RCTs, along with results from several other RCTs for selected outcomes. Where possible, Miller et al. pooled results across trials. However, this was not possible for all outcomes. More detailed results from these program-specific reviews are incorporated in the section where various outcomes and components associated with specific programs are presented.

Individual Randomised Controlled Trials

Nineteen peer-reviewed publications covering 10 individual trials of 8 different programs were identified in the literature search. This section is organised according to i) identified programs, ii) specific child and parent outcomes, and iii) summary evidence.

Table 2 briefly describes the content of each study. It provides an overview of the intervention and study design, targeted population and sample characteristics, process of delivery, overall effectiveness, and risk of bias assessment.

Table 2: Characteristics of included SNHV studies

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
(Corbacho et al., 2017)	Family Nurse Partnership vs Usual Care RCT	IG: n=782 CG: n=786 UK, England Targeted: Teenage (≤19 years), first-time mothers English-speaking Demographics: see Robling below	Pregnancy to child age 2 years	No program effects for primary outcomes. <u>Cost Analysis</u>: very little difference in utilities and maternal QALYs between the FNP and usual care groups.	+
(Eckenrode et al., 2010)	Nurse Family Partnership vs Usual Care* *Usual care= screening and transport RCT	IG: n=90 of 116 CG: n=140 of 184 USA, Elmira New York State Deprived semi-rural community, with high rates of child abuse, infant mortality and very low SES Targeted: young, unmarried, low SES Mostly Caucasian (83% intervention, 90% comparison) Age: 19.5 years (range 14-34)	Pregnancy to child age 2 years Visits: *M*= 9 prenatal (range 0-16), and 23 postnatal (range 0-59) Frequency[1]: Fortnightly during pregnancy, weekly from birth to child age 1 month, visit frequency diminishing thereafter to 6-weekly intervals from child age 18 to 24 months	No overall program effects. Some program effects observed on criminal behaviour (among girls), and on childbearing and welfare use (for girls born to low income unmarried mothers)	+

[1] Olds (1986)

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
(Goldfeld et al., 2018)	right@home vs Usual Care RCT	IG: n= 363 CG: n=359 Australia, Victoria & Tasmania Targeted: >=2 of 10 risk factors[a] Race/Ethnicity: not reported Age: 27.6 (SD=6.2) years	Pregnancy to child age 2 years Visits intended: minimum of 25 visits (3 antenatal) Visits delivered: M=23 Frequency: 3 antenatal, weekly from birth to 6 weeks, fortnightly to 12 weeks, 3-weekly to 6 months, 6-weekly to 12 months, bi-monthly to 2 years	**Parent Outcomes:** Positive program effects • Safer family homes • Regular bed times • Varied home environment • Warm parenting • Less hostile parenting • Facilitation of child learning	++
(Jungmann et al., 2009)	Pro Kind vs Usual care RCT Pilot trial	IG: n=38 CG: n=38 Germany Targeted: primiparous mothers at economic risk with ≥1 social risk factors[b]; 25% self-referred German-speaking Race/Ethnicity: not reported other than 11.8% 'non-German' Age: 21.4 (SD=5.1) years	Pregnancy to child age 2 years Visits: fortnightly, number intended and delivered not reported	**Child Outcomes**: Positive program effects • infant temperament at 6 months • mental development from 6 to 12 months (time x group effect) **Parent Outcomes**: No program effects	-
(Kemp et al., 2011)	Miller Early Childhood Sustained Home visiting programme vs	IG: n=111 CG: n=97 Australia, Sydney	Pregnancy to child age 2 years Visits: M= 16.3 (range of 0-53).	**Child outcomes:** No overall program effects **Parent outcomes** Positive program effects for:	++

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
	Usual care RCT	Targeted: ≥1 risk factor[c] , either multi- or primiparous Race/Ethnicity: 50% born overseas, from 31 countries Age: Overall, M=28 years, First time mothers M=24.6 (5.8), Multiparous mothers (>65%) M= 29.1(6.0).	Duration: M=child age 57 weeks (range 0-122) Frequency: Intended at least every second week antenatally, weekly for first 6 weeks post-partum, fortnightly till 12 weeks, monthly till 6 months, bi-monthly to 2 years. (Actual frequency determined by needs of mother)	• quality of home environment (responsivity 12-24 months) • breast-feeding	
(Kemp et al., 2013)	Miller Early Childhood Sustained Home visiting programme vs Usual care RCT	As above	As above Prenatal visits: M=2.9 (range of 0-11)	**Parent outcomes** Positive program effects: • self-reported maternal general health at 4-6 weeks post-partum • SIDS knowledge • Pregnancy induced hypertension (p=0.05) • type of delivery (p=0.07)	++
(Kitzman et al., 2010)	Nurse Family Partnership vs Usual care RCT	IG: n=191 of 228 CG: n=422 of 515 USA, Memphis Tennessee Targeted: At least 2 of the following 3 risk factors: low SES (unemployed), low education (<12 years), unmarried Race/Ethnicity: 92% African American Age: 18.05 (SD=3.2) years	Pregnancy to child age 2 years Visits intended: 62 assuming women register at 16 weeks gestation Visits delivered: M=7 (range 0-18) in pregnancy, M= 26 (range 0-71) from birth to 2 years	Follow up: child age 12 years **Child outcomes:** Positive program effects: • number of days using cigarettes, alcohol or marijuana • internalizing disorders	++

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
		Drug-use: ~5%, Partner conflict 10%,			
(Meghea et al., 2013)	Unnamed Nurse-Community Health Worker Team program Vs Alternative intervention (community care delivered by one person only, usually a nurse) RCT	IG: n=307 CG: n=306 USA, Kent County Michigan Targeted: low SES Race/Ethnicity: Mixed - approximately 40% Caucasian, 23% Hispanic, 27% African American, remainder 'Other' Age: 27% intervention mothers <20 years. 53% intervention mothers 20-25 years, 19% >25 years; 56% multiparous Risk factors: drug use: 6% at baseline, 53% history of illicit drug use, 50% family violence history, 55% depression symptoms, 83% unmarried, 57% unemployed	Pregnancy to 12 months Visits: In the Nurse-CHW arm M=24 (13 postnatal). In the Nurse-Only condition, women received 8 (5 postnatal) visits.	**Child outcomes:** No overall program effects **Parent outcomes:** see Roman (2009)	++
(Mejdoubi et al., 2013)	VoorZorg Vs Usual care RCT	IG: n=237 CG: n=223 Netherlands Targeted: low income, ≤25 years, primiparous, + ≥1 other risk factor[d]	Pregnancy to child age 2 years Intended visits: 40-60 (10 prenatal, 20 in child's first year, 20 in second year) Visits delivered: M= 9 (SD=4) during pregnancy. Number of	**Child outcomes:** Reported elsewhere **Parent outcomes:** Positive program effects: • experience of intimate partner violence	++

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
		Dutch-speaking Race/Ethnicity: Mixed - approximately 50% Dutch, 26% Surinames/Antillean, and 6% Turkish/Moroccan Age: 19.2 (SD=2.6) and 19.5 (2.8) in Control and Intervention, respectively. 19.4 years overall >75% not married or living with a partner, >70% unemployed, 18-19% physically abused in year previous, 4-5% sexually assaulted	visits postpartum: not reported	• perpetration of intimate partner violence	
(Mejdoubi et al., 2014)	As above	As above	Pregnancy to child age 2 years Intended visits: 40-60 (10 prenatal, 20 in child's first year, 20 in second year)	**Child Outcomes:** No overall program effect **Parent Outcomes:** Positive program effects: • pre-natal smoking • postnatal smoking • breastfeeding	++
(Mejdoubi et al., 2015)	As above	IG: n=237 (168 child protection data) CG: n=233 (164 child protection data) Country, Race, Age: As above	Pregnancy to child age 2 years Intended visits: 40-60 (10 prenatal, 20 in child's first year, 20 in second year)	**Child outcomes:** Positive program effects: • internalising (24 months) • child abuse (birth to 3 years). **Parent Outcomes:** Mixed results on Home Observation Measurement of the Environment, with differences favouring VoorZorg at 24 months (but not 6 or 18 months)	++

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
(Olds et al., 2010)	Nurse Family Partnership Vs Usual care RCT	IG: n=228 CG: n=515 USA, Memphis Targeted: low SES, low education, unmarried (2 of these 3 risk factors satisfy inclusion criteria) Race/Ethnicity: 92% African American Age: 18.05 (SD=3.2) years	Pregnancy to child age 2 years Visits intended: 62 assuming women register at 16 weeks gestation	Follow up child age 12 years **Child Outcomes:** Reported in Kitzman et al (2010) **Parent Outcomes** NFP mothers reported less role impairment due to alcohol and other drug use (but not less use per se), longer partner relationships, and greater sense of mastery from 6 months to 12 years. No statistically significant differences on mother's marriage or partnership with the first-born child's biological father, intimate partner violence, arrests, incarceration, psychological distress, reports of child foster care placement, or drug use.	+
(Olds, Kitzman, et al., 2014)	Nurse Family Partnership Vs Usual care RCT	IG: n=228 CG: n=166 (treatment 1: free transport), n=514 (treatment 2: free transport and developmental screening), n= 230 (treatment 3: free transport, free screening, and prenatal visits with 2 post-partum visits). For child outcomes in this study, treatment 2 is the comparison group. For maternal outcomes, treatments 3 was combined with	Pregnancy to child age 2 years Visits intended: 62 assuming women register at 16 weeks gestation Visits delivered: M=7 (range 0-18) in pregnancy M= 26 (range 0-71) from birth to 2 years	Follow up child age 20 years **Child outcomes**: Positive program effects on preventable child mortality **Parent Outcomes:** Mixed results: External-cause and all-cause maternal mortality was lower in the 20 years following trial enrolment among mothers assigned to receive nurse visiting (combining limited visiting with sustained visiting conditions) than among mothers	+

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
		intervention and compared with treatments 1 and 2 combined. USA, Memphis Tennessee Targeted: At least 2 of the following 3 risk factors: low SES (unemployed), low education (<12 years), unmarried Race/Ethnicity: 92% African American Age: 18.05 (SD=3.2) years 24% smokers, 16% marijuana, 7% alcohol, <1% cocaine; 16% family violence,		assigned to comparison conditions (with no nurse visiting). These differences were statistically significant. However, contrasts between SNHV and no visiting were not statistically significant.	
(Olds, Holmberg, et al., 2014)	Nurse Family Partnership vs Usual care (free transport and screening) This trial had a third arm (NFP delivered by paraprofessionals) Data is extracted only for the nurse and control groups	IG: n=235 (nurse-visited) CG: n=255 USA, Denver Colorado Targeted: Primiparous Low SES Race/Ethnicity: 47% Hispanic, 35% Caucasian, 15% African American, 3% Asian/American Indian Age: 20.24 (SD=4.17) Intervention, and 19.7 (SD=4.13) Control	Pregnancy to child age 2 years Visits: M = 6.5 (range 0-17) during pregnancy and 21 (range 0-71) during infancy (see Olds et al., 2004).	Follow up study **Child Outcomes** No overall program effects at $p<0.05$ on child internalising or externalising at 6 years and 9 years of age. No overall program effects on language, intelligence, attention, working memory or academic achievement.	+

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
(Robling et al. 2016)	Family Nurse Partnership vs Usual care RCT	IG: n=823 CG: n=822 UK, England Targeted: young (<19 years), Sample: low SES, low education, Race/Ethnicity: 88% Caucasian Age: 17.9 years (intervention range 17-18.8)	Pregnancy to child age 2 years Visits intended: Up to 64 Visits completed: M=39.28 (SD=15.19)	**Child outcomes**: No clinically or statistically significant differences on birthweight or proportion of children attending an A&E department by their second birthday. Several small positive impacts on child cognitive development and language development, and on safeguarding documentation (higher in FNP indicating stronger surveillance rather than negative impact). **Parent Outcomes:** No differences for prenatal smoking, subsequent pregnancies prior to child age 2 years. Small positive effects on secondary outcomes: intention to breastfeed, level of social support, partner-relationship quality, general self-efficacy.	++
(Roman et al., 2009)	Nurse-Community Health Worker Team vs Alternative intervention (comprehensive home visiting primarily by a Nurse)	IG: n=307 CG: n=306 USA, Kent county Michigan Targeted: low SES Race/Ethnicity: Mixed (see Meghea 2013)	Pregnancy to child age 12 months Visits: M= 24.4 'contacts', in Nurse-CHW team model vs M=8.5 in alternative intervention. Frequency intended: fortnightly during pregnancy,	**Child outcomes:** Reported in Meghea (2013) **Parent outcomes:** Overall, significantly fewer depressive symptoms favouring the Nurse-CHW team model. No differences on self-esteem or social support.	++

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
	RCT	Age: See Meghea (2013)	weekly from birth to 1 month, twice per month from 2-6 months, then once or twice monthly from 6 to 12 months depending on mother need.		
(Sadler et al., 2013)	Minding the Baby vs Usual care Cluster RCT	IG: n=60 CG: n=45 USA, New York Targeted: primiparous, 14-25 years, no psychotic disorder or drug misuse English-speaking Race/Ethnicity: 62% Hispanic, 28% African American or Caribbean, 10% mixed Age: 19.6 (SD=2.5) N=6 being abused by own mother	Pregnancy to child age 2 years Visits intended: 91 (based on frequency information) Visits delivered: 3.5 per month (SD=1.5) Frequency: weekly in 3rd trimester and first year. Then bi-weekly in year 2. Nurse and Social Worker alternate for most visits	**Child Outcomes** Positive program effects on: • immunisation compliance and attendance at well-child visits at child age 12 months (though not at 24 months). • secure infant attachment and lower rates of disorganised attachment styles at child age 12 months No effect on birthweight **Parent Outcomes** Positive program effect on: • subsequent births within 2 years of the first child. No differences for: • caesarean sections • maternal mental health	+
(Sidora-Arcoleo et al., 2010)	Nurse Family Partnership vs Usual care RCT	IG: n=228 CG: n=515 USA, Memphis Tennessee Targeted: young, low education, unmarried Race/Ethnicity: 92% African American	Pregnancy to child age 2 years Visits: M= 7 prenatal (rang 0-18) and 26 post-natal (range 0-71)	Follow up study **Child Outcomes** Positive program effect on: • aggression at child age 2 years (but not at child ages 6 or 12 years) No intervention effects on: • child cognitive or verbal development at child age 2 and 6 years	+

Short Title	Intervention and Study Design	Sample	Delivery	Overall Effectiveness	Study Quality
(Sierau et al., 2016)	Pro Kind vs Usual care RCT	Age: 18.1 years IG: n=394 CG: n=361 Germany Targeted: low SES (unemployment and over-indebtedness), low education, young Race/Ethnicity: Not reported in Sierau. Brand & Jungman (2014) state 15% immigrants from Soviet Union, Turkey and Polland (but larger sample presumably from same trial) Age: M=21.27 (SD=4.2, range 14-40) years Drug or alcohol problems <3%, Childhood history of abuse/neglect 38%, 8-9% experiencing violence in pregnancy ~30% Stress, 17% Anxiety, 10% Depression on DASS	Pregnancy to child age 2 years Visits: M=32.7 (SD=18.6) range 0-94 (the 94 was an outlier- one woman with very serious risk factors and higher needs- drug abuse, low prenatal attachment, domestic violence; next lowest score was 59). Frequency: Weekly in first four weeks from enrolment date and first four weeks after birth, bi-weekly from 1 month to 18 months, then monthly in stage. Midwife and Social Worker delivered (24 social workers, 37 midwives, and 1 paediatric nurse).	**Child outcomes** No differences on: • mental or psychomotor development at 6, 12, and 24 months • language at 12 and 24 months • social-emotional development at 24 months. **Parent Outcomes** Positive effect on: • parental self-efficacy and feelings of attachment at 12 months (but not at 36 weeks gestation or 6 months post-partum) • stress levels (12 and 24 months), • relationship satisfaction (at 6 but not 12 or 24 months) • social support (at 24 months p=0.05). No treatment effect on: • knowledge of childrearing (prenatal and child 6 months) • parenting style (12 and 24 months), mother child affectivity or mother-child responsiveness (at 6, 12 and 24 months), maternal empathy (prenatal and child 24 months), or belief in control • educational achievement or subsequent births (12 and 24 months)	+

Key: - indicates high risk of bias; + is moderate risk of bias; ++ is low risk of bias; CG= Control group; IG= Intervention group; QALYs= quality adjusted life years; [a]education, income, employment, living alone, global health, chronic illness, smoking, youth, anxiety, low support. [b] Low education, experienced violence, neglect; [c]<19 years age, distress, low support, late to seek antenatal care, major stressors, substance misuse, childhood abuse, IPV, mental health problems; [d] single, domestic violence, psychosocial symptoms, unwanted pregnancy, financial stress, housing difficulty, no employment, low education, alcohol or drug use

Overall, the summary of study characteristics shows that SNHV programs have been implemented and evaluated in several developed countries (USA, UK, Netherlands, Germany, and Australia) representing diverse health systems and samples. Almost all trials utilised an RCT design with comparison to a usual care condition. The exceptions were the Minding the Baby trial (which utilised a Cluster RCT) and the Nurse-Community Health Worker team program (which compared a team approach to the "standard" home visiting program primarily delivered by nurses). Although quite different from the other trials we chose not to exclude this one because differences between the team and standard approach to SNHV might be useful for identifying components that optimise child and family outcomes. Several SNHV programs were identified in the 19 publications. Each of the programs is described next.

Program Summaries

Most evaluations examined the US-based Nurse Family Partnership or a close adaptation of it, such as the Family Nurse Partnership (FNP) in the UK or VoorZoorg in the Netherlands. A German version of the NFP, Pro Kind, differed more substantively with the program delivered by social workers and midwives. Another program modelled closely on the NFP with variation to staffing and content is US-based Minding the Baby. Other programs identified included the Australian Maternal and Early Childhood Sustained Home visiting program (MECSH), right@home, and an unnamed Nurse-Community Health Worker team program. A brief description of each program is provided below. Because many of the programs were based on the NFP, it is presented first. Thereafter, programs are listed in alphabetical order.

Table 3: Program descriptions

Nurse-Family Partnership	
Background	The NFP is the most extensively evaluated SNHV program. Developers initially tested the NFP in three well-known US-based RCTs, known as the Elmira, Memphis and Denver trials. The program has also been evaluated in at least two independent US-based RCTs (Miller 2015) and adapted for use internationally with RCTs conducted in the Netherlands (see VoorZorg), the UK (Family Nurse Partnership), and Germany (Pro Kind).
Aim and theoretical underpinning	The aims of the NFP are to "(1) improve the outcomes of pregnancy by promoting women's prenatal health behaviours, (2) improve the health and development of the child by promoting parents' competent care of their children, and (3) enhance parents' life-course development by encouraging parents to plan subsequent pregnancies, complete their education, and find work" (Kitzman 2010, p.413). The NFP is grounded in theories of human ecology, self-efficacy, and human attachment. Drawing on these theories, nurses (a) involve family members (especially fathers) in home visits, (b) encourage mothers to set realistic and small achievable goals and (c) promote reflection on childhood upbringing to inform parenting intentions and decisions. Establishment of an empathic and trusting relationship with the mother and family is considered critical to facilitating participant capacity to form trusting relationships with others and provide sensitive and empathic care to their children.
Program content	• prenatal health (e.g., tobacco, alcohol and drug exposure, stress, diet and monitoring of weight-grain, rest and regular exercise, signs of pregnancy complication and obstetric hygiene) • sensitive and competent care of the child (foetal and child development education, responsive and positive parenting) • early parental life-course (promotion of appropriate choices around the timing of subsequent pregnancies and relationships with others).

Process of delivery	Up to 62 nurse home visits from pregnancy through child age 2 years (assuming women enrol by 16 weeks gestation). Nurses follow detailed visit-by-visit guidelines that are adapted to the needs of each family.
Provider components	Nurses deliver the program.
Population focus	Pregnant women targeted in areas characterised by low socioeconomic conditions, who are young (less than 19 years old), single, or low SES.
Key References	Miller, T., & Miller, T. R. (2015). Projected Outcomes of Nurse-Family Partnership Home Visitation During 1996-2013, USA. Prevention Science, 16(6), 765-777. doi:10.1007/s11121-015-0572-9 Olds, D. L. (2008). Preventing child maltreatment and crime with prenatal and infancy support of parents: The nurse-family partnership. Journal of Scandinavian Studies in Criminology and Crime Prevention, 9(Suppl1), 2-24. doi:http://dx.doi.org/10.1080/14043850802450096 Olds, D., Henderson, C. R., Jr., Tatelbaum, R., & Chamberlain, R. (1986). Improving the delivery of prenatal care and outcomes of pregnancy: A randomized trial of nurse home visitation. Pediatrics, 77(1), 16-28
Family Nurse Partnership	
Background	The Family Nurse Partnership is a UK-adaptation of the Nurse Family Partnership
Aim and theoretical underpinning	The FNP aims to affect risks and protective factors related to prenatal health, sensitive and competent care-giving, and early parental life-course. For the theoretical underpinnings see NFP description.
Program content	• Prenatal health • Sensitive and competent caregiving, • Early parental life-course (see NFP description for a more detailed description of content areas).
Process of delivery	Up to 64 structured home visits from pregnancy through to child age 2 years.
Provider components	Nurses deliver the program.
Population focus	Teenage first-time mothers.
Key References	Corbacho, B., Bell, K., Stamuli, E., Richardson, G., Ronaldson, S. Hood, K. Sanders, J., Robling, M.,& Torgerson, D. (2017). Cost-effectiveness of the Family Nurse Partnership (FNP) programme in England: Evidence from the building blocks trial. Journal of Evaluation in Clinical Practice, 23(6), 1367-1374. doi:10.1111/jep.12799 Robling, M. et al. (2016). Effectiveness of a nurse-led intensive home-visitation programme for first-time teenage mothers (Building Blocks): a pragmatic

	randomised controlled trial. Lancet, 387(10014), 146-155. doi:https://dx.doi.org/10.1016/S0140-6736(15)00392-X
Maternal and Early Childhood Sustained Home visiting (formerly Miller Early Childhood Sustained Home-visiting programme)	
Background	The MECSH is an Australian sustained and structured antenatal and postnatal home visiting program for socioeconomically disadvantaged families.
Aim and theoretical underpinning	MECSH aims to improve: • the transition to parenting by supporting mothers during pregnancy • maternal health and wellbeing by helping mothers to care for themselves • child health and development by assisting parents to interact with children in developmentally appropriate ways • parents' aspirations for themselves and their children • family and social relationships and networks
Program content	The most common interventions (delivered to at least 50% of families) were: • infant sleeping/settling • infant feeding • maternal health • maternal physical activity • maternal nutrition • pregnancy/childbirth terminology • contraception/conception • expectations of having a baby • complete depression scale • maternal mood • partnership issues • partner coping • relationships with other children • family's social support network • relationships with extended family • care planning • caregiver aims and goals for forthcoming weeks • caregiver aspirations for baby • aspirations for self • housing/physical environment • finances/budget
Process of delivery/structure	• Home visits - at least every second week antenatally, weekly for first 6 weeks post-partum, fortnightly till 12 weeks, monthly till 6 months, and bi-monthly to 2 years. • Postnatal child development Learning to Communicate education programme - 12 monthly sessions • Access to secondary and tertiary early childhood health and family support services.

	• Community links to parenting groups, walking groups, and community activities
Provider components	The program is delivered by child and family health nurses with postgraduate qualifications and is embedded within the broader universal child and family health system.
Population focus	Primiparous or multiparous mothers considered young (<19 years) or 'at-risk' due to the following: • lack of practical and emotional support • history of mental health problems • maternal depression • maternal experience of childhood abuse • use of drugs or alcohol • domestic violence in the household
Key References	Kemp, L., Eisbacher, L., McIntyre, L., O'Sullivan, K., Taylor, J., Clark, T., & Harris, E. (2006). Working in partnership in the antenatal period: What do child and family health nurses do? Contemporary Nurse, 23(2), 312-320. Kemp, L., Harris, E., McMahon, C., Matthey, S., Vimpani, G., Anderson, T., & Schmid, M. (2008). Miller Early Childhood Sustained Home-visiting (MECSH) trial: design, method and sample description. BMC Public Health, 8, 424. Kemp, L., Harris, E., McMahon, C., Matthey, S., Vimpani, G., Anderson, T. et al. (2011). Child and family outcomes of a long-term nurse home visitation programme: a randomised controlled trial. Archives of Disease in Childhood, 96(6), 533-540. Kemp, L., Harris, E., McMahon, C., Matthey, S., Vimpani, G., Anderson, T., et al. (2013). Benefits of psychosocial intervention and continuity of care by child and family health nurses in the pre- and postnatal period: process evaluation. Journal of Advanced Nursing, 69(8), 1850-1861. doi:https://dx.doi.org/10.1111/jan.12052
Minding the Baby	
Background	Minding the Baby is an interdisciplinary home visiting intervention delivered by a nurse practitioner and clinical social worker. It is described as an amalgam and elaboration of the Nurse Family Partnership and Infant-Parent Psychotherapy approaches.
Aim and theoretical underpinning	The program has twin aims. These are to improve parent-child relationships and public health outcomes including regular paediatric visits and immunisation, timing of subsequent childbearing, and frequency of referrals to child protective services. As a mentalisation-based intervention, it emphasises reflective functioning and identifies this capacity (to envision the thoughts, feelings, and intentions of oneself and one's baby) as a critical component of the program.

Program content	Nurse: • Reinforcing prenatal care and health education (e.g. nutrition, foetal brain development, premature labour prevention, birth planning, newborn communication, breastfeeding education and support) • Supporting healthy child development (child development assessments, diagnosis and treatment of illness, environmental safety education, injury prevention). • Strong emphasis on ensuring mothers effectively use a contraceptive method after the birth of their child. Clinical social worker: • Ongoing assessment of both mother and child • Diagnosing perinatal depression, anxiety and mental health issues • Providing a range of treatments (e.g. infant-parent psycho-therapy, dyadic play and developmental guidance, individual, couples and family counselling, crisis intervention, case management and other supportive approaches) • Negotiating legal and court systems
Process of delivery	Home visits are conducted weekly during pregnancy and the child's first year, and then fortnightly to child age two years.
Provider components	Visits are conducted by a Nurse and Clinical Social Worker team. Visitors alternate such that the nurse visits one week and the social worker visits the next. Advanced training and experience among both the nurse practitioner and clinical social worker team is emphasised, with masters level qualifications required.
Population focus	Young (14-25 years) first-time mothers attending a community health centre.
Key References	Sadler, L. S., Slade, A., Close, N., Webb, D. L., Simpson, T., Fennie, K., & Mayes, L. C. (2013). Minding the Baby: Enhancing reflectiveness to improve early health and relationship outcomes in an interdisciplinary home visiting program. Infant Mental Health Journal, 34(5), 391-405. Slade, A., Sadler, L. S., De Dios-Kenn, C., Webb, D. L., Currier-Ezepchick, J., & Mayes, L. C. (2005). Minding the Baby: A reflective parenting program. The Psychoanalytic Study of the Child, 60, 71-100.
Nurse-CHW Team	
Background	The Nurse-CHW model was compared to a high level of usual community care, described as an Enhanced Prenatal/Postnatal Service (EPS) that most Michigan women are eligible to receive. This 'usual care' service is delivered by certified agencies reimbursed by Medicaid and includes up to nine prenatal and nine postnatal visits to the child's first birthday (primarily delivered by nurses). The EPS provides care co-ordination, case management, risk assessment, nutritional counselling, health education, and home visiting delivered by professional providers.

Aim and theoretical underpinning	The Nurse-CHW model was developed to address concerns with low numbers of women being assessed for enhanced pre- and post-natal services and receiving services once enrolled. Community Health Workers were recruited to help engage especially disenfranchised women. The Nurse-CHW intervention differed from standard nurse home visiting primarily in a) the utilisation of CHWs as well as nurses; b) persistent efforts to engage women with services, c) intensive social support from the CHW, and d) targeting of stressors and maternal mental health.
Program content	Nurse: • guiding the CHW • leading assessment • providing crisis intervention and case management • assessing and managing health problems • visiting prenatal providers. CHWs: • provide relationship-based support through regular visits • deliver specific manualised activity modules targeting self-esteem, positive health behaviours, awareness of stressors and problem solving, self-determination, and use of community resources.
Process of delivery	Nurses deliver a minimum of two prenatal visits, a post-delivery visit, and two postpartum visits. CHWs visit fortnightly prenatally, weekly in the first postpartum month, twice a month from two to six months, then once or twice monthly to twelve months, depending on need.
Provider components	Nurse-CHW teams comprise one nurse and two CHWs per 50-60 families. First assessment visits are typically delivered by a nurse and CHW together, then visits occur separately unless necessary (e.g. family crisis or domestic violence).
Population focus	Multi- and primiparous Medicaid-eligible women from five public prenatal clinics in Kent County Michigan.
Key References	Meghea, C., Li, B., Zhu, Q., Raffo, J., Lindsay, J., Moore, J., & Roman, L. (2013). Infant health effects of a nurse-community health worker home visitation programme: a randomized controlled trial. Child, 39(1), 27-35. Roman, L. A., Gardiner, J., Lindsay, J. K., Moore, J. S., Luo, Z., Baer, L. J., et al. (2009). Alleviating perinatal depressive symptoms and stress: a nurse-community health worker randomized trial. Archives of Women's Mental Health, 12, 379-391. Roman, L. A., Lindsay, J. K., Moore, J. S., Duthie, P. A., Peck, C., Barton, L., et al. (2007). Addressing mental health and stress in Medicaid-insured pregnant women using a nurse-community health worker home visiting team. Public health nursing, 24(3), 239-248.
Pro Kind	

Background	Pro Kind is a German adaptation of the NFP, trialled in three federal States of Germany.
Aim and theoretical underpinning	The program is grounded in theories of self-efficacy, human attachment, and human ecology. It aims to improve maternal and child health, parenting skills, social support and maternal life-course.
Program content	Program content is largely the same as the NFP with manuals translated into German, and the addition of a Partners in Parenting education module which targets the emotional availability and relationship building skills of parents. Content and delivery of this module was not well-described.
Process of delivery	Home visits are conducted from pregnancy to child age 2 years, with visits weekly prior to and for the first four weeks following birth, then bi-weekly, and monthly in the final six months. There are two different formats of delivery: • Continuous model - one home visitor (primarily a midwife) delivers the whole program • Tandem model - a midwife delivers the pregnancy and early post-partum material while a social worker takes over visiting at child age 2 months (with three visits conducted by both the midwife and nurse together). Presumably, both forms of delivery were implemented in the main RCT, but this is not clear.
Provider components	Pro Kind visitors are predominantly midwives and social workers rather than registered nurses.
Population focus	Low income first-time mothers with economic risk factors (e.g. unemployment or over-indebtedness) and at least one social risk factor (e.g. poor education, experience of violence or neglect).
Key References	Brand, T., & Jungmann, T. (2012). Implementation Differences of Two Staffing Models in the German Home Visiting Program “Pro Kind”. Journal of Community Psychology, 40(8), 891-905. doi:10.1002/jcop.21489 Jungmann, T. Z., Yvonne Kurtz, Vivien Brand, Tilman. (2009). Preventing adverse developmental outcomes and early onset conduct problems through prenatal and infancy home visitation: The German pilot project "Pro Kind.". European Journal of Developmental Science, 3(3), 292-298. Sierau, S., Dahne, V., Brand, T., Kurtz, V., Klitzing, K., & Jungmann, T. (2016). Effects of Home Visitation on Maternal Competencies, Family Environment, and Child Development: a Randomized Controlled Trial. Prevention Science, 17(1), 40-51.

right@home	
Background	right@home is an Australian sustained and structured antenatal and postnatal home visiting program for socioeconomically disadvantaged families.
Aim and theoretical underpinning	right@home aims to improve three outcome domains: parental care, responsivity, and the home learning environment. Program development was informed by a logic model explicitly aligning evidence around neuroscience, early adversity, and child development with targeted and evidence-based content. Standardized focus modules are aligned with primary outcomes.
Program content	**Evidence-based strategies:** Parental care: • KidSafe audit of home safety • Anticipatory guidance on normal infant sleep and bedtime routines (0-6 months) • Behavioural sleep intervention (from 6 months) • Get up and Grow healthy eating guidelines Responsivity: • Promoting First Relationships program • Home Learning Environment: • Learning to Communicate program (0-12 months) • Modified Small Talk program (13-24 months) Process modules: • Video feedback • Motivational interviewing **General content:** • Problem-solving and resource mobilization • Positive parenting • Community engagement establishing supportive relationships • Maternal-infant bonding and attachment • Proactive primary health care and education (e.g. immunisation, SIDS, nutrition, safety) • Assistance accessing childhood health services, volunteer home visiting services, family support services
Process of delivery	The program schedule includes a minimum of 25 home visits conducted from pregnancy to child age 2 years. Three antenatal visits are followed by a post-natal visit in the first week following birth, then weekly visits to child age 6 weeks, fortnightly visits to 12 weeks, 3-weekly visits to 6 months, 6-weekly visits to 12 months, and bi-monthly visits to child age 2 years. Visits are structured flexibly to suit the needs, skills, strengths and capacity of each mother.

Provider components	Delivered by Baccalaureate-registered nurses with postgraduate qualifications in Child and Family Health and Family Partnership Model Training. For every 100 families, one full-time social care practitioner (with at minimum a bachelor's degree in social work) provides support to both the nursing staff and families.
Population focus	Primiparous and multiparous women experiencing adversity as defined by the presence of at least two of the following risk factors: • Young (<23 years) • Not cohabiting • Low support in pregnancy • Smoking • Poor global health • Long-term illness • Anxious mood • Low education • Low income • Unemployment
Key References	Goldfeld, S., Price, A., Bryson, H., Bruce, T., Mensah, F., Orsini, F., et al. (2017). 'right@home': a randomised controlled trial of SNHV from pregnancy to child age 2 years, versus usual care, to improve parent care, parent responsivity and the home learning environment at 2 years. BMJ Open, 7(3), e013307. doi:https://dx.doi.org/10.1136/bmjopen-2016-013307 Goldfeld, S., Price, A., & Kemp, L. (2018). Designing, testing, and implementing a sustainable nurse home visiting program: right@home. Ann N Y Acad Sci, 1419(1), 141-159. doi:10.1111/nyas.13688
VoorZorg	
Background	VoorZorg is a Dutch adaptation of the NFP. Program content is translated into Dutch and culturally adapted to meet the needs of women in the Netherlands.
Aim and theoretical underpinning	The ultimate goals of VoorZorg are to improve: • outcomes of pregnancy by addressing prenatal health • child health and development by facilitating the provision of competent care • maternal personal development
Program content	Each visit includes content relating to: • the mother's health • child health and safety • personal development of the mother • mother as role model

	• relationships with significant others (partner, family, friends) • service use Adaptations to meet the needs of Dutch women include: • an emphasis on home birth • specific intervention to stop prenatal smoking • additional information and promotion of breastfeeding • adjustment of program practices to avoid nurse duties overlapping with those of midwives and youth health care professionals • pregnancy classes • ultrasounds and educational opportunities
Process of delivery	Approximately 10 prenatal home visits, then 20 visits in the child's first year and another 20 in the second year.
Provider components	Nurses deliver the program
Population focus	Young (25 years or less) first time mothers with low education, some understanding of Dutch, and at least one additional risk factor (e.g. single, history of domestic violence, psychosocial symptoms, unwanted pregnancy, financial problems, housing difficulty, unemployment, or substance use issues).
Key References	Mejdoubi, J., Heijkant, S., Leerdam, F., Crone, M., Crijnen, A., & HiraSing, R. (2014). Effects of nurse home visitation on cigarette smoking, pregnancy outcomes and breastfeeding: a randomized controlled trial. Midwifery, 30(6), 688-695. doi:10.1016/j.midw.2013.08.006 Mejdoubi, J., Heijkant, S., Leerdam, F., Heymans, M., Crijnen, A., & Hirasing, R. (2015). The effect of VoorZorg, the dutch nurse-family partnership, on child maltreatment and development: a randomized controlled trial. PloS one, 10(4). doi:10.1371/journal.pone.0120182 Mejdoubi, J., Heijkant, S., Leerdam, F., Heymans, M., Hirasing, R., & Crijnen, A. (2013). Effect of nurse home visits vs. usual care on reducing intimate partner violence in young high-risk pregnant women: a randomized controlled trial. PloS one, 8(10), e78185. doi:10.1371/journal.pone.0078185 Mejdoubi, J., Heijkant, S., Struijf, E., Leerdam, F., HiraSing, R., & Crijnen, A. (2011). Addressing risk factors for child abuse among high risk pregnant women: design of a randomised controlled trial of the nurse family partnership in Dutch preventive health care. BMC Public Health, 11, 823. doi:10.1186/1471-2458-11-823

Child Outcomes

This section compares the effects of each program on specific child outcomes. Table 4 and Table 6 provide an overview of short-term outcomes (birth to preschool). These include child physical and psychosocial health outcomes. In addition to presenting overall program effects we also note where positive program effects were observed for specific subgroups (

Table ***5*** and Table 7). More detailed information about the effects observed for each program can be found in Appendix D: Details of Child Outcomes by Program. Long-term outcomes are presented in Table 8.

Short-Term Child Outcomes

The following section compares the evidence of effectiveness in specific child outcome areas for each of seven SNHV programs. Programs identified in the search included the FNP, NFP, Nurse-CHW model, MECSH, Minding the Baby, Pro Kind and VoorZorg. Although the right@home evaluation protocol indicates short-term child outcomes (such as sleep problems, health, stress, and communication) were measured at child age 2 years (Goldfeld et al., 2017), the results for these had not been published at the time of writing this review. Therefore, right@home is not included in the child outcomes tables.

Most programs were evaluated in RCTs or CRCTs comparing the intervention with usual care conditions. The main exception to this is the Nurse-CHW model, which compared a team approach to intervention with an individual practitioner approach to sustained home visiting. Thus, it is not directly comparable to the other programs.

Overall program effects for early outcomes (birth to preschool) for the NFP have predominantly been drawn from the two program-specific reviews published within the review time-frame (i.e. no earlier than 2008). The Miller et al (2015) publication, which was rated as moderate in quality and risk of bias, pooled results across multiple NFP trials for selected outcomes. In cases where results were not pooled, findings are reported for each trial separately. Outcomes not included in the Miller synthesis and subgroup analyses are primarily drawn from one review (Olds, 2008). As that review focussed on a presentation of positive effects, rather than a balanced summation of all positive and null effects, the evidence drawn from it should be interpreted cautiously.

Child Physical Health

Program effects on child physical health outcomes have been evaluated for seven programs. All seven examined birthweight; four assessed preterm birth (FNP, MECSH, NFP and VoorZorg); three included measures of motor development (FNP, MECSH, and Pro Kind), hospital presentations or admissions for accidents or injuries (FNP, Nurse-CHW, NFP), and child maltreatment (Minding the Baby, NFP, VoorZorg); two presented results on common childhood illnesses (MECSH, Nurse-CHW), and one included mortality data (NFP).

Table 4: Child physical health – short-term outcomes (birth to preschool)

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Team Model	NFP	Pro Kind	VoorZorg
Child Physical Health							
Birthweight	#	#	#	#	#	#	#

Preterm birth	#	#			*		#
Motor Development	# (12, 18, 24months)	# (18 months)				# (6, 12 months)	
Common childhood illnesses		# (6-24 months)		# (0-12 months)			
Accidents, Injury or Hospital/ED admissions	# (0-24 months)			# (0-12 months)	+ (0-24 months Elmira and Memphis, 0-15 months Louisiana)		
Maltreatment			* (0-24 months)		+ (4-15 years, Elmira RCT)		+ (0-36 months)
Mortality					# (Infancy-Denver,0 to age 9 years-Memphis)		

+ Significant positive program effect; * trend favouring program; -=negative effect; #=no statistically significant effect; blank=not assessed or not published

Table 5: Sub-group analyses on child physical health (birth to preschool)

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Team Model	NFP	Pro Kind	VoorZorg
Child Physical Health							
Birthweight					young mothers 14-16 years (babies 395g heavier)		#
Prematurity					Smokers (75% fewer pre-term deliveries)		#

Common childhood illnesses	Low psychosocial resources		
Maltreatment		Low income unmarried teens, *p*=0.07 (80% fewer verified cases of abuse/neglect)	#

No statistically significant effect

FNP

The FNP trial included measures of birthweight, preterm delivery, motor development, and hospital presentations and admissions. No statistically significant program effects were observed on any of these child health outcomes. Subgroup analyses were not reported. Although the FNP trial did not assess child maltreatment per se, it is worth noting that significantly higher rates of child safeguarding documentation (i.e. presumably monitoring potential maltreatment) occurred for families receiving the intervention, indicating stronger surveillance (Robling et al., 2016).

MECSH

As illustrated in Table 4 there were no significant differences found for any child physical outcomes in the MECSH study (birthweight, prematurity, motor development, common childhood illnesses). Although the MECSH program (Kemp et al., 2013; Kemp et al., 2011) included content directly relevant to child sleep, no child sleep outcomes were included in the published material. Similarly, none of the other program evaluations presented child sleep outcomes

Minding the Baby

The evaluation of Minding the Baby (Sadler et al., 2013) included child physical health outcomes related to birthweight and maltreatment. Child maltreatment data suggest there was a clinically important difference favouring intervention participants over controls (0% vs 5% investigations), though this difference failed to reach statistical significance (*p*=0.10). However, a relatively small sample size (n=105) and limited power to detect effects on relatively infrequent and socially undesirable behaviours should be considered when interpreting this result. The Minding the Baby program had no effect on birthweight. Other child physical health outcomes were not reported.

Nurse-CHW Model

The Nurse-CHW trial included child physical health measures of birthweight, common childhood illness, and hospital presentations/admissions. Although the Nurse-CHW program did not show any overall effect on outcomes related to child physical health compared with the single-visitor program, subgroup analyses revealed that this program may have been more effective for reducing common childhood illnesses among babies born to mothers with low psychosocial resources. First year maternally-reported diagnoses of asthma, wheezing or croup were significantly lower among babies born to mothers with low psychosocial resources (27% vs 13%, *p*=0.01), and marginally so for babies born to mothers with low psychosocial resources and high stress (29% vs 17%, *p*=0.08). However, health records of common childhood illnesses failed not show statistically significant differences (Meghea et al., 2013).

NFP

The NFP evaluations have included child physical health measures of birthweight, preterm birth, hospital presentations/admissions for accidents or injury, child maltreatment and mortality. Although five NFP studies fail to demonstrate an overall effect on birthweight, subgroup analyses of the Elmira trial (Olds, 2008) suggest the program may be effective for very young mothers. Similarly, evidence of an overall effect on preterm births is limited to a trend when pooling across five NFP studies (p=0.053, Miller 2015), but subgroup analyses (Olds, 2008) suggest more consistent improvements for babies born to smokers.

The program has demonstrated a positive effect on injuries, accidents, and hospital admissions with data pooled across three RCTs (two of which were considered high quality; (Miller, 2015)). There is also evidence (from the Elmira RCT) that the NFP may effectively reduce child maltreatment (Miller, 2015). Subgroup analyses suggest the reduction in verified cases of abuse and child neglect are strongest among low income unmarried teenage mothers (Olds, 2008).

Publications included in this review did not include data pertaining to possible effects of the NFP on motor development or common childhood illnesses. However, two studies (Denver and Memphis trials) evaluating possible effects on early mortality were identified (Miller, 2015); neither demonstrated a significant program effect.

Pro Kind

As illustrated in Table 4 there were no significant differences found for any child physical outcomes included in the Pro Kind publications (birthweight and motor development).

VoorZorg

The evaluation of VoorZorg included child physical health measures of birthweight, preterm birth and maltreatment. The program demonstrated a positive effect on rates of suspected child maltreatment (Mejdoubi et al., 2015). Indeed, data from child protection services (CPS) at child age 3 years suggest lower rates of maltreatment among intervention than comparison children (11% vs 19% had a CPS report). Additional information about whether CPS reports were substantiated cases of maltreatment was available for 50% of the sample, and in 96% of cases maltreatment was indeed substantiated. Similarly, the authors report that in the Netherlands 93% of reports to CPS appear to be substantiated on subsequent investigation. No overall or subgroup effects were observed for birthweight or preterm birth. Effects on motor development, common childhood illnesses, and mortality do not appear to have been measured.

Summary: Short-term child physical health outcomes

Evaluations of both the NFP and VoorZoorg found evidence of significantly lower child maltreatment rates among intervention than comparison groups. There is also some evidence (albeit limited) that a third program (Minding the Baby) may improve child maltreatment outcomes.

No program demonstrated a statistically significant main effect on birthweight, preterm birth, motor development or common childhood illnesses in the short term. Few evaluations presented sub-group analyses. However, there is some evidence that the NFP can improve birthweight and preterm birth outcomes among sub-groups identified as having additional relevant risk factors.

Child Psychosocial Outcomes

Child psychosocial outcomes were evaluated for all programs except the Nurse-CHW model. Assessments of cognitive development have been published for four programs (FNP, MECSH, NFP, Pro Kind). Language outcomes have been reported for three (FNP, NFP, Pro Kind), and social-emotional outcomes in five programs (NFP, VoorZorg, Pro Kind and Minding the Baby, MECSH). The results for each are presented in Table *6*.

Table 6: Child psychosocial outcomes (birth to preschool)

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Team Model	NFP	Pro Kind	VoorZorg
Psychosocial Outcomes							
Cognitive	#, #, + (12, 18, 24 months, cognitive concern)	# (18 months, Bayley Scales)			# (2 years Bayley Scales, Sidora-Arcoleo)	+, # (12 months, Bayley Scales, Jungmann; 6,12 & 24 months Sierau)	
Language	+, +, + (12, 18, 24 months)				+ (2-6 years, Miller 2015)	#, # (12, 24 months Sierau)	
Social-Emotional		# (18 months, Bayley Scales)	+ (attachment, 12 months)		+ , +# (6 months, Olds 2008; 2 years Sidora-Arcoleo,)	+, # (6 months Jungmann; 24 months CBCL Sierau)	+,# (+ internalising, # externalizing,24 months)

+ Significant positive program effect; * positive trend; -=negative effect; #=no effect; blank=not assessed

Table 7: Sub-group analyses on child psychosocial health (birth to preschool)

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Team Model	NFP	Pro Kind	VoorZorg
Psychosocial health							
Cognitive		Distressed mothers			Low psychological resources (Denver, 21 months and 4 years)	High-risk group	
Language					Low psychological resources (Denver, 21 months and 4 years)		
Social-Emotional					Poor unmarried smokers Elmira (less irritable		

			babies 6 months); low psychological resources- (Denver- 4 years behaviour) Girls, high resource mothers (2 years; Sidora-Arcoleo)	

FNP

The FNP trial included psychosocial measures relating to cognitive and language development. Significant differences favouring children of nurse visited mothers were found on maternal reports of concern with language development at 12 and 18 months, and on a standardised test of language development at 24 months (Robling et al., 2016). There is also some evidence that the FNP program improved cognition in children at age 2 years, with significantly fewer intervention mothers (8.1% vs 12.6%, p= 0.013) reporting concern with cognitive development at this time. Differences in concern with cognitive development were not statistically significant at earlier assessments (at 12 and 18 months). No outcomes related to social-emotional outcomes were assessed.

MECSH

The MECSH evaluation included measures of child cognitive and social-emotional development. Results indicate that there were no main effects for these outcomes (Kemp et al., 2011). However, among children born to distressed mothers, there was a trend toward higher mental development scores in the intervention than comparison arms of the trial (p=0.07, d=0.58). Given the size of the effect and sample of only 40 distressed mothers, this is worthy of note.

Minding the Baby

There is some evidence that Minding the Baby positively impacts social-emotional development (effects on cognition and language were not reported). Intervention infants had more secure and less disorganised attachment styles than comparison infants at 12 months of age (Sadler et al., 2013).

Nurse-CHW Team Model

No relevant outcomes were explored.

NFP

The NFP trials have included measures of child language, social-emotional and cognitive development. Significant differences in language development or delay have been observed in each of three NFP trials conducted in Elmira, Memphis, and Denver (Miller, 2015). Two of the three trials showed positive effects for social-emotional outcomes. Indeed, in the Elmira trial, infants of nurse visited mothers were less irritable and fussy at 6 months of age than comparison group infants, and in the Denver trial, nurse visited children showed less emotional vulnerability to fear stimuli at 6 months of age (Olds, 2008). In the Memphis trial, lower levels of aggression have been found among children of nurse-visited than comparison mothers at child age 2 years (Sidora-Arcoleo et al., 2010). However, this result should be interpreted cautiously as there was high attrition, and it is inconsistent with the overall result indicating no effect of intervention for externalising problems.

There is reasonably consistent evidence that the NFP program is especially effective for certain subgroups. In the Denver trial, superior language and mental development, and less irritable and fussy infants were observed for children born to low resource mothers (Olds, 2008). Similarly, in the Elmira trial (Olds, 2008), poor, unmarried nurse-visited women had less irritable and fussy infants at 6 months, an effect that was highly concentrated among those who smoked more than 10 cigarettes per day during pregnancy. Results from the Memphis trial (Sidora-Arcoleo et al., 2010) showed a significant reduction in aggression at child age 2 years for girls but not boys and that program effects on aggression were observed among those born to mothers with high psychological resources. This contrasts with most other sub-group effects in the review, where the program was generally more effective for more disadvantaged families.

Pro Kind

Evaluations of Pro Kind have included measures of child cognitive, language, and social-emotional development. In a pilot evaluation, positive outcomes for the intervention group were noted on cognition and social-emotional outcomes. Specifically, at six months of age infants were rated significantly less irritable than comparison infants (p<0.05) and a time by treatment interaction effect showed higher scores for cognitive development among intervention than comparison infants at 12 months (Jungmann et al., 2009). In contrast, a larger study of Pro Kind (Sierau et al., 2016) reported no overall difference in mental development from 6 to 24 months, nor social-emotional development (behaviour ratings, internalising, or externalising problems) at 24 months. Similarly, there were no differences in maternal reports of concern with language development at 12 or 24 months, and no difference in scores on a language test administered at 24 months (Sierau et al., 2016).

Overall, the larger, higher quality study suggests few lasting positive program effects on child psychosocial health. However, a significant group by risk interaction effect (p=0.03) was observed on mental development showing children born to low-risk families scored similarly, whereas among high-risk families, children in the treatment group scored higher than their comparison counterparts and similarly to (even slightly exceeding) low-risk children. Thus, much like the NFP and MECSH, there appears to be some evidence that Pro Kind has a positive effect on cognitive development for especially vulnerable children.

VoorZorg

There is some evidence that VoorZorg can improve social-emotional development outcomes (Mejdoubi et al., 2015). At 24 months significantly fewer intervention than comparison children exhibited internalising behaviour problems (17% vs 31%, p<0.05), but the difference in externalising behaviour was not statistically significant (25% vs 35%, p=0.12). Cognitive and language outcomes were not reported in the studies identified for this review.

Summary: Short-term child psychosocial outcomes

Of the four programs including assessment of cognitive outcomes, positive main effects have been observed for two (FNP, Pro Kind), with sub-group effects emerging for the other two (NFP, MECSH). Positive effects on language development emerged for two (NFP and FNP) of three programs (not Pro Kind), and on social-emotional outcomes for four of the five programs (NFP, VoorZorg, Pro Kind and Minding the Baby, not MECSH).

Long-Term Child Outcomes

Long-term child outcomes were available only for the NFP program. Table 8 includes data drawn from the two NFP review papers (Miller, 2015; Olds, 2008) and individual follow-up studies identified in the literature search. Overall, the results show the NFP has demonstrated long term benefits for child physical and psychosocial health, as well as some life-course outcomes.

Table 8: Long term child outcomes from NFP trials

Outcomes	Overall Evidence	Findings
		Physical health
Tobacco, alcohol, and drug use **(Kitzman et al., 2010; Miller, 2015)**	Positive (age 12-15 years), Mixed (age 19 years)	Memphis • Lower self-reported rates among intervention than comparison children for (a) use of cigarettes, alcohol or drug use in the previous 30 days, (b) incidence number of substances used in the past 30 days, and (c) incidence of days of substance use in the past 30 days Elmira: • From age 12-15 years, lower alcohol, tobacco and drug use reported by intervention compared with comparison group children • At age 19 years, differences in alcohol and substance use were not statistically significant
Mortality **(Olds, 2008; Olds, Kitzman, et al., 2014)**	Positive	Memphis: • At child age 9 years a trend (p=0.08) indicated lower child mortality rates among intervention children • At 20 years, lower rates of preventable deaths (SIDs, unintentional injury, homicide) were observed for intervention children (0% vs 1.6%, p=0.04). All-cause mortality was also lower (0.9% vs 2.7%) but not statistically significant, p=0.11
Psychosocial health		
Social-Emotional **(Kitzman et al., 2010; Olds, 2008; Olds, Kitzman, et al., 2014; Sidora-Arcoleo et al., 2010)**	Mixed	Memphis: • By child age 6 years, children of nurse visited mothers had fewer behaviour problems in the borderline and clinical ranges • No differences found on a measure of physical aggression at 6 or 12 years, except among children born to mothers with high psychological resources • A 12 year follow up found significantly lower rates of self-reported internalising disorder, with fewer children in the NFP than comparison group meeting borderline or clinical thresholds (22.1% vs 30.9%, p=0.04). No differences for externalising, total problems, and conduct.

		Denver: • Trends favoured intervention children with fewer internalising problems at child age 9 years (p=0.08) and total problems at 6 years (p=0.08). No treatment effects for internalising problems at 6 years, externalising at 6 or 9 years, or total problems at 9 years. Overall: Internalising most consistent (at 9 years Denver and 12 years Memphis).
Cognitive development / Primary Education outcomes **(Kitzman et al., 2010; Olds, 2008; Olds, Holmberg, et al., 2014; Sidora-Arcoleo et al., 2010)**	Subgroup only	Memphis: • By child age 6 years, intervention children had higher intellectual functioning and receptive vocabulary. Yet, no difference emerged on the Peabody Picture Vocabulary Test at 6 years • At 12-year follow-up there were no effects on special education placement, having ever been retained, or sustained attention Denver: • By 9 years no overall program effects on most cognitive measures (attention dysfunction, intelligence, visual attention, working memory, or academic achievement). A trend favouring nurse-visited children was observed for attention dysfunction, p=0.07. Pooled results • pooling from Memphis (age 12) and Denver (age 9) showed no significant intervention effect on grade repetition **Sub-group effects (mothers with low psychological resources)** Memphis: • At 6 years: arithmetic scores were higher for nurse-visited than comparison children • At 9 years, grade point averages in reading and math were higher among nurse-visited children • At 12 years: scores on Peabody Individual Achievement Tests in reading and maths (p=0.009), group-administered standardised tests of math and reading achievement through grades 1 to 6 (p=0.02), and GPA scores from grades 1-6 (p=0.03) and grades 4-6

		(p=0.047) were higher among nurse-visited than comparison children Denver: • Averaged over ages 4,6, and 9 years: sustained attention (p=0.006) was stronger among nurse-visited than comparison children • At 6 years: Nurse-visited children were also less likely to have used therapeutic services (p=0.01) • In the first three years of school: fewer nurse-visited than comparison children enrolled in special education or remedial services (p=0.06).
Language **(Olds, Holmberg, et al., 2014; Sidora-Arcoleo et al., 2010)**	Subgroup effect	Memphis • No intervention effects on verbal ability at 6 years (Peabody Picture Vocabulary Test). **Sub-group effects (mothers with low psychological resources)** Denver • Intervention children scored better than comparison counterparts on language tests averaged over measures at ages 2,4, and 6 years, effect size 0.3, (p=0.01)
Life course		
Reproductive behaviour **(Eckenrode et al., 2010)**	Subgroup effects	Elmira 19-year follow up • no overall program effect on reproductive behaviours **Sub-group effects (low income unmarried mothers)** • Females of nurse-visited women had fewer children themselves • Higher rates of condom use • Among males born to high risk mothers, the NFP was associated with a greater number of sexual partners[2]
Educational achievement **(Secondary school age)** **(Eckenrode et al., 2010)**	No effect	Elmira 19-year follow up • No intervention effect on graduation rates

Welfare use **(Eckenrode et al., 2010)**	Subgroup effect	**Sub-group effects (low income unmarried mothers)** Elmira 19-year follow up • Females of nurse-visited women had less Medicaid use (18% vs 45%).
Criminal involvement **(Eckenrode et al., 2010; Kitzman et al., 2010; Olds, 2008)**	Subgroup effect	Memphis (child age 12 years) • No difference in rates of arrest Elmira: • At 15-year follow-up, fewer arrests among children born to nurse-visited than comparison mothers; effect strongest for subgroup (children born to poor and unmarried mothers) • At 19 years females of nurse-visited mothers were less likely to have ever been arrested (10% vs 30%) or convicted (4% vs 20%) and had fewer incidences of arrest or conviction.

As shown in the table above, the NFP has demonstrated some long term benefits to child physical health. Indeed, follow-up studies of the Memphis trial suggest the program results in lower rates of preventable child mortality up to 20 years later. Additionally, two of three trials (Elmira and Memphis) reported positive program effects on tobacco, alcohol and drug use from age 12 to 15 years.

Long term benefits have also been observed for psychosocial development. Program effects on social-emotional development appear most consistent for internalising problems, with two trials (Denver and Memphis) demonstrating positive effects at age 9 and 12 years, respectively. For children born to more vulnerable mothers, positive effects on cognitive and language development during the primary school years have also been demonstrated in two trials (Denver and Memphis).

Positive program effects on child life-course outcomes (such as reproductive behaviour, welfare use, and criminal involvement) are also evident for specific subgroups. The 19 -year follow up of the Elmira trial demonstrated positive effects on childbearing and welfare-use among girls born to low income unmarried mothers. This trial also showed positive effects on criminal involvement for girls.

Taking into consideration the large number of comparisons increasing Type I error, self-report and the potential for social desirability effects perhaps reflecting greater self-confidence, this difference should probably not be interpreted as evidence of a negative program effect.

Summary: Long-term child outcomes

The effect of SNHV on long term child outcomes has been evaluated in three NFP trials. Overall, the NFP has demonstrated long term benefits for child health behaviours (in early adolescence), preventable mortality (up to 20 years later), and psychosocial development (particularly internalising problems). For children born to more vulnerable mothers, the program has also demonstrated positive effects on cognitive and language development, and child life-course outcomes (such as reproductive behaviour, welfare use, and criminal involvement). However, positive program effects are not observed across all outcome measures and there is some inconsistency in findings across trials.

Parent Outcomes

In this section a series of tables present an overview of the parent outcomes that have been evaluated in SNHV program trials and published between 2008 and 2018. Tables are presented for maternal outcomes only as no studies *systematically* examined paternal outcomes. As such, the few outcomes most closely related to paternal well-being (e.g. intimate partner violence perpetrated by the mother, cohabitation with the child's father) are presented within maternal outcomes tables. At this time, the NFP is the only SNHV program for which long term outcomes (i.e. follow ups from child age 6 to 19 years) have been evaluated. Short term outcome evaluations (from birth to child age 5 years) are presented from Table 9 to Table 15. The results from studies evaluating long term maternal outcomes are presented in Table 16.

Short-Term Maternal Outcomes

Table 9 shows short term maternal physical health outcomes.

Table 10 presents parenting outcomes. Table 12 presents maternal psycho-social outcomes. Table 14 provides an overview of outcomes related to maternal life course in the first few years following birth. For some outcomes, there appear to be stronger effects for specific subgroups. These subgroup effects are presented in Table 11, Table 13, and Table 15, each below the respective overall outcomes tables.

Maternal Physical Health

Table *9* summarises the findings on five maternal physical health outcomes. The most commonly evaluated of these were smoking behaviour (assessed in evaluations of 5 programs: FNP, MECSH, NFP, Pro Kind and VoorZorg) and perinatal health (3 programs: FNP, MECSH, and NFP). Fewer programs have published outcomes relating to general overall health (MECSH), health behaviours including diet, sleep, and exercise (FNP, NFP) and substance misuse (NFP).

Table 9: Maternal Short-term physical health outcomes

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Team Model	NFP	Pro Kind	right@ home	VoorZorg
				Physical health				
Smoking	# (prenatal, 6,12,18,24 months)	# (0-24 months)			+ (prenatal-Miller)	# (prenatal-Jungmann)		++ (prenatal and 2 months)
Substance misuse	# (24 months)					#		
Pre & Perinatal Health	# (pre-eclampsia/ hypertension)	+,* (4-6 weeks post- partum; prenatal diabetes & hypertension)			+ (pre-eclampsia-Miller; hypertension, kidney infection-Olds 2008)			
General physical health		# (0-2 years)						
Sleep, Diet, Exercise, Weight	# (weight at 24 months)				+ (diet -Olds 2008, Elmira trial)			

+=positive impact, #=no impact, -=negative, *=trend/marginal

FNP

Although several maternal physical health outcomes were assessed in the UK FNP trial (smoking, substance misuse, pre-eclampsia/hypertension, and weight[3]) statistically significant differences between the nurse home-visiting group and comparison group were not observed (Robling et al., 2016).

MECSH

The MECSH trial in Australia included measures of smoking, prenatal health and general health. Positive program effects emerged on some prenatal health outcomes. Indeed, lower rates of gestational diabetes and pregnancy induced hypertension were observed for the intervention group (no cases) in comparison with the control group (12.6% and 4.2% respectively-similar to population levels). Rates of unassisted vaginal delivery were also compared with a trend (p=0.07) favouring the intervention group (80% vs 69%). In contrast, there was no intervention effect on genitourinary infections during

[3] The FNP publications did not explicitly state whether the measurement of 'weight' was intended to document maternal overweight/obesity, underweight, or healthy weight.

pregnancy. Mothers participating in the MECSH program also reported better general health than their comparison counterparts 4-6 weeks post-partum, with 51% of mothers in the intervention group reporting 'very good or excellent health' compared with 35% of comparison mothers, *d*=0.44 (medium effect). No differences were observed for smoking behaviour either at the level of the household or individual.

Minding the Baby and Nurse-CHW model

There were no maternal physical health outcomes evaluated in the Minding the Baby and Nurse-CHW trials.

NFP

NFP evaluations included measures of smoking, prenatal health, and diet (with pooled RCT data for smoking and pre-eclampsia and evidence from at least one RCT for hypertension, kidney infection, and diet). Smoking during pregnancy was assessed in the Elmira, Memphis, and Denver NFP studies, with all recording decreases, though the difference was not significant in Memphis (Miller, 2015). Two of the three NFP studies (Memphis and Elmira) reported lower rates of pre-eclampsia for the intervention group when compared with a control group (large effect). Presumably, the Denver trial did not include a measure of pre-eclampsia (as it is not included in the Miller results). Hypertension, kidney infections, and diet were not assessed in the Miller synthesis. However, Olds (2008) reported positive findings on these outcomes. Specifically, the Elmira trial demonstrated statistically significant intervention effects in relation to fewer kidney infections and maternal diet quality during pregnancy and the Memphis trial resulted in fewer (and less serious) cases of pregnancy induced hypertension among nurse-visited women than comparison women. Olds (2008) does not report whether kidney infection and hypertension were measured in all three trials, nor whether other measures of maternal physical health were measured.

Pro Kind

Regarding maternal physical health, the Pro Kind trial examined prenatal smoking only. There was no effect on this outcome.

right@home

The right@home protocol paper indicates that maternal physical health outcomes were measured at child age 2 years, however results for these outcomes were not published at the time of writing this review.

VoorZorg

The VoorZorg trial included an evaluation of prenatal and postnatal smoking. Publications included in this review did not address other maternal physical health outcomes. The trial protocol indicates that drug and alcohol use measures were administered, but no other maternal physical health outcomes appear to have been assessed. Data showed that there were positive intervention effects on both prenatal and early post-natal smoking (small effect size; quit rates, average number smoked, and number of cigarettes smoked near the baby).

Summary: Maternal short-term physical health outcomes

Overall, evidence that SNHV programs significantly improve maternal physical health and health behaviours is mixed. Several trials have demonstrated positive impacts on prenatal smoking (NFP and VoorZorg) and pregnancy-related health outcomes such as pre-eclampsia, gestational diabetes, and pregnancy-induced hypertension (NFP and MECSH). There is little available evidence pertaining to health behaviours (such as diet, exercise, and sleep) or more general health outcomes (such as healthy weight, or overall physical health) as these have been assessed in fewer trials. It is also unclear whether program effects are more pronounced for certain sub-groups, as none of the trials reported sub-group effects for maternal physical health outcomes. Given the available evidence it appears that the NFP and VoorZorg are most effective for improving maternal physical health outcomes, with promising results also emerging for the MECSH.

Maternal Parenting Outcomes

Table *10* provides an overview of short-term maternal parenting outcomes. The most commonly reported parenting outcomes related to parenting skills and behaviour (MECSH, NFP, Pro Kind, right@home, and VoorZorg) and mother-child interaction (FNP, MECSH, Minding the Baby, Pro Kind, and NFP), each assessed for five programs. Breastfeeding (FNP, NFP, MECSH, VoorZorg), immunisation compliance (FNP, NFP, MECSH, Minding the Baby, Nurse-CHW) and child safety or hazard reduction (FNP, MECSH, NFP, right@home) outcomes were each assessed in evaluations of four programs. Child abuse risk (FNP, MECSH, NFP) and the quality of the home learning environment (MECSH, NFP, right@home) were evaluated for three programs, while measures of parent knowledge (MECSH, Pro Kind) and attendance at well-child check-ups (Minding the Baby, Nurse-CHW) were included for only two programs.

Table 10: Short term parenting outcomes

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Team Model	NFP	Pro Kind	right@ home	VoorZorg
Short term parenting outcomes								
Breastfeeding	+, # (intention, duration)	#,+ (0-4 weeks, 6 months, 2011 paper)			+,# (Miller 2015-Memphis & Elmira initiation; Olds 2008-duration)			#, + (initiation, duration)
Child diet	# (baby diet 18, 24 months)							

Skills & behaviour	#	#+ (2011 paper, HOME Inventory; 12-24 months)			+ (Olds 2008; Elmira 10-22 months)	# (Sierau:self-report parenting scale 12, 24 months)	+# (Parent Care and HOME inventory-24 months)	#,#,+ (HOME @ 6,18, 24 months)
Parent-child interaction	# (24 months) Maternal sensitivity & intrusiveness and child responsiveness & child affect	# (18 months - observation clinic, 2011 paper)	# (4 months-video) AMBIANCE scale - disrupted communication		# (olds 2008)	# (6,12,24 months-video) Mother-child affectivity and responsiveness (video rated)		
Parent Knowledge		+ (2013 paper, SIDS specific)				#,#,* (Sierau: pregnancy, 6 months, 12 months)		
Hazard reduction	* (Child safety:12,18,24 months, *p*=0.08)	# (SIDS recommendations 4-6 weeks post=partum, 2013)			+ (Olds 2008; Elmira age 3-4 years)		+ (24 months)	
Immunisation compliance	# (6, 12, 18 months)	# (6, 12 months)	+, # (+ 12 months, # 24 months)	# (0-12 months)	# (Miller 2015; Elmira & Memphis, 2 years)			
Well-child check ups			+, # (+ 12 months, # 24 months)	# (0-12 months)				
Child abuse risk	#,? (referral to social services, safeguarding procedures -24 months)	# (HOME 12-24 months)			+ (Olds 2008, Memphis 0-24 months)			

Home learning environment	# (2011 paper, HOME Inventory; 12-24 months)		+ (Olds 2008:Memphis, Elmira, Denver)	+# (HOME-24 months)

Table 11: Sub-groups with positive parenting effects

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Team Model	NFP	Pro Kind	Right@ Home	VoorZorg
Positive Parenting Effects								
Breastfeeding		Overseas born						
Skills & behaviour		First-time, overseas-born, >1 risk factor, distressed						
Parent-child interaction			Teen mothers		Poor unmarried teens (Elmira) Low psychological resources (Memphis) Low resource-group (Denver)			
Child abuse risk					Poor unmarried teens (Elmira)			
Home learning environment		>1 risk factor, Distressed, Australian born			Poor unmarried teens (Elmira)			

FNP

The FNP trial included assessments of the following parenting outcomes: breastfeeding, child diet, parent skills and behaviours, parent-child interaction, hazard reduction, and immunisation compliance. A small positive impact on *intention* to breastfeed was observed with more women in the intervention than comparison arms (58.4% vs 50.4%) reporting an intention to breast or mix feed their infants (Robling et al. 2016). However, there was little difference in the proportion of women initiating breast or mixed feeding in the FNP and comparison groups (43.8% vs 41.4%, respectively) and similarly, no significant difference in the median duration of breast feeding, measured at six months (7 versus 14

days, in the intervention and comparison arms). Child diet was also measured, with no program effect observed.

The FNP trial included several measures related to parenting skills and behaviours. These included anticipatory parenting, prenatal attachment, and prenatal role strain. No program effects were observed on these measures. Mother child interactions were assessed at child age 24 months, but observer-coded measures of maternal sensitivity and intrusiveness scores together with child responsiveness and child affect did not reveal any statistically significant differences (Robling et al. 2016).

Parent knowledge does not appear to have been evaluated in the FNP trial. Child safety, however, was assessed (at 12, 18, and 24 months) with a trend suggesting more positive responses to child safety feature questions among nurse-visited than comparison mothers (p=0.08). However, details about child safety items were not reported. Immunisation compliance rates were similar in intervention and comparison arms (~ 80% by 24 months) suggesting the program does not improve this outcome.

Child abuse risk was not directly measured in the FNP trial. However, rates of safeguarding procedures and referral to social services were. Results showed safeguarding procedures were more common among FNP than comparison families (13.6% vs 8.0%, p=0.005). Similarly, there were higher rates of referral to social services in FNP than comparison arms (20.5% vs 16.8%), though this difference was not statistically significant (p=0.13). Robling suggests the difference in safeguarding documentation reflects a surveillance effect rather than child abuse or risk per se.

MECSH

The evaluation of MECSH included measures of breastfeeding, parenting skills and behaviours, parent-child interaction, hazard reduction, parent knowledge, immunisation compliance, child abuse risk, and the home learning environment. It demonstrated a positive effect on breastfeeding *duration* (Kemp et al., 2011) but not initiation (Kemp et al., 2013). Intervention mothers breastfed for more weeks (16 vs 8) than comparison mothers. The proportion initiating breastfeeding was high in intervention and control arms (87% vs 85% respectively). By 4 weeks, rates dropped markedly for both groups (58% vs 52%, see Kemp 2013). Sub-group analyses on duration of breastfeeding showed the program was most effective for mothers born overseas (d=0.87, p<0.001).

The program has also demonstrated some positive effects for parenting skills and behaviour. An overall program effect was observed on responsivity (d=0.26) as measured by the Home Observation Measurement of the Environment (HOME) from 12 to 24 months (Kemp et al., 2011). The program appears especially effective for more vulnerable sub-groups. Indeed, significant positive program effects on responsivity emerged for first time mothers (d=0.29, p=0.01), overseas born mothers (d=0.21, p=0.05), mothers with more than one risk factor (d=0.24, p=0.02), and distressed mothers (d=0.39, p=0.001). Similarly, a positive impact on maternal involvement was observed for first-time mothers (d=0.29 p=0.02).

The MECSH trial included assessment of parent-child interaction during free play in a structured clinic environment at child age 18 months. No overall group nor subgroup effects were observed on ratings of sensitive stimulating parenting, detached flat parenting, or child engagement (Kemp et al., 2011).

A measure of parent knowledge specific to SIDS was included in the MECSH trial (Kemp et al., 2013). Overall, the proportion of mothers who could name two or more strategies to reduce the risk of SIDS was higher among the intervention than comparison group (83% vs 68%, *p*=0.04). However, it is unclear whether improved knowledge translated into improved practice. The proportion of sleeping areas conforming with SIDS recommendations was higher among intervention than comparison groups (51.2% vs 44.7%), but the difference was not statistically significant. It is worth noting however, that the sample size for this analysis was limited (n=81) and a larger trial may have found this small difference significant (both statistically and clinically).

Immunisation compliance rates were similar in intervention and comparison arms (both 100% at 6-24 months (Kemp et al., 2013). Well-child check-up rates were not reported.

No overall program effects emerged on avoidance of restriction and punishment, suggesting no evidence that MECSH reduces child abuse risk.

Measures of the quality of the home learning environment were included in the MECSH trial (Kemp et al., 2011), and effects on the provision of appropriate play materials (e.g. toys for literature and music, toys to encourage hand-eye co-ordination, role-playing toys) were explicitly reported. Although no overall difference was observed for the provision of appropriate play materials in this study, significant effects favouring the MECSH group were observed for some sub-groups of mothers (first time mothers *d*=0.34, *p*=0.003, Australian born *d*=0.22, *p*=0.04, >1 risk factor *d*=0.20, *p*=0.06). On organisation of the home environment, effects favouring the MECSH group were observed among distressed mothers (*d*=0.29, *p*=0.01), and mothers with more than one risk factor (*d*=0.19, *p*=0.07).

Minding the Baby

The evaluation of Minding the Baby included measures of parent-child interaction, immunisation compliance and well-child check-up attendance. Mother-child interactions were assessed at child age 4 months with the quality of affective communication between mothers and infants recorded in video-taped face-to-face interactions. Although no overall program effect emerged, there was some evidence of improvement among teen mothers (Sadler et al., 2013). Among this sub-group, 66.6% of intervention compared with 93.8% of comparison dyads scored in the disrupted communication range. Intervention teen mothers were 11.9 times more likely to have healthy communication patterns than control dyads.

A statistically significant positive program effect was observed for immunisation status and attendance at well-child check-ups, at child age 12 but not 24 months (Sadler et al., 2013). At 12 months, children in the intervention group were more likely than comparison counterparts to be up to date on immunisations and to have attended well-child check-ups (though no statistics were reported). The authors suggest convergence in immunisation rates at 24 months was probably attributable to the community health centre implementing a funded state-wide outreach program aiming to have all children immunised by 24 months.

Breastfeeding, parenting skills and behaviours, parent knowledge and child safety do not appear to have been evaluated.

Nurse-CHW Team

Breastfeeding outcomes, parenting skills, mother-child interaction, parent knowledge and hazard reduction outcomes were not reported in the publications describing evaluations of this program.

However, immunisation and well-child check-up outcomes were assessed. The evaluations suggest adding a CHW to the standard single-visitor model does not improve immunisation compliance (~84% in both arms) or the mean number of well-child visits attended by child age 12 months (Meghea et al., 2013).

NFP

The literature pertaining to the NFP included measures of breastfeeding, parent skills and behaviours, the home learning environment, parent-child interaction, immunisation compliance and child abuse risk. Pooled results from two NFP trials (Elmira and Memphis) show a significant effect of the program on *initiation* of breastfeeding (Miller, 2015), with more intervention than comparison mothers attempting breastfeeding. However, the program does not appear to have demonstrated an effect on breastfeeding duration (Olds, 2008).

Pooled results for parent skills and behaviours were not included in the independent review (Miller, 2015). However, there is evidence from the Elmira and Memphis trials demonstrating a positive program effect on some parenting skills (Olds, 2008). Specifically, the Elmira trial is reported to have found statistically significant differences favouring nurse-visited mothers with less punishment and restriction and more appropriate play materials provided at child age 10-22 months, and provision of home environments more conducive to emotional and cognitive development at 34 and 46 months (Olds, 2008). Similarly, in the Memphis trial, at 24 months, the homes of nurse-visited mothers were rated as more conducive to children's development than comparison mothers.

There is also some evidence that the NFP improves mother-child interactions for particularly vulnerable families. Indeed, Olds (2008) reported that poor, unmarried teen mothers in the Elmira trial, and mothers with low psychological resources in the Memphis and Denver trials benefited from the NFP with more positive mother-child interactions than their comparison counterparts. In the Memphis trial, by 24 months, children born to nurse-visited mothers with low psychological resources were observed to be more communicative and responsive to their mothers. In the Denver trial, by 24 months, mother-infant dyads were also reported to interact more responsively. Details of the effect sizes were not reported, however.

Parent knowledge does not appear to have been evaluated. Similarly, the literature included in this review provides little information about the effects of NFP on hazard reduction. This outcome was not included in Miller (2015). However, Olds reported that the Elmira trial found statistically significant differences, favouring nurse-visited families, in the safety of home environments at child ages 34 and 46 months.

The NFP does not appear to have a significant effect on immunisation rates. Separate results from the Elmira and Memphis trials revealed no statistically significant differences (Miller, 2015). Results were not pooled for this outcome. No information pertaining to well-child check-up rates was reported in the publications included in this review.

There is some evidence that the NFP reduces child abuse risk. Beliefs about child-rearing that are associated with abuse and neglect were less common among nurse-visited than comparison women as measured up to child age 24 months in the Memphis trial (Olds, 2008). There is also evidence from the Elmira trial, whereby a subgroup effect was observed at child age 10 and 22 months, such that nurse-visited mothers who were poor and unmarried showed less punishment and restriction (Olds, 2008).

There is also some evidence that the NFP improves the home learning environment. According to Olds (Olds), the Elmira trial found statistically significant differences favouring nurse-visited families on the provision of appropriate play materials at child age 10-22 months, and the Memphis trial similarly found the homes of nurse visited women were rated as more conducive to children's development than those of comparison women at child age 24 months. In the Denver trial, trends were observed suggesting nurse-visited mothers provided home environments that were more supportive of early learning than comparison mothers (Olds, 2008).

Pro Kind

Pro Kind evaluations have included measures of parent skills and behaviour, parent-child interaction and parent knowledge. Measures of parenting skills and behaviours were included from child age 12 to 24 months but no statistically significant program effects were observed on measures of parenting style or maternal empathy (Sierau et al., 2016). However, a significant difference was observed for maternal feelings of attachment at 12 months (though not at 36 weeks of pregnancy or 6 months post-partum). Pro Kind did not affect parent-child interaction. Indeed, on video coded mother-child affectivity and responsiveness, no differences were observed at 6, 12, or 24 months (Sierau et al., 2016).

A measure of child rearing knowledge was included at 36 weeks pregnant and child ages 6 and 12 months. Although a trend favouring Pro Kind mothers was observed over the three time-points (p=0.06), and examination of the means suggests the difference approached significance at 12 months (Sierau et al., 2016), it unclear exactly what types of parent knowledge were assessed. The publication does not describe these sufficiently clearly.

Breastfeeding outcomes, hazard reduction, immunisation compliance, and well-child check-up rates were not reported in the publications describing evaluations of this program.

right@home

The published right@home literature includes results relevant to parent skills and behaviours and the home learning environment. The trial found positive program effects on 6 of 13 primary outcome measures across three domains including parent care, responsivity, and the home learning environment. Specifically, compared with parents in the control group, those in the intervention reported significantly safer family homes (p=0.016), more regular child bed time (p=0.002), and a more varied home environment including opportunities for social interaction with adults (p=0.016). Additionally, the parenting practices of program mothers were rated as warmer (p=0.010) and less hostile (p<0.001) than those of their control counterparts. Similarly, program mothers scored significantly higher on facilitation of their child's learning than did control mothers (p=0.001).

In contrast, no differences were observed on measures of regular meal times or bed routines, or on food choices. Nor were there significant differences on HOME measures of parental responsivity, acceptance of the child, or learning materials.

Other parenting measures included in the trial assess breastfeeding and the parent-child relationship. However, the results for these outcomes have not yet been published.

VoorZorg

The VoorZorg trial included measures of breastfeeding and parent skills and behaviours. While the results indicate little difference on the proportion (78% vs 82%) of women initiating breastfeeding

(Mejdoubi et al., 2014), significantly more women in the intervention than comparison (13% vs 6%) group were continuing to breastfeed at child age six months. A positive program effect was also observed on parenting skills and behaviour (Mejdoubi et al., 2015). At child age 24 months, there were higher scores among intervention than comparison arms on a measure of the quality of the home environment (HOME Inventory[4]). Differences were not evident at 6 and 18 months (Mejdoubi et al., 2015). The evaluation of VoorZorg did not find any statistically significant evidence of a program effect on mother child interaction. Parent knowledge, hazard reduction, immunisation compliance, and well-child check-up rates do not appear to have been evaluated. Although the VoorZorg trial included measures relating to the home learning environment (e.g. provision of appropriate play materials) sub-scale results were not reported (Mejdoubi et al., 2015).

Summary: Short term parenting outcomes

Of the four programs including a published evaluation of breastfeeding outcomes (NFP, FNP, VoorZorg, MECSH) all reported some overall positive effect of the program, whether it be on measures of breastfeeding intention, initiation, or duration. Similarly, for four of five programs including measures of parenting skills and behaviour (NFP, VoorZorg, MECSH, right@home), positive program effects emerged on either some measures or at some time-points. In contrast, no programs demonstrated overall improvements in mother-child interaction, though some effects were observed for specific sub-groups. The only program showing an effect on immunisation rates or attendance at well-child check-ups was Minding the Baby. Four programs have assessed child safety or hazard reduction, of which three (NFP, FNP, right@home) provide some evidence of effectiveness. There is also some (albeit limited) evidence that the NFP can reduce child abuse risk and that both NFP and right@home increase the quality of the home learning environment.

Maternal Psycho-Social Outcomes

Table 12 summarises the findings for maternal psychosocial outcomes. These included measures of internal distress such as depression, anxiety, or stress (6 programs: FNP, MECSH, Minding the Baby, Nurse-CHW, NFP, Pro Kind), social support (5 programs: FNP, MECSH, Nurse-CHW, NFP, Pro Kind), community engagement (2 programs: FNP, NFP), sense of control or satisfaction in the maternal role (4 programs: FNP, MECSH, Nurse-CHW, Pro Kind), family structure (2 programs: FNP, Pro Kind) and family violence (3 programs: FNP, NFP, VoorZoorg).

Table 12: Maternal psycho-social outcomes – short term

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Model	NFP	Pro Kind	Right@ Home	VoorZorg
Psycho-Social								
Depression/Anxiety/Stress	# (6 to 24 months)	# (0-24 months)	# (12 & 24 months)	+* (0-15 months)	+,# (depression prenatal, 6-8 months)	#,+ (+ stress 12 &24 months)		

[4] This measure includes assessment of responsivity, avoidance of restriction and punishment, organisation of environment, provision of appropriate play materials, maternal involvement and variety in daily stimulation

Social support	+ (18 & 24 months)	# (0-24 months)	# (0-15 months)	+ (pregnancy, Elmira, Olds 2008)	* (24 months)		
Engagement & attitude to community services	# (6 to 24 months)			+ (pregnancy, Olds 2008-Elmira & Memphis)			
Maternal sense of control/satisfaction	+ (6 to 24 months)	# (18-24 months)	* (0-15 months)		#+ (# pregnancy, 6mths, + 12 months)		
Family structure and functioning	# (6 to 24 months)				#+ (# pregnancy &12 moths, + 6 months)		
Family violence	# (24 months)			+ (0-5 years-Miller)			+,* (prenatal, 24 months)

Table 13: Sub-group effects on maternal psycho-social outcomes

Outcomes	FNP	MECSH	Minding the Baby	Nurse-CHW Team Model	NFP	Pro Kind	Right@ Home	VoorZorg
Psycho-Social								
Depression/Anxiety /Stress				Low psychological resources; high stress				
Social support						High risk women >=6 risk factors		
Engagement & attitude to community services								
Maternal sense of control/satisfaction		First time, overseas born, distressed						
Family functioning								

FNP

The FNP evaluation included measures relevant to all psycho-social outcomes listed above. It found the proportion of participants reporting maximum levels of social support was statistically higher among intervention than control mothers (p=0.023) at 18 months (25.7% vs 20.3%) and 24 months (27.9% vs 23.1%). A small but statistically significant (p=0.011) difference was also observed on self-efficacy scores favouring FNP participants. Robling et al (2016) also reported a small difference in relationship quality scores. No other differences were significant.

MECSH

The MECSH trial included measures of internal distress, social support and maternal sense of satisfaction. Although it did not reveal any significant main effects on maternal psychosocial outcomes (Kemp et al., 2011) significantly higher levels of satisfaction with being a mother were observed among intervention than control mothers who were first-time parents (d=0.59), overseas born (d= 0.54), or distressed (d=0.38).

Minding the Baby

The evaluation of Minding the Baby included a measure of maternal depressive symptoms and general psychological distress but found no evidence of an overall program effect or sub-group effects.

Nurse-CHW team

There is some evidence that the Nurse-CHW team program had a positive impact on depressive symptoms, stress, and mastery (Meghea et al., 2013). Significantly fewer depressive symptoms (p=0.04) were observed among intervention than the comparison group mothers in the 15-month period from enrolment to final assessment. Trends also indicated less perceived stress (p=0.06) and higher mastery (p=0.06) among Nurse-CHW than control mothers. This suggests the addition of a Community Health Worker to Nurse visiting programs may be beneficial for these outcomes. Sub-group analyses (Roman et al., 2009) showed among women with low psychosocial resources, those assigned to the Nurse-CHW intervention had lower levels of depressive symptoms (p=0.02) and stress (p=0.02). Similarly, for women with high baseline stress, the intervention had a statistically significant effect on depressive symptoms (p=0.02). Roman found the largest reduction in depressive symptoms from prenatal enrolment to 15 months post birth occurred for women who had both high levels of stress and low psychosocial resources (p=0.02).

NFP

Based on the publications included in this review, the NFP trials have included maternal psychosocial outcome measures pertaining to internal distress, social support, community engagement and family violence. There does not appear to be consistently strong evidence that the NFP improves maternal depression in the short term. Although it was reported that a Louisiana RCT showed a 43% reduction in prenatal depression, there were no differences 6 to 8 months post-partum (Miller, 2015).

There is some evidence that the NFP may improve social support. In the Elmira trial, by the end of pregnancy, nurse-visited women reported more social support than their control group counterparts (Olds, 2008). However, it is unclear whether social support was measured in the Memphis and Denver trials.

There is stronger evidence that the NFP has a positive effect on family violence. Intimate partner violence was assessed in the Denver (from 0-4 years), Memphis (from 0-5 years), and Louisiana (0-1

years) NFP trials (Miller, 2015). Although each of the US studies individually failed to show a significant reduction, when pooled, Miller reported lower rates for the intervention than comparison groups (10.9% vs 13.7%,).

As noted above, psychosocial outcomes have also been evaluated in longer-term follow up studies of the NFP. The results from these are reported in Table 16.

Pro Kind

The Pro Kind evaluation reported positive effects on maternal stress, social support, self-efficacy and partnership satisfaction (Sierau et al., 2016). Lower levels of stress were observed for treatment than comparison mothers at 12- and 24-month assessments. A marginally significant Time x Treatment effect (p=0.05) on social support indicated that women in the intervention group maintained levels of perceived social support at 24 months post-partum, whereas women in the control group experienced a reduction in social support over time. This effect was statistically significant (p=0.006) for high risk women[5]. Although differences in parental self-efficacy were not evident at 36 weeks pregnancy or 6 months post-partum, at 12 months self-efficacy was significantly higher among treatment than comparison mothers (p=0.044). A significant difference on partnership satisfaction emerged at 6 months post-partum favouring home-visited over comparison mothers, but no differences were observed at 36 weeks pregnant, or 12 months post-partum.

right@home

Although the right@home evaluation protocol indicates that several maternal psycho-social outcomes would be measured at child age 2 years (e.g. maternal mental health, quality of life, and parenting efficacy), the results of these comparisons were not published at the time of writing this review.

VoorZorg

The VoorZorg protocol paper indicates that the trial included psychosocial outcome measures pertaining to maternal depression and intimate partner violence (IPV; Mejdoubi et al., 2011). Although no results describing effects on depressive symptomology appear to have been published, the evaluation found several positive and statistically significant effects on prenatal intimate partner violence (Mejdoubi et al., 2013). At 32 weeks of pregnancy, fewer women in the intervention than comparison arm reported experiencing severe psychological aggression (39% vs 56%), physical assault (40% vs 58%), severe physical assault (20% vs 31%), level 1[6] sexual coercion (8% vs 16%), and multiple types of intimate partner violence (19% vs 31%). Differences did not emerge for level 1 psychological aggression (100% in both arms), severe sexual coercion (7% and 6%), minor injury (16% vs 26%) or severe injury (both arms 5%). At 24 months, the only statistically significant difference observed was on level 1 physical assault, with fewer women in the intervention arm experiencing this (26% vs 44%). Although not significant, the pattern of results also noticeably favoured the intervention group on severe psychological aggression (35% vs 47%), severe physical assault (17% vs 25%), sexual coercion

[5] High-ris women were defined as having six or more child maltreatment risk-factors (for example, being under age, low education, low income, low occupational status, unwanted pregnancy, alcohol misuse, drug misuse, single mother, social isolation, experienced custodial care, childhood neglect or maltreatment, loss of attachment figure during childhood, violence during pregnancy, life-time violence, psychiatric disorder, depression, anxiety, stress, potential for aggression)

[6] Level 1 forms of IPV were those considered relatively less severe or aggressive

(8% vs 15%), minor injury (16% vs 23%), severe injury (2% vs 9%), and experience of more than 2 types of violence (23% vs 36%).

Positive program effects were also observed on maternal perpetration of intimate partner violence. At 32 weeks pregnant, intervention mothers were less likely than their comparison counterparts to report perpetrating severe psychological aggression (46% vs 60%) minor physical assault (52% vs 65%) or more than two forms of violence (19% vs 31%). At 24 months they were less likely to report perpetrating minor sexual coercion (3% vs 18%) and reported a lower mean combination of IPV forms (1.3 vs 1.7).

Summary: Short term maternal psychosocial outcomes

Five programs appear to improve at least one maternal psychosocial outcome. These are the NFP (intimate partner violence), FNP (social support, self-efficacy), VoorZorg (intimate partner violence-both as victim and perpetrator), Pro Kind (stress, social support,) and the Nurse-CHW team model (depressive symptoms).

Maternal Life-Course

Maternal life-course outcomes have been reported most extensively for the NFP, where follow up studies have been conducted up to 20 years after program enrolment. All other programs included in this review report on maternal life outcomes up child age 2 years. Maternal life-course outcomes up to child age 5 are presented in Table 14, and long-term outcomes in Table 16.

As shown in Table *14*, evaluations of SNHV programs have included measures of subsequent pregnancies or births (4 programs: FNP, Minding the Baby, NFP, Pro Kind), welfare use (2 programs: FNP, NFP), education (2 programs: FNP, Pro Kind), employment (1 program: FNP) and homelessness (1 program: FNP).

Table 14: Maternal life-course – short term outcomes

Outcome	FNP	MECSH	Minding the Baby	Nurse-CHW Model	NFP	Pro Kind	right@ Home	VoorZorg
Life course								
Subsequent pregnancies/births	# (0-24 months)		+ (0-24 months)		+,+ (0-24 months, Miller; 4-5 years Memphis & Denver Olds 2008)	# (0-24 months)		
Welfare use	# (0-24 months)				+,# (0-24 months, 4-5years,Olds			

					2008; Denver Miller)			
Education	# (0-24 months)					# (0-24 months)		
Employment	# (0-24 months)							
Homelessness	* (birth to 24 months)							

Table 15: subgroup effects on early maternal life outcomes

Outcomes	FNP- UK	Minding the Baby	MECSH	Nurse-CHW Team	NFP	Pro Kind	right@Home	VoorZorg
Life Course								
Subsequent pregnancies/births					Low income unmarried - Elmira (fewer births & longer intervals)			
Employment					Low income unmarried – Elmira			

FNP

The FNP trial included maternal life-course outcome measures relating to subsequent births, welfare use, employment, education, and homelessness. It found little evidence of any effects on maternal life course outcomes within 2 years. There was no effect on subsequent births (66% in both trial arms) nor receipt of state benefits (FNP 87% vs Control 89%). Although participants in the FNP arm reported slightly lower rates of not being in employment, education or training than participants in the usual care arm (62.1% vs 69.7%) and higher rates of being in paid employment (18.7% vs 15.7%) at 24 months, these differences were not statistically significant (Robling et al., 2016). The FNP trial did show a trend (p=0.09) whereby fewer women in the intervention than comparison group (17.8% vs 21%) reported experiencing homelessness from baseline to 24 months, however, given the large number of comparisons conducted, this result should be interpreted very cautiously.

MECSH

The evaluations of this program did not include maternal life-course outcomes.

Minding the Baby

There is some preliminary evidence that Minding the Baby led to lower rates of pregnancy in the 24 months following first child birth (Sadler et al., 2013). Indeed, the rate of subsequent pregnancies was lower among intervention than comparison mothers (1.6% vs 15%, p=0.019). No other maternal life-course outcomes were reported.

Nurse-CHW Model

The evaluation of this program did not include maternal life-course outcomes.

NFP

The NFP has demonstrated positive overall effects on subsequent births and welfare use. Subsequent births within 24 months of the first were measured in the Elmira, Memphis, and Denver RCTs of the NFP (Miller, 2015). All three showed lower rates in intervention than comparison arms (though not statistically significant for Denver) with a pooled effect of 16.8% vs 28.0%. A significant effect indicating lower abortion rates among intervention than control arms (5.3% vs 8.7%) within 48 months was also observed when pooling results from the three NFP trials (Miller, 2015). Subgroup analyses in the Elmira trial indicated that the effect was concentrated among low income unmarried women (Olds, 2008).

There is also some evidence that the NFP positively impacts welfare use in the 24 months following first child birth. In the Memphis trial, slightly fewer months receiving welfare were reported for nurse-visited than comparison women (Olds, 2008). However, across the preschool years (0-4 years) differences in food stamps and TANF payments were not statistically significant in the Denver trial (Miller, 2015). Although no main effects on education and employment outcomes within 24 months were reported for the NFP, subgroup analyses reported positive employment outcomes for low income unmarried women in the Elmira trial (Olds, 2008).

As noted above, maternal life-course outcomes have also been evaluated in longer-term follow up studies of the NFP. The results from these are reported in Table 16.

Pro Kind

The Pro Kind trial measured subsequent childbirth at 24 months and educational achievement at 6, 12 and 24 months post-partum (Sierau et al., 2016). No statistically significant differences emerged on these outcomes. No other maternal life-course outcomes were reported.

right@home

The published evaluations of this program did not include maternal life-course outcomes.

VoorZorg

The published evaluations of this program did not include maternal life-course outcomes.

Summary: Short term maternal life-course outcomes

Overall, two programs (NFP and Minding the Baby) have demonstrated positive effects on subsequent pregnancies in the two years following first child birth. The NFP has also demonstrated a positive impact on welfare use from child age birth to 24 months in at least one trial. No programs demonstrate a significant overall impact on education or employment within the first two years.

No maternal life course outcomes appear to have been reported for evaluations of the Nurse-CHW model, MECSH, right@home or VoorZorg.

Long-Term Maternal Outcomes

The potential effects of the NFP on long term maternal outcomes have been evaluated in several studies. No other program evaluations have assessed long term maternal outcomes. Table 16 summarises results for long term NFP effects on maternal physical health, psychosocial health, and life-

course outcomes. It includes content drawn from the two NFP overview papers (Miller, 2015; Olds, 2008) and individual NFP follow-up studies of maternal outcomes, as identified in the literature search.

Table 16: Long term maternal outcomes

Outcomes:	Overall Evidence	Findings
Physical health		
Alcohol and Other Drugs (Olds et al., 2010)	Mixed	Memphis • Child age 12 years, fewer NFP mothers reported role impairment due to alcohol or other drug use (0.0% vs 2.5%, *p*=0.04). • No difference in percent of mothers reporting alcohol or drug use at this time-point (9.6 vs 10.4%, *p*=0.76).
Mortality (Olds, Kitzman, et al., 2014)	Mixed	Memphis • External-cause (unintentional injury, suicide, drop overdose, homicide) and all-cause maternal mortality was lower in the 20 years following trial enrolment among the intervention groups • Contrasts between *SNHV* and *no* visiting were not statistically significant (2.2% vs 3.7% for all-cause and 0.4% vs 1.7% for external cause, respectively). • Contrasts between sustained visiting with limited or no visiting were not presented.
Psycho-social		
Depression/Anxiety/Stress (Miller, 2015; Olds, 2008)	No effect	Denver: • 66% reduction in maternal depression at 9 years post-partum. Statistical significance not reported. Memphis and Elmira: • No intervention effect on depression at 9 or 15 years • At 12 years, no difference in the proportion of mothers reporting symptoms of psychological distress (18.4% vs 17.1%)
Mastery (Olds et al., 2010)	Positive	Memphis: • Maternal mastery, measured from 6 months to 12 years postpartum was significantly higher among NFP than comparison mothers (*p*=0.005)

Family structure (Olds, 2008; Olds et al., 2010)	Positive	Memphis: • At child age 4-5 years nurse-visited women had higher rates of living with the biological father, and longer duration of employment among partners. Longer relationships with a current partner were also reported for nurse-visited mothers by child age 9 years • Longer partner relationships among NFP than comparison mothers have been reported from measurements at child age 6, 9, and 12 years. However, no program effects emerged on the percentage of women co-habiting, partnered or married to the child's biological father at child age 12 (9.7% vs 6.7% for NFP vs Comparison, *p*=0.20). • The proportion of children placed in foster care from birth to 12 years was lower among nurse-visited than comparison children (0.04 vs 0.12, *p*=0.08)
Intimate partner violence (IPV) (Miller, 2015; Olds et al., 2010)	No effect	Memphis: • At child age 9-12 years, the % of mothers reporting experience of IPV was not statistically significant (22% vs 21%) Pooled results: • Although IPV risk was lower for NFP than comparison mothers assessed at 6 and 9-year follow ups in the Memphis and Elmira trials, the pooled difference was not statistically significant at 6 years (*p*=0.36) or 9 years (*p*=0.43)
Life-course		
Subsequent births (Miller, 2015; Olds, 2008; Olds et al., 2010)}	Subgroup effects	Memphis: • At child age 9 years, nurse-visited women had fewer subsequent pregnancies, fewer therapeutic abortions, and longer intervals between births of first and second child • At child age 12 years, there was no overall program effect on subsequent birth. However, among mothers with *higher* psychological resources there were fewer subsequent births among NFP than comparison mothers (*p*=0.04) Elmira: • At the 15-year follow up, among poor unmarried nurse-visited women there were fewer subsequent births and longer intervals

		between births reported for nurse-visited than comparison mothers.
Welfare use (Olds, 2008; Olds et al., 2010)	Mixed	Memphis: • At child age 4-5 years, and 9-years, NFP mothers had less use of aid and food stamps. • Over the period 0-12 years, NFP mothers reported less use of food stamps and AFDC-TANF. However, the difference was not significant for Medicaid use from 0-12, nor welfare measures (food stamps, TANF or Medicaid) from child age 10-12. Elmira: • From 0-15 years, a positive program effect emerged on food stamps (p=0.03) with a trend favouring the NFP (p=0.05) on TANF Denver: • No differences emerged on welfare use at child age 0-4 or eligibility at age 0-6.
Employment (Olds, 2008; Olds et al., 2010)	No effect	Memphis: • Time employed from child age 2 to 12 years was similar (4.50 vs 4.64 months) in NFP and comparison groups. Elmira: • No effect at 15 year follow up
Arrests/Convictions (Miller, 2015; Olds et al., 2010)	Mixed	Elmira • Arrest and conviction rates were 70% lower for intervention than comparison mothers through to 15 years post-partum, statistical significance not reported Memphis: • Self-reported arrest and conviction rates through to 12 years post-partum were 36% higher for NFP than comparison mothers, but not statistically significant

There is some evidence that the NFP has a lasting impact on maternal physical health, with less role impairment due to alcohol or other drugs (at 12 years) and potentially lower mortality rates (by 20 years) among nurse-visited women compared to controls[7].

[7] While the comparison between SNHV and controls was not statistically significant, a difference was observed when sustained and limited home visiting conditions were combined.

Similarly, there appear to be some lasting effects on psychosocial outcomes such as greater maternal mastery and longer partner relationships (up to 12 years). In contrast, there is very little evidence that the NFP program had a lasting impact on intimate partner violence or maternal mental health.

Evidence that the program has lasting effects on maternal life-course outcomes is mixed. Positive program effects on at least some measures of welfare use have been demonstrated in two of three trials. Lower rates of subsequent pregnancies and longer intervals between the first and second child have also been demonstrated in two trials, particularly for specific subgroups. Evidence that the program has lasting effects on criminal involvement is less consistent, with one trial (Elmira) suggesting some benefit over a 15-year period and another (Memphis) failing to find a significant difference up to 12 years later. There is no evidence of a long-term program effect on employment (neither the Elmira nor Memphis trial demonstrated a significant effect).

> **Summary: Long term maternal outcomes**
> There is evidence that the NFP has a lasting effect on some maternal physical health (e.g. impairment due to drug use), psychosocial (e.g. maternal mastery and partner relationships), and life-course outcomes (e.g. welfare use, timing and number of subsequent pregnancies). In contrast, there is no statistically significant evidence of long-term benefit to maternal mental health, intimate partner violence, employment, or criminal involvement.

Sustained Nurse Home Visiting Programs: Summary Evidence

In this section, a summary of the evidence for each program is provided. Outcomes are listed only if a statistically significant (p<0.05) overall program effect was observed. Trends and subgroup effects are not included. The exception is for the NFP (where for some outcomes in the Miller review included data was available only for a subgroup in one RCT). Where this occurred, it did not affect the overall evidence rating. Outcome data from studies assessed as having high risk of bias are not included.

Table 17: Overview of findings for SNHV programs with child and parent outcomes

Intervention	Evidence source	Effective program (child outcomes)	Effective program (parent outcomes)	Effective program with low to moderate risk of bias	Cost Effective Program
Family Nurse Partnership (Corbacho, 2017; Robling et al., 2016)	1 RCT	Secondary outcomes only: • child cognitive development, • language development	Secondary outcomes only: • Intention to breast feed • Level of social support • Partner-relationship quality • General self-efficacy	++	No[8] £1811 more per participant than usual care
Maternal & Early Childhood Sustained	1 RCT	None	• Breastfeeding duration (d=0.49)	++	Not reported

[8] Probability of cost-effectiveness <20%

Intervention	Evidence source	Effective program (child outcomes)	Effective program (parent outcomes)	Effective program with low to moderate risk of bias	Cost Effective Program
Home visiting program (Kemp et al., 2013; Kemp et al., 2011)			• Responsivity (*d*=0.26) • SIDS knowledge		
Minding the Baby (Sadler et al., 2013)	1 Cluster RCT	• Infant attachment	• Subsequent pregnancies • Immunisation compliance & well child check-ups[9]	+	Not reported
NFP-Early Outcomes (Miller, 2015)	1 Synthesis	• Child injury (pooled– 3 RCTs) • Language development (3 RCTs[10])	• Pre-eclampsia (pooled - 2 RCTs) • Pre-natal smoking (2 of 3 RCTs) • Breastfeeding attempted (pooled - 2 RCTs) • IPV (0-4years, pooled - 3 RCTs) • Subsequent births & abortions (pooled 3 RCT[11])	+	See below
NFP- Long Term Outcomes (Eckenrode 2010; Kitzman 2010; Miller 2015; Olds 2010; Olds 2014; Olds 2014; Sidora-Arceolo 2010)	1 synthesis 1 individual RCT follow up (Memphis)	• Substance abuse (2 RCTs ages 12-15years- Miller) • Preventable-cause mortality at 20 years	• Welfare use from 0-15 years (2 of 3 RCTs) • Maternal mastery (1 RCT)	+	• Program cost ~$ US 11,511 per family ((in 2006 $) • Welfare use $1025 less in NFP than control per year • savings of $12,300 in welfare benefits over 12 years.
Nurse-CHW model vs Single-visitor **(Meghea et al., 2013; Roman et al., 2009)**	1 RCT	None	• depressive symptoms	++	See Olds (2010) • $1680 vs $675 'standard care' (per mother 2008-adjusted)

[9] Authors state that the difference was significant, but no statistical information was provided.
[10] For 1 RCT, data was presented for a subgroup only
[11] Data from the Elmira trial was for white low income women only

Intervention	Evidence source	Effective program (child outcomes)	Effective program (parent outcomes)	Effective program with low to moderate risk of bias	Cost Effective Program
					• Note 'standard care included sustained nurse visiting)
Pro Kind (Sierau et al., 2016)	1 RCT (excluded results from pilot with high risk of bias)	None	• Maternal attachment at 12 months[12] • parental self-efficacy at 12 months[13] • maternal stress at 12 and 24 months[14] • partnership satisfaction at 6 months[15]	+	Not reported
right@home	1 RCT	Not published to date	At child age 2 years: • home safety • regular bedtime • warm parenting • hostile parenting • home learning environment	++	Not reported
Voor Zorg **(Mejdoubi et al., 2014; Mejdoubi et al., 2015; Mejdoubi et al., 2013)**	1 RCT	• Child maltreatment • Internalising problems	• Intimate partner violence during pregnancy and at 24 months (as both victim and perpetrator) • Prenatal smoking • Breastfeeding duration	++	Not reported

Programs were rated Supported if there was no evidence of harm or risk to participants and a well conducted systematic review or meta-analysis or at least 1 RCT (with low to moderate risk of bias) found the intervention to be more effective than a control group on at least three child or parent valid outcome measures. Programs were rated Promising if they met the above criteria but demonstrated a significant main effect on only one or two child or parent outcomes.

[12] No difference at earlier timepoints
[13] No difference at 6 months
[14] No difference during pregnancy or at 6 months
[15] No difference at 36 weeks pregnant, 12 months or 24 months

Table *18* lists each program according to the overall evidence rating, and the outcomes for which the evidence rating is relevant. Programs were rated Supported if there was no evidence of harm or risk to participants and a well conducted systematic review or meta-analysis or at least 1 RCT (with low to moderate risk of bias) found the intervention to be more effective than a control group on at least three child or parent valid outcome measures. Programs were rated Promising if they met the above criteria but demonstrated a significant main effect on only one or two child or parent outcomes.

Table 18: List of SNHV programs by evidence ranking

Supported SNHV Programs
Nurse Family Partnership: • Child injury • Language development • Child substance abuse (age 12-15 years) • Pre-eclampsia • Prenatal smoking • Breastfeeding (attempts) • Intimate Partner Violence • Subsequent births and abortions • Maternal welfare use (from 0-15 years) • Maternal mastery • Child mortality Family Nurse Partnership: • Child cognition • Child language • Breastfeed intentions • Social support • Partner-relationship quality • General self-efficacy right@home • Safety of family home • Regular bedtime • Varied home environment • Parenting (more warm & less hostile) • Facilitation of child learning VoorZorg • Child maltreatment • Child internalising problems • Intimate partner violence

- Breastfeeding duration
- Prenatal and postnatal smoking

Maternal & Early Childhood Sustained Home Visiting

- Breastfeeding duration
- Maternal responsivity
- SIDS knowledge

Minding the Baby

- Infant attachment
- Subsequent pregnancies
- Immunisation and well-child check ups

Pro Kind

- Maternal attachment
- Parental self-efficacy
- Maternal stress
- Partnership satisfaction

Promising

Nurse-CHW Model

- Maternal depressive symptoms

RESULTS PART 2: EFFECTIVE COMPONENTS

Multiple strategies were used to identify components associated with effective SNHV programs. First, a search for meta-analyses exploring critical components of home visiting programs was conducted. Second, a comparison of the components characterising effective SNHV programs was conducted. This section presents an overview of the included meta-analyses, then organises key findings (from both meta-analyses and the comparison of components common to supported SNHV programs) according to the following indictors: quality, quantity, and participation.

Overview of meta-analyses

Three meta-analyses of home visiting programs explored the association between program components and program effectiveness (Casillas et al., 2016; Filene et al., 2013; Nievar et al., 2010). The most recent of these considered 18 implementation factors relating to staff selection, training, supervision, fidelity monitoring and type of organisation delivering the program (Casillas 2016). An earlier meta-analysis (Filene, 2013) focussed mainly on program content but also included several components related to program implementation (e.g. staff selection). The earliest of the three (Nievar et al 2010) included only two program components (visit frequency and staff selection). Overall findings most relevant to identifying effective components are summarised in Table *19* and components related to specific outcomes are presented in Table *20* (for more detailed information see Appendix F: Meta-analyses overviews)

Table 19: Overview of most effective components identified in meta-analyses

Casillas et al 2016:
Components related to higher overall effectiveness: • Staff training (role-playing) • Reflective supervision • Supervision with observation • Supervisor with specific training to supervise • Monitoring of program fidelity (occasional or once off) • Fidelity monitored by independent raters • Fidelity focused on quality of home visitor
Filene et al 2013:
Components shown to be effective on more than one outcome: • Teaching sensitive and responsive parenting • Teaching discipline and behaviour management • Teaching problem solving techniques
Nievar et al 2010:
Components shown to be effective (for maternal behaviour): • For small effects, at least 2 visits per month • For moderate effects, at least 3 visits per month

Table 20: Components related to specific outcomes from 3 meta-analyses

Improved parent of child outcome	Implementation component shown to be effective		
	Content	Process	Nurse provider
Parent behaviour and skills	• Developmental norms and appropriate expectations[2] • Discipline and behaviour management strategies[2] • Responsive and sensitive parenting[2] • Substance use[2]	• Once off or occasional fidelity monitoring[1] • Fidelity monitoring assessing quality as well as content[1] • At least 3 visits per month[3]	
Children's cognitive outcomes	• Programs teaching responsive and sensitive parenting[2] • Programs using rehearsal or role-play[2]		• Programs requiring role-play in visitor training[1] • Training that does *not* include practice cases[1] • Supervision specific training for supervisors[1]
Children's health outcomes	• Discipline and behaviour management[2] • Programs without support group content[2]		• Delivery through professional home visitors (e.g. nurses, psychologists, social workers)[2]
Child maltreatment	• Problem solving[2] • Selecting appropriate alternative caregivers for children[2]	• Independent fidelity monitoring (not by home visitor or supervisor)[1] • Monitoring of fidelity quality (not just content)[1] • Fidelity monitoring by supervisor (vs not monitored by supervisor)[1]	• Training included observation[1]
Birth outcomes			• Mon-professional home visitors[2]

			• Visitors and clients matched on race/ethnicity[2]
Maternal life course	• None	• None	• None

1= Casillas et al (2016); 2= Filene et al (2013); 3= Nievar et al. (2010)

Quality

In this section, components relating to program quality are divided into three categories including content (what is delivered), process (how it is delivered), and provider (by whom it is delivered). To inform the development of quality indicators, components associated with program effectiveness are identified from both (a) the included meta-analyses and (b) identification of components characterising effective SNHV programs.

Content components

Several specific content components have been associated with more effective home visiting programs. Specifically, in their meta-analysis of home visiting programs, Filene et al (2013) found teaching sensitive and responsive parenting, discipline and behaviour management, and problem-solving techniques predicted stronger effects on multiple outcomes.

Content components common to supported SNHV programs may also be related to program effectiveness. Table *21* summarises the content areas included in each of the SNHV programs in this review.

Table 21: Content components of SNHV programs by evidence ranking

	Supported							Promising
Content components	FNP	MECSH	Minding the Baby	NFP	Pro Kind	Right@ Home	Voor Zorg	Nurse-CHW Team
Smoking	✓	✓	✓	✓	✓	Implied	✓	Implied
Alcohol	✓	✓	✓	✓	Not reported	Implied	✓	Implied
Substance use	✓	✓		✓		Implied		
Maternal mental health	✓	✓	✓			Implied	✓ (referrals)	✓
Parenting	✓	✓	✓	✓	✓	✓	✓	✓
Home learning environment	✓	✓	✓	✓		✓		
Child health and development	✓	✓	✓	✓	✓	✓	✓	✓
Social support/	✓	✓	✓	✓	✓	✓	✓	✓

Community engagement								
Economic factors	✓	✓	✓	✓	✓	✓	✓	Implied
Family violence	✓	✓	✓	✓		Implied	✓	

✓=Yes, publications provide information indicating inclusion of program component

Consistent with the stated aims of the programs, all included components relating to parent health, parenting, child health and development, social support, and economic factors. It is less clear whether all programs included mental health content and to what degree (i.e. whether help is in the form of assessment and referral or includes specific information and activities to address mental health issues). Most programs appeared to include some family violence content, but again, it is unclear to what extent. Content relating to the home-learning environment appears to be included in most of the programs. Although not explicitly reported for Pro Kind or VoorZorg, it seems likely to be included in these given both are based on the NFP.

Overall, few papers included in the review provide *detailed* information about the content components of the programs, or where to find published details of program content. The MECSH program is a notable exception with one published paper (Kemp et al., 2006) listing more than 40 intervention areas under 8 main themes (parent craft; maternal well-being; maternal mental health; family well-being; referrals; safety; planning & goal setting; and environment and resources). Moreover, there is quantitative information about the proportion of families who received program content in each of these 40 areas of intervention. The specific evidence-based intervention strategies used to address the central aims of the righ@home program are also well documented (Goldfeld et al., 2018).

Information about the number of families receiving specific program content and how frequently specific content areas were addressed during program implementation could be useful for understanding why some SNHV programs demonstrated an effect on specific outcomes and others did not. Consider smoking as an example. Whereas VoorZorg demonstrated an effect the MECSH program did not. One possible explanation may be that nurses provided more emphasis on smoking in VoorZorg than MECSH. There is some information consistent with this idea. Indeed, it was reported that VoorZorg nurses inquired about smoking behaviour at every home visit and offered a specific smoking intervention to those who smoked (Mejdoubi et al., 2014). In contrast, information about the content delivered in the MECSH program indicates that only 15.6% of families received a maternal smoking intervention (Kemp et al., 2006). In contrast, the MECSH program demonstrated significant effects in the outcome areas on which a sizeable proportion of families received intervention (e.g. breastfeeding -63%, SIDs knowledge -50%).

Although it makes intuitive sense to consider whether differences across the programs in outcome-specific dosage of intervention content might explain differences in program effectiveness on the corresponding outcome, limited reporting of exactly what is delivered and how much is delivered, makes this very difficult to accurately analyse.

However, previous meta-analyses (Casillas et al., 2016) and reviews (Segal et al 2012) of home visiting programs suggest that the alignment of program aims with content influences program effectiveness.

Indeed, in their meta-analysis of home visiting programs Casillas et al. found significantly larger effects on primary compared with secondary outcomes. Similarly, in a review of home visiting programs to prevent child maltreatment Segal found that effective programs were characterised by a match between program aims and a theory of change underpinning the program that is consistent with the target population, their needs, and program components. In contrast, all programs with no match were considered ineffective, while those with a partial match comprised a mix of effective and ineffective programs. Thus, there appears to be converging evidence that not only is program content important, but also content dosage, and alignment with program goals and population needs.

Summary: Content components of effective programs

Previous meta-analyses and reviews of home visiting programs suggest that the alignment of program aims with content influences program effectiveness. Similarly, the comparison of content components characterising effective SNHV programs suggests that program effects tend to emerge on the specific outcomes most emphasised during program delivery.

The comparison of programs shows that the content delivered in effective SNHV programs tends to cover a comprehensive range of topics. All included content relating to prenatal health, child health and development, parenting practices, social support or community engagement, and economic factors. Meta-analytic evidence identifies three content areas significantly associated with program effects on several outcomes. These include: sensitive and responsive parenting; discipline and behaviour management; and problem-solving skills.

Process components

As noted in the section describing meta-analyses, several process components have been associated with more effective home visiting programs. Ensuring program delivery includes monitoring of fidelity appears important. Casillas et al (2016) reported that more effective programs were characterised by occasional or one-off monitoring of program fidelity, independent ratings of fidelity, and fidelity ratings that include assessment of home visitor quality. This was especially pronounced in the area of child maltreatment, where four processes of fidelity monitoring were associated with more effective programs.

Process components common to supported SNHV programs may be related to program effectiveness.

Table *22* summarises process component information specific to each of the SNHV programs in this review.

Table 22: Comparison of process components by SNHV program evidence ranking

	Supported							Promising
Process components	FNP	MECSH	Minding the Baby	NFP	Pro Kind	right@ home	VoorZorg	Nurse-CHW Team Model
Continuity of care		✓		✓	✓	✓		

Individualised	✓	✓	✓	✓	✓	✓	✓	✓
Flexible delivery		✓	✓			✓	✓	✓
Inclusion of family	✓	✓	✓	✓	✓	Implied	✓	✓
Fidelity monitoring	✓	✓			✓	✓	✓	

✓=Yes, publications provide information indicating inclusion of process component

Continuity of Care

Information about continuity of care was available for four programs (MECSH, right@home, NFP and Pro Kind). In the MECSH trial (Kemp et al., 2013) 82% of the intervention group were reported to have continuity of care during the transition from pre- to post-natal care, whereas women in the comparison group received care from multiple providers. In the right@home trial, continuity of care was recognised as a critical program component and disruption due to management and nurse turnover was reported to have occurred at only two of seven implementation sites (Goldfeld et al., 2018).

It appears that almost two thirds of families in at least one NFP trial also had continuity of care (Kitzman et al., 2010). Indeed, in the Memphis trial it was reported that 37% of families did not have continuity of care due to nurse availability. In the Denver trial, all 10 nurses were retained (Olds et al., 2004) but it is unclear whether these nurses necessarily served the same family throughout. Information relating to continuity of care in the Elmira trial was not presented in any of the publications included in this review.

In the Pro Kind trial, continuity of care was affected when 13 home visitors left (Sierau et al., 2016). Although the percentage of families experiencing a disruption to continuity of care was not reported explicitly, the potential importance of continuity of care was investigated in another study of Pro Kind (Brand & Jungmann, 2012). In this earlier study (presumably including a subsample of the final number of participants) the program was delivered in two separate formats, described as continuous and tandem delivery. In the continuous condition a single visitor (primarily midwives) delivered the program. In the tandem condition, a midwife delivered pregnancy and early post-partum visits and a social worker took over at child age 2 months. Although program effectiveness was not compared across these conditions, program attrition and ratings of participant satisfaction were. Attrition was lower in the continuous model (30% vs 38%, assessed at child age 12 months) and participant ratings of satisfaction, quality of relationship with the home visitor during pregnancy, and client engagement were higher for the continuous than tandem model.

Although information relevant to continuity of care was available for only four of the programs, the information provided suggests continuity of care is important (it was high in the MECSH and right@home programs, reasonably high for the NFP, and related to participation factors for Pro Kind).

Individualised Content

All NFP-based programs involve a detailed visit-by-visit guide and curriculum but also explicitly encourage tailoring content to individual client needs. The MECSH, right@home and Nurse-CHW models also involve specific activities and competencies but tailor content to family needs. Thus, individualising content to family needs is a component common among SNHV programs considered promising or supported.

Flexible Delivery

Strategies to enhance program accessibility included flexibility around mothers' school and work schedules (e.g. Minding the Baby, MECSH), use of technology (e.g. text messaging, telephone, social media) to reschedule missed or cancelled visits (reported for Minding the Baby, VoorZorg, and Nurse-CHW), and translation of program content for monolingual participants (NFP). No other strategies to improve accessibility were reported.

Inclusion of Family

All programs except Minding the Baby and right@home explicitly reported inclusion of family members, mostly the child's father and/or grandmother. No information was provided to quantify how many family members joined in sessions or communication with the home visitor, nor how often.

Implementation Fidelity, Social Validity and Quality Assurance

Information pertaining to implementation fidelity was reported for five programs (FNP, MECSH, Pro Kind, right@home and VoorZorg). The level of detail provided was generally minimal. For example, the FNP publications included only a basic statement that fidelity was maintained (Robling et al., 2016). The MECSH publications indicated that nurses completed checklists of the types of interventions delivered and that these reflected the conceptual framework of the program (Kemp et al., 2006). In the case of Pro Kind, authors stated that case notes showed implementation was not always as planned because visitors often had to fix current crises rather than deliver the planned content (Sierau et al., 2016). The VoorZorg publications indicated that pilot versions of the program confirmed nurses were able to carry out the intervention as described in the guidelines (Mejdoubi et al., 2011).

Social validity measured were reported for four of the programs (MECSH, Pro Kind, VoorZorg, and right@home). In the MECSH program (Kemp et al., 2013) women in the intervention reported feeling more able to cope with and understand their baby and care for themselves and baby as a result of the visits, compared with women receiving only the usual care nurse visit ($p<0.001$). The social validity of VoorZorg was assessed in a pilot study with both qualitative data and quantitative data collected from 40 participating mothers. Details of the measures utilised and results were not reported but the authors concluded that the 'program fulfilled the needs of the mothers and the mothers received significant support from the VoorZorg nurse' (Mejdoubi et al., 2011). In the case of Pro Kind, parents rated the quality of the helping relationship with the visitor. Although quality of relationship was used as a predictor variable for outcomes on which a treatment effect was observed (Sierau et al., 2016), the mean score or proportion of participants rating the relationship positively was not reported.

The right@home trial provided the most comprehensive information about implementation fidelity, social validity, and quality assurance processes. Indeed, Goldfeld et al. (2018) reported that several processes were used to monitor the quality of implementation. These included (a) nurses completing program activity checklists, (b) families completing session rating scales at six key time points to

Summary: Process components of effective programs

Results from the meta-analyses suggest monitoring of program fidelity and visitor quality is an important component associated with effective home visiting programs. The comparison of common process components shows that SNHV programs with a relatively strong evidence base are characterised by individual tailoring of program content, inclusion or encouragement of family participation, continuity of care, and a process of implementation fidelity monitoring.

provide nurses with timely feedback, (c) families completing researcher administered satisfaction surveys at three time points, (d) nurses and social workers participating in two focus groups to discuss program challenges, and (e) families providing feedback 6-9 months after program completion. Additionally, information about structural quality was also provided. Training, caseload, referral, and supervision monitoring processes were noted, while rates of program uptake, retention to child age 2 years, and visit dosage at specific intervals were clearly reported.

Provider components

All three meta-analyses compared programs delivered by professionals with those delivered by paraprofessionals. Unfortunately, none addressed questions of (a) whether programs delivered by nurses specifically are more effective than those delivered by either paraprofessionals or other professionals, (b) whether the addition of other professionals to nurse-delivered programs might improve outcomes, or (c) whether postgraduate training or extensive prior experience in community or child and maternal health nursing improve program outcomes.

Nevertheless, several provider components were associated with more effective home visiting programs. Specifically, Casillas et al. (2016) found significantly larger *overall* effects for programs characterised by the following: staff training involving role-play, reflective supervision, supervision with observation, and supervision-specific training of supervisors.

Filene et al. (2013) found programs matching home visitors and clients on race or ethnicity had larger effects than others on birth outcomes, but not maternal life course, parenting skills and behaviours, or child cognition. However, it is unclear to what extent the effect of demographic matching on birth outcomes would be generalisable to nurse-delivered programs[16].

Table 23 summarises information extracted from the included SNHV programs about provider characteristics.

Table 23: Provider components of SNHV programs by evidence ranking

	Supported							Promising
Provider components	**FNP**	**MECSH**	**Minding the Baby**	**NFP**	**Pro Kind**	**right@ home**	**VoorZorg**	**Nurse-CHW**
Provider Demographics					• Female • German • 40 years (range 22-53)			Implied CHWs shared characteristics

[16] It seems likely that programs characterised by demographic matching would also have been delivered by paraprofessionals.

Multi-disciplinary supports		✓	✓		✓	✓		✓
Qualifications	Majority have undergraduate degree	Mostly postgraduate	Masters-level	Majority had undergraduate degree	University/ College level	Postgraduate qualification required	Not reported	CHWs: high-school Nurses: NR
Previous Experience		9 years post-registration, 5 years in community nursing		Nurses had experience in community or MCH (amount not quantified)	Visitors: 15 years experience (range 0-31), 11 years (range 0-30) with mothers living in adversity	Not reported	At least 2 years nursing experience	CHWs: 'some' previous experience (not quantified). Nurses: not reported
Training provided	12 days delivered in block mode	Yes	Yes	1 month extensive	16 days for visitors, 5 days for supervisors	23 hours: MECSH, right@home modules and Family Partnership Model	Yes	10 'sessions' core training + monthly training (hours/days not specified)
Supervision		Monthly	Weekly, joint supervision of nurse and social worker	Yes (details not reported)	1 hour weekly + regular team meetings	1 hour per month minimum; reflective; not line manager	Weekly	Nurses supervise CHWs
Caseload	Goal of 25 families per nurse	21-25 families per nurse		25 families per nurse	~9.5 vs 12.5 clients (for continuous vs tandem model)	30 families per full-time nurse	18 mothers per full-time nurse	CHW: 25-30 families Nurse-CHW teams (1 nurse, 2 CHWs): 50-60 families

Visitor Demographics and Cultural Competence

Overall, the demographic characteristics of visitors delivering SNHV programs were not well reported. Indeed, quantified information was reported for only one supported program, Pro Kind (see Sierau et al., 2016). One promising program (Nurse-CHW model) specifically employed community health workers thought to share characteristics (ethnicity, language, SES, experience) with those they serve, in an effort to improve program reach (Meghea et al., 2013). Although the extent to which CHWs in

the trial actually shared similar cultural backgrounds or experience with their clients was not reported, the authors did provide evidence that the program was successful in reaching more high-risk pregnant women, and increased participation (Roman et al., 2009). Indeed, whereas 57% of women in the standard care arm of the trial received more than one contact, the nurse-CHW team reached 86% of participants (Roman et al., 2007). The Nurse-CHW teams also reached more women in higher behavioural and psychosocial risk categories (e.g. women with unplanned pregnancies, smoking at enrolment, depressive symptoms, history of abuse).

Overall, there is limited evidence that the demographic profile of home visitors impacts many child or parent outcomes. Although one meta-analysis found programs matching clients and visitors had larger effects on birth outcomes than other programs, there were a number of potential confounders and ths needs further exploration to tease out the effect. Similarly, there is little evidence that supplementing SNHV programs with CHWs affects many of the targeted outcomes. However, the higher levels of engagement in the Nurse-CHW model suggests that it is important to ensure staff are culturally competent.

Multi-Disciplinary Supports

Five programs made use of multi-disciplinary teams (MECSH, right@home, Minding the Baby, Nurse-CHW, and Pro Kind). Among supported programs, a common addition to the nurse visitor was a social care practitioner. Both Minding the Baby and Pro Kind utilised the skills of social workers. Similarly, the MECSH and right@home interventions were supported by social care practitioners specifically employed for the projects (Goldfeld et al., 2018; Kemp et al., 2008). In addition, the MESCH intervention included access to a perinatal psychiatrist, allied health staff, and workers from the Departments of Housing and Community Services. The promising Nurse-CHW program employed nurses and paraprofessional community health workers. There is therefore some evidence that embedding multi-disciplinary supports, particularly from social care practitioners, is a reasonably common component of effective SNHV programs.

Qualifications and Experience

Information about home visitor qualifications was available for most programs. Those employing staff with postgraduate level qualifications included MECSH, right@home, and Minding the Baby. Home visitor experience was described to varying degrees for most programs. The number of years previous experience was reported for MECSH, Pro Kind, and VoorZorg. Pro Kind and MESCH visitors had extensive experience in community settings. For Pro Kind, the average number of previous years of experience was 15, and 11 years working with mother living in adversity. In the MECSH program, nurses had been registered for at least 9 years and most (80%) had more than 5 years of experience in community-based nursing. In contrast, VoorZorg nurses had at least 2 years of experience. The extent of nursing experience was not quantified for the FNP, NFP, Minding the Baby, right@home or Nurse-CHW programs. Given that VoorZorg was one of the most successful programs, it seems reasonable to suggest that SNHV programs should be delivered by nurses with at least 2 years of experience if they are to be effective.

Training

All interventions were reported to include program specific training. Descriptions of five programs included information concerning how much training was provided. Two (FNP, Pro Kind) quantified the amount of training in days, and information about the number of hours was provided for only one

program (right@home). Details about when, where, how, or by whom training was delivered were generally not provided.

Supervision

Most SNHV programs reported some supervision of home visitors. Frequency of supervision sessions was reported for five programs, three of which included weekly supervision (Minding the Baby, Pro Kind and VoorZorg). It is likely that the NFP and FNP also involved weekly supervision (given that Pro Kind and VoorZorg are adaptations of the NFP). Monthly supervision occurred for the MESCH and right@home programs. Given that MESCH and right@home both demonstrated positive program effects on several parent outcomes it may be appropriate to adopt the supervision schedules employed for these programs as a reasonable quality indicator benchmark.

The duration of supervision sessions was reported for only two programs (right@home and Pro Kind), each reporting hour-long group supervision sessions.

For those programs employing multi-disciplinary teams, details of whether supervision occurred individually or in joint sessions was reported clearly for one program, Minding the Baby. Joint supervision of nurses and social workers together was considered a critical component of this program (Slade et al., 2005). In contrast, it appears that the Nurse-CHW model utilised an individual model of supervision, where nurses guided CHWs. Whether nurses and social care practitioners received supervision together was not clear for Pro Kind. Given descriptions of program delivery occurring in tandem or continuous formats (see program descriptions), it seems unlikely that joint supervision would have occurred often.

Overall, the available information concerning supervision duration provides little guidance as to how much supervision is needed. None of the meta-analyses examined supervision frequency, duration, or format and the comparison of programs included information for only two programs. The available (albeit limited) evidence suggests a minimum benchmark of at least 1-hour supervision, with reflective content, delivered monthly.

Caseload

Visitor caseload was reported for all but one program (Minding the Baby). For three programs (NFP, FNP, MESCH), the caseload was around 25 families per nurse, and for one (right@home) the caseload was 30 families per full time nurse. In contrast, nurses were responsible for 50-60 families in the Nurse-CHW model. However, they were supported by two CHWs each with a caseload of 25-30 families. Caseloads were noticeably smaller for VoorZorg (with 18 families per nurse) and Pro Kind (on average 10 to 13 families per visitor, with a standard deviation of 5-6). For Pro Kind, caseload varied according to format of delivery, such that visitors delivering the program in tandem had higher caseloads than

Summary: Provider components of effective programs

Results from the meta-analyses show larger effects have been demonstrated by programs where providers receive (a) training involving role-play, (b) reflective supervision, (c) supervision with observation, and (d) supervision-specific training of supervisors. The comparison of provider components common to effective SNHV programs showed that nurses typically had Bachelor-level qualifications, at least two years nursing experience, program-specific training, at least monthly supervision, a caseload of no more than 30 families, and multi-disciplinary support from social workers.

visitors who delivered the program alone from commencement to completion. In the tandem model, the program was typically delivered by a nurse in the early stages, then by a social care practitioner for the latter part. Given that both VoorZorg and the NFP have demonstrated positive program effects across a range of child and parent outcomes, while MECSH and right@home have demonstrated effectiveness for parent outcomes in the context of Australia's service system it seems reasonable to adopt similar caseload benchmarks as quality indicators (i.e. 20-30 families per nurse).

Table 24: Proposed quality indicators for SNHV services.

NURSE HOME VISITING		
Content	**Process**	**Provider**
QL A supported SNHV program is offered		
QL 1 % of visits addressing home learning (e.g. talking, reading)	**QL 8** % of families who have their aspirations and goals documented	**QL 24** % of nurse home-visitors with specialised child & family training and at least 2 years nursing experience
QL 2 % of visits addressing parenting issues (e.g. sensitive and responsive parenting, behaviour and discipline)	**QL 9** % of families with continuity of care	**QL 25** % of nurse home-visitors with program/service specific training
QL 3 % of visits in which problem-solving skills are taught	**QL 10** % of families with reported improvement in documented goals	**QL 26** % of staff provided training which included role playing exercises
QL 4 % of antenatal & early post-partum visits where breastfeeding education/support is offered	**QL 11** % of NESB families receiving a translated version of the program/service and/or support from an interpreter	**QL 27** % of staff receiving weekly supervision including reflection (on experiences, thoughts, and feelings about visit) and not merely administration or case-management
QL 5 % of visits that focused on at least one of the key issues identified by the parent as a priority area on referral/enlistment	**QL 12** % of new staff observed implementing the program and assessed for quality	
QL 6 % of families offered program specific support from evidence-based programs (e.g. Triple P; Crib to Cradle; Promoting First Relationship; Smalltalk; Learning to Communicate)	**QL 13** % of women who are asked about their smoking status (and % recorded)	**QL 28** % of staff who have received Family Partnerships Training or an equivalent working in partnership with families program
QL 7 % of families provided information about local and free or low cost community engagement opportunities (e.g. play groups; toy libraries; pram walking sessions; library rhyme or story time)	**QL 14** % of women who are asked about the status of their mental health (and % recorded)	**QL 29** % of nursing staff who have undertaken professional development relevant to their current work in the past 12 months
	QL 15 % of women who are asked about family violence (and % recorded)	**QL 30** % of supervisors provided supervision-specific training
	QL 16 % of women who are asked about alcohol & substance abuse (and % recorded)	**QL 31** % of staff with caseloads as defined by the program/service
	QL 17 % of women with a mental health problem who are referred for psychological intervention	**QL 32** % of staff provided access to multi-disciplinary support
	QL 18 % of women experiencing domestic violence who are referred to an evidence-based support service	**QL 33** % of staff provided training in cultural competence
	QL 19 % of women with drug or alcohol problems referred to an evidence-based support service	
	QL 20 % of women experiencing financial difficulty provided information about avenues for assistance	
	QL 21 % of women given opportunity to provide nurse feedback during program/service implementation	
	QL 22 % of women given opportunity to provide confidential program feedback	
	QL 23 % of women who rate the program and nurse-family relationship highly (average score >80% on satisfaction measures) on exit survey (administered regardless of completion)	

Abbreviations: QL, quality indicator; SNHV, Sustained Nurse Home Visiting; NESB

Quality indicator

The SNHV program is one of the seven supported programs, or the SNHV program reaches the high quality threshold for each of the three quality domains of content, process, and nurse-provider.

Participation

The participation levels required to effect positive outcomes may be related to several factors. Information about program commencement and duration, completion rates, the number of intended and delivered visits, and visit frequency, is pertinent. Relevant findings from the included meta-analyses are presented, then each of the identified SNHV programs are compared.

The included meta-analyses did not evaluate program commencement, duration or the number of visits related to effective home visiting, either because this was not the focus of the analysis (Casillas et al., 2016) or because of limited reporting in original studies (Filene et al., 2013; Nievar et al., 2010). However, there is evidence from one meta-analysis that more *frequent* visitation is associated with larger improvements in maternal behaviour. Indeed, Nievar et al. (2010) reported that a medium effect was observed for programs with at least three visits per month and that, in US-based home visiting studies, a minimum of two visits per month was required to achieve a small effect.

Table *25* compares information about program commencement and duration, number of visits intended and delivered, and visit frequency for each of the included SNHV programs identified in this review.

Table 25: Participation components by program and evidence ranking

	Supported							Promising
Participation components	**FNP**	**MECSH**	**Minding the Baby**	**NFP**	**Pro Kind**	**right@ home**	**VoorZorg**	**Nurse-CHW Team**
Primiparous women only	✓		✓	✓	✓		✓	
Prenatal Commencement	✓	✓	✓	✓	✓	✓	✓	✓
Program end: Child age 2 years	✓	✓	✓	✓	✓	✓	✓	X child age 1 year
Number of visits	**Intended** Up to 64	**Intended** ~27 based on frequency	**Intended** ~90 based on frequency	**Intended** Up to 62	**Intended** ~54 based on frequency	**Intended** Minimum of 25	**Intended** 40-60	**Intended** ~24-36 based on frequency
	Delivered M=39.28 (SD=15.19)	**Delivered** M=16.3 (range 0-53)	**Delivered** 3.5 Per month (SD=1.5) Overall number	**Delivered** Prenatal: M=6.5-9 (range 0-18) Postnatal: M=21-26	**Delivered** M=32.7 (SD=18.6)	**Delivered** M= 23	**Delivered** Prenatal: M=9 (SD=4) Postnatal: not reported	**Delivered** Prenatal: 11 Postnatal: 13

			not reported	(range 0-71)			
Duration of visits	M=79.1 minutes	60-90 minutes	45-60 minutes, hours when in crisis	72 to 90 minutes		60-90 minutes	
Timing/ Frequency of visits (intended only)	Prenatal: f/n Birth-1 month: weekly Tapered to 6-weekly intervals from child age 18 to 24 months	Prenatal: f/n Birth-6 weeks: weekly 6-12 weeks: f/n 3-6 months: monthly 6-24 months bi-monthly	Prenatal-child age 1: weekly 1-2 years: biweekly		Prenatal: f/n Birth-1 month: weekly 1-18 months: bi-weekly 18-24 months: monthly	Prenatal: 3 visits Birth to 6 weeks: weekly 7-12 weeks: fortnightly 13-26 weeks: 3-weekly 27-52 weeks: 6-weekly 1-2 years: bi-monthly	Prenatal: f/n Birth-1 month: weekly 2-6 months: twice per month 6-12 months: once or twice monthly

f/n= fortnightly

Program Commencement, Duration, And Completion

All programs commenced prenatally, and all except one (Nurse-CHW model) were offered to child age 2 years. The average duration of program participation was reported for only one intervention (MECSH), with a mean of 57 weeks (Kemp et al., 2011). Information about program retention was available for two programs (right@home and NFP). Program completion was very high for right@home, with 86% completing the program at child age 2 years. Additionally, preliminary post-trial implementation data shows an 88% retention rate at child age 1 year. In contrast, it has been reported that many families enrolled in the NFP and Pro Kind discontinue the program prior to completion. For Pro Kind, 38.5% of families drop out before completing 75% of the enrolment time (Brand & Jungmann, 2014). Similarly, data from the Denver trial of the NFP indicates 38% of families discontinued prior to completion (Olds et al., 2002). Given the mean number of visits completed (see below), it appears that many families discontinue SNHV programs prior to child age 2 years. Alternatively, it may be that the

frequency of visits is reduced over time, potentially due to less acute need. Limited reporting of actual program duration makes it difficult to determine whether duration is related to program effectiveness, however, there appears to be consensus that programs should start early (antenatal) and at minimum be available to families until child age 2 years. Indeed, all supported programs commenced during pregnancy and were offered to child age 2 years.

Number of Visits

The intended maximum number of visits was reported for almost all programs (not Pro Kind). Those based on the NFP typically reported an intended maximum number of approximately 60 visits from enrolment through to program completion at child age 2 years. The MESCH, right@home and Nurse-CHW models offer around 30 visits. Minding the Baby is the most intensive with approximately 90 intended visits.

Information about the number of visits delivered was reported for all programs, to varying degrees. The average number of visits completed for the NFP, FNP, and Pro Kind was around 30-40. The MECSH and Nurse-CHW programs report comparatively fewer visits (16 and 24 respectively). More detailed information was presented for right@home. Specifically, the mean number of visits was 2.07 antenatally, 5.13 from birth to 6 weeks, 2.87 from 7-12 weeks, 4.12 from 13-26 weeks, 4.83 from 27-52 weeks, and 7.32 from 53 to 104 weeks. The range of visits delivered was reported only for two programs (MECSH and NFP), both of which reported large variation (from 0 to more than 50 visits).

In the Nurse-CHW trial, the number of contacts (not only visits) was entered as a predictor variable (Roman et al., 2009). This did not account for differences between the intervention and comparison group, and the authors concluded the effect of the intervention was not a result of the amount of service delivered. Given that the comparison group in the Nurse-CHW trial also received a substantive number of visits, however, these results are somewhat limited. Whether the number of visits delivered was related to outcomes within other programs was not reported. The program with the most intensive visiting schedule (Minding the Baby) does not appear to be any more effective than programs with fewer visits.

Overall, the results show that supported programs deliver an average of at least 16 visits, but more commonly include around 25 completed visits.

Duration of Visits

The duration of visits was reported for five programs. Of these, four programs (NFP, FNP, MECSH, right@home) reported an average duration between 60 to 90 minutes. The fourth program (Minding the Baby) involved shorter visits (45-60 minutes), but more of them. Overall, there is little variation in the *intended* duration of visits.

Timing/Frequency of Visits (intended only)

All programs utilised a more intensive visiting schedule in the pre-natal and early post-partum period, with frequency of visits diminishing over time. This makes sense in terms of adjustment to the parenting role and the intensive demands of infant care earlier in child development.

Summary: Participation components of effective SNHV services

Overall, determining the optimal dose required to effect positive outcomes is difficult. Evidence from the included meta-analyses of home visiting programs suggests at least three visits per month are required to observe moderate improvements in maternal behaviour and a minimum of two is required to achieve small effects (Nievar, Van Egeren, & Pollard, 2010). The comparison of components characterising effective SNHV programs shows that (a) all commenced prenatally, and most (b) continued to child age 2 years, (c) included at least 25 scheduled visits, with (d) visit duration of 60-90 minutes, and (e) more frequent visitation in the antenatal and early post-partum periods.

Within the Australian service system, it will be important to monitor participation levels specific to diverse at-risk populations in any implementation of SNHV programs. There are indications of significant inequalities in receiving early post-partum visits as part of universal home visiting programs. Indeed, a NSW study (Widdup, Comino, Webster, & Knight, 2012) found Aboriginal infants were significantly less likely than non-Aboriginal infants to receive a home visit within two weeks of birth (43% vs 58%). There are also indications that other populations, such as refugees, experience significant

barriers to receiving Maternal and Child Health services (Willey, Cant, Williams, & McIntyre, 2018), and by extension may require additional supports to access SNHV programs.ams.

Table *26* shows the indicators developed to monitor participation levels in SNHV programs.

Table 26: Proposed participation indicators for SNHV programs

NURSE HOME VISITING	
Participation	
Overall attendance	Frequency of visits
P % of mothers living in adversity who attend a high quality NHV program	
P1 % of women receiving at least 25 home visits by child age 2 years	**P9** % of pregnant women who are visited at home at least twice in the 3rd trimester
P2 % of women retained in program to child age 2 years	**P10** % of women visited at least weekly in the first month following birth
P3 % of women receiving at least 15 home visits by child age 1 year	**P11** % of women visited at least fortnightly to child age 3 months
P4 % of women receiving no more than 10 HV in the 2nd year	**P12** % of pregnant women from disadvantaged groups (HCC, refugee, ATSI, NESB) who are visited at home at least twice in the 3rd trimester
P5 % of funded hours delivered	
P6 % of women living in adversity	**P13** % of women from disadvantaged groups (HCC, refugee, ATSI, NESB) who are seen at least weekly from birth to child age 1 month
P7 % of eligible ATSI women accepting a place	
P8 % of eligible women from NESB accepting a place	

Abbreviations: ; P, participation indicator ; ATSI, Aboriginal or Torres Strait Islander; HCC, health care card; NESB, Non-English speaking background

Participation indicator

The target population (i.e. mothers living in adversity) should attend a high quality SNHV program at the right dose. A high quality program is defined as one of the seven Supported SNHV programs or if a NHV program achieves a "high" quality threshold for each quality domain (content, process, nurse-provider). (The threshold is the estimate required to deliver a quality NHV program that will be tested in the field and re-evaluated).

Quantity

There are two dimensions that are related to quantity:

- Is there sufficient infrastructure? i.e., the number of home-visiting program places per defined population for a sustained period.
- Is there sufficient workforce? i.e., the number of qualified nurses with manageable caseloads (that do not compromise program implementation quality or staff well-being and retention).

Neither the meta-analyses nor individual trial publications included in the literature search contained information about what proportion of a population should receive support from a home visiting program or service. Some RCTs included information about the uptake of SNHV programs. For example, in the right@home evaluation, post-trial implementation data showed 95.5% of families offered the program commenced it, with 88% retained at child age 12 months (implementation had not reached the 2-year mark at the time of publishing). This suggests it would be prudent to assume very high levels of program participation in efforts to calculate adequate infrastructure and workforce capacity to deliver SNHV programs.

One way to determine the proportion of the population who should receive support from a SNHV program may be to obtain data from the Commonwealth Department of Social Services on the number of families with children under 2 years of age receiving the maximum Family Tax Benefit Part A payment for each LGA[17], and the number of families in each LGA. Then, if 30% of families are considered disadvantaged in one LGA, but 15% are considered disadvantaged in another, required infrastructure and workforce capacity could be calculated for each LGA accordingly.

Summary: Participation components of effective SNHV services

The meta-analyses and RCTs included in the review generally provided little information about what proportion of a population should receive support from a home visiting service. However, one Australian RCT suggests demand for SNHV program places will be high (~ 96% of eligible families could be expected to accept a program place, with almost 90% retention). Data from the Commonwealth Department of Social Services could be used to determine what proportion of women living in adversity are eligible to receive a SNHV place.

[17] The Victorian Department of Education and Training uses this data to calculate target enrolment and funding weighted by disadvantage for the Enhanced Maternal and Child Health program

Table *27* shows the quantity indicators developed to gauge infrastructure and workforce capacity required to deliver quality SNHV programs in the Australian service system.

Table 27: Proposed quantity indicators for SNHV services

NURSE HOME VISITING	
Quantity	
Health infrastructure	Health workforce
QN 1 Number of Maternal and Child Health centres by suburb per 10, 000 women of child-bearing age	**QN 4** Maternal and Child Health nurse density Number per 10, 000 women of child-bearing age
QN 2 Funded SNHV program places Number per 1, 000 pregnant women	**QN 5** Social care practitioner density Number per 10, 000 women of child-bearing age
QN3 Funded SNHV program hours Number per 1, 000 pregnant women	**QN 6** Community health worker density Number per 10, 000 women of child bearing age

Quantity indicator

The number of places offered in a local community, in Supported (high quality) SNHV programs.

Table 28: Program by Critical Factors for Implementation Decisions

Program	Effective: Child outcomes	Effective: Parenting outcomes [a]	Embedded in existing service system[b]	Tested in Australian Service System	Accessibility (adversity broadly defined)[c]	High Program Participation[d]
Nurse Family Partnership	✓	✓				
Family Nurse Partnership	✓	✓	✓			
MECSH		✓	✓	✓	✓	
Minding the Baby	✓	✓				✓
Pro Kind		✓			✓	
right@home	*	✓	✓	✓	✓	✓
VoorZorg	✓	✓	✓		✓	

[a]Outcomes assessing parenting skills; [b] evidence that nurses were employed and managed within an existing system (not recruitment of participants through existing services alone); [c] not restricted to first-time, low income, young mothers, but allows in multiparous mothers and women with other risk factors; [d] based on high proportion of intended visits actually delivered

CONCLUSIONS

Summary

The aim of this restricted review was to identify the key components of SNHV programs that effectively improve child and family outcomes. Three meta-analyses were identified which broadly assessed critical components of home visiting programs. Eight specific SNHV programs, tested in good quality RCTs and demonstrating effectiveness on at least one child or parent outcome, were also identified. Seven of these programs demonstrated significant and positive effects on more than three outcomes. Two of these programs have demonstrated effectiveness when embedded within the Australian service system, and indicate high rates of participation. Information about program components was collated and features common to supported programs were identified. A framework for establishing quality, quantity, and participation indicators was then developed.

SNHV Quality Indicators

Quality indicators were informed by:

1. Identification of supported SNHV programs –that is, programs demonstrating a statistically significant main effect on at least three valid child or parent outcomes in at least one RCT with low to moderate risk of bias.

2. Meta-analyses evaluating program content and process components of home visiting programs for mothers living in adversity.

3. SNHV program componentry – there are several components relatively common to SNHV programs demonstrating positive program effects on child or parent outcomes. These fall into three categories: content, process, and provider components.

We identified seven specific SNHV programs, which were tested in good quality RCTs and demonstrated effectiveness on at least three child or parent outcomes:

- Nurse Family Partnership
- Family Nurse Partnership
- MECSH
- Minding the Baby
- Pro Kind
- right@home
- VoorZorg

A SNHV program that does not meet the criteria for supported will be assessed against 34 quality indicators across three domains (content, process and nurse-provider). For a full list of quality indicators see Appendix G.

Quality indicator

The target population (i.e. mothers living in adversity) should attend a high quality SNHV program at the right dose. A high quality program is defined as one of the seven Supported SNHV programs or if a NHV program achieves a "high" quality threshold for each quality domain (content, process, nurse-provider). (The threshold is the estimate required to deliver a quality NHV program that will be tested in the field and re-evaluated).

SNHV Participation Indicators

Participation indicators were informed by:

1. Meta-analyses evaluating process components of home visiting programs for mothers living in adversity.
2. Identification of Supported SNHV programs –that is, programs demonstrating statistically significant positive main effects on at least three valid child or parent outcomes in at least one RCT with low to moderate risk of bias.
3. SNHV program dose information – i.e. comparison of program commencement and duration, along with the number and frequency of visits.

Participation indicator

The target population (i.e. mothers living in adversity) should attend a high quality SNHV program at the right dose. A high quality program is defined as one of the seven Supported SNHV programs or a NHV program that achieves a "high" quality threshold for each quality domain (content, process, nurse-provider). (The threshold is the estimate required to deliver a quality NHV program that will be tested in the field and re-evaluated).

For a full list of participation indicators see Appendix G.

SNHV Quantity Indicators

There are two dimensions that are related to quantity:

- Is there sufficient infrastructure? i.e., the number of home-visiting program places per defined population for a sustained period.
- Is there sufficient workforce?

Quantity indicators were developed using:

- program uptake and retention information provided for the most recently developed and rigorously tested Australian SNHV program, right@home.

- Existing processes utilised by Australian government departments to identify population disadvantage at the LGA level.

The evidence related to quantity suggests that health infrastructure and workforce capacity needs to accommodate:

- high demand (assuming 95% uptake and 86% retention) among pregnant women experiencing socioeconomic adversity for SNHV program places. The proportion of pregnant women who are living in socioeconomic adversity will vary according to LGA.
- program delivery over approximately 2 years,
- qualified nurses with a caseload of no more than 25 families each
- ~1 social care practitioner per 100 families.

Quantity indicator

The number of places offered in a local community, in Supported (high quality) SNHV programs.

For a full list of quantity indicators see Appendix G.

Strengths of the Approach

This restricted review focussed on studies utilising the most rigorous methods of evaluation (meta-analyses, systematic reviews, and RCTs) to provide the strongest level of evidence in identifying effective SNHV programs and, by extension, the components thought to underpin program effectiveness. The review covered a 10-year period including the most recently published literature available in peer reviewed journals indexed across several of the most relevant academic databases. In addition, the websites of several reputable evidence data-bases pertaining to child and family outcomes were searched for relevant programs and supporting material. It seems unlikely that the search process would have failed to identify many (if any) programs supported by a strong evidence base in the published academic literature.

Limitations of the Approach

One limitation of constraining the review to only those evaluations utilising the most rigorous research methods is that other evidence relevant to the question of which SNHV program components optimise outcomes was not considered. Only three relevant meta-analyses were identified and these included home visiting programs that were not necessarily sustained or delivered by nurses. It is possible that the findings in these meta-analyses do not generalise to SNHV programs specifically. None of the meta-analyses presented results separately for nurse home visiting and other programs, let alone for SNHV programs compared with others.

The evidence brought to bear from the individual trials also has its limitations. The RCTs included in the review were primarily concerned with addressing the question of whether each SNHV program was more effective than usual care. Though it is possible to systematically manipulate and test the effect of specific program components, few RCTs of SNHV programs have done this (the Denver NFP comparing

delivery by nurses and paraprofessionals is a notable exception). As such, the review does not provide RCT-level evidence that specific program components significantly improve program outcomes. This means our conclusions are limited to observations of practices that characterise effective programs with a relatively strong evidence base. As others have recently noted (Kaye et al., 2018), identifying common components is useful for understanding the characteristics that are shared among evidence-based programs and may assist policy makers and providers in identifying effective practices. Although informative, common components analyses cannot determine which (if any) common components cause a program to be effective, nor indicate the magnitude of each component's effect (Kaye et al., 2018).

Constraining the review to RCTs means that studies using non-experimental methods of examining critical components may have been missed, even for programs included in the review. Although some process evaluations were consulted when the included publications referred readers to these for more detailed information about the intervention, these types of publication were not actively sort for each program. It is also possible the review has missed quantitative evaluations of whether specific program components predict outcomes for those participating in the intervention conditions. In only one of the included publications (Sierau et al., 2016) did authors include a quantitative analysis of implementation variables to identify active program components. They included in their analyses of outcomes with significant treatment effects a measure of 'helping relationship' and number of visits received (as proxies for quality and quantity of home visiting). Only perceived quality of the relationship significantly predicted maternal feelings of attachment (p=0.002). Evaluations of how program components relate to program participation could also have been missed (though one such paper was uncovered).

A final limitation of restricting the review to RCTs is that it limits the variety of SNHV programs included. There may be other SNHV programs that are effective but have not been evaluated as rigorously. These programs may share common features with those identified in the review or may be characterised by other features potentially providing useful insights as to which components are necessary. For example, if SNHV programs of shorter duration (e.g. Burstrom, Marttila, Kulane, Lindberg, & Burstrom, 2017; Horrevorts et al., 2015) are shown to be ineffective or effective in RCTs this could provide useful information about the importance of program duration.

Gaps in the Literature and Directions for Future Research

A general limitation of the literature, rather than the approach of this restricted review per se, is that there has been limited reporting and limited variation across programs with respect to the process, content, and practice components that might be critical to the effectiveness of SNHV programs. This situation is likely the reason why no meta-analyses specific to identifying components that optimise SNHV programs were found. The absence of detailed information concerning program content and implementation processes has been noted previously (Filene et al., 2013; Goldfeld et al., 2018; Nievar et al., 2010) with recent efforts to ensure more thorough reporting in current and future trials of SNHV programs (e.g. Catherine et al., 2016; Goldfeld et al., 2017). More detailed reporting, along with greater variation across components, would make the literature more amenable to meta-analytic evaluation. It may also be useful in future research to explicitly measure program components and explore which of these are significantly related to intervention outcomes.

Another important area for future research is to test whether programs with a strong evidence base established in one country produce similar results when implemented in other service system contexts.

Others (e.g. Bayer, 2009) have similarly cautioned that nurse-home visiting may be less effective in Australia than the USA, given higher US deprivation levels and better existing universal services and resources in Australia. In systems characterised by strong existing supports for mothers living in adversity, the addition of SNHV programs may not necessarily lead to large numbers of improved outcomes. Indeed, when adapted to the UK system, the immediate results of the FNP trial led researchers to conclude that the program was largely ineffective. In the Netherlands, on the other hand, the adaption of the NFP appears to have been quite successful. The NFP has also recently been tested in a Canadian trial enrolling participants from 2013-15 (Catherine et al., 2016), though results do not appear to have been published yet.

Future research is also needed to establish the effectiveness of SNHV programs with high-risk sub-groups specific to the Australian service system. This review identified only two RCTs of SNHV programs implemented within Australia (MECSH and right@home). The MECSH trial included a substantial proportion of participants from diverse backgrounds and demonstrated effectiveness on specific outcomes for women born overseas. Demographic details related to the cultural and linguistic backgrounds of participants in the right@home trial had not yet been published at the time of writing this report. There appears to have been no RCT of a SNHV program with indigenous Australians, despite the fact that Australia's Commonwealth Department of Health funds a program modelled off the NFP program but tailored to Aboriginal and Torres Strait Islander populations.

Finally, there appear to be important gaps in the SNHV literature for particular outcomes and family members. With respect to outcomes, for example, several programs appear to include content related to infant settling and child sleep difficulties. Yet, to date, only one program (right@home) has published findings for related outcomes (regular bedtime and bedtime routines). With regard to the impact of SNHV programs on family members, it is noteworthy that few SNHV trials have examined possible effects on paternal or sibling outcomes. Notable exceptions are VoorZorg (which included IPV data for women as both victims and perpetrators) and right@home (which will examine program effects for child siblings).

Implications

Overall, the review indicates that there is a reasonably strong evidence base supporting SNHV programs as an effective strategy to improve child and parent outcomes among families experiencing adversity. Indeed, each of the programs identified demonstrated an effect on at least one child or parent outcome in an RCT-level evaluation, and seven of the programs demonstrated effects on at least three outcomes. The review also suggests that SNHV programs can have long-lasting benefits for both children and their mothers, particularly for families experiencing greater disadvantage. However, long-term benefits appear to have been evaluated for only one program, the NFP. Further research is needed to determine whether programs implemented in service systems outside the US will also demonstrate long term benefits.

A variety of program components potentially related to optimal program outcomes were identified in the design of the review and two strategies were used to determine which, if any, are associated with improved outcomes. The results suggest that to achieve outcomes of similar magnitude to those observed in this review, SNHV programs may need to satisfy several quality and participation indicators. Quality indicators relate to program content, process of delivery, and provider. The quality of program content may be gauged by the extent to which services offer comprehensive, evidence-based specific

supports that are tailored to the individual needs of each family. The quality of program delivery may be gauged by the extent to which services offer: continuity of care, translation of material to reach linguistically diverse groups, accurate record keeping and referral to additional services for mothers living in adversity compounded by multiple or severe risk factors, and quality assurance processes to ensure family needs are addressed in a timely manner. The quality of program providers may be gauged by the extent to which nurses have previous experience, appropriate training and professional development, adequate supervision, reasonable caseloads, and access to multi-disciplinary supports. Indicators of adequate program participation relate to the proportion of vulnerable families accepting program places and receiving the recommended number of scheduled visits both across the course of the program and during identified critical periods.

To ensure that health infrastructure and workforce capacity can meet demand, indicators were developed to calculate the number of program places and hours likely to be required, along with the expected number of nurses and social care practitioners needed.

The preliminary indicators and thresholds we have selected will help identify gaps and priorities for SNHV in Australian communities. We will test them in ten communities over the next three years to determine which are pragmatic to collect, resonate with communities, and provide robust measures to stimulate community and government action. We will follow a similar path for the other four fundamental strategies that Restacking the Odds is focusing on – antenatal care, early childhood education and care, parenting programs, and the early years of school.

REFERENCES

Avellar, S. A., & Supplee, L. H. (2013). Effectiveness of home visiting in improving child health and reducing child maltreatment. *Pediatrics, 132 Suppl 2*, S90-99. doi:10.1542/peds.2013-1021G

Bayer, J. H., H. Scalzo, K. Mathers, M. McDonald, M. Morris, A. Birdseye, J. Wake, M. (2009). Systematic review of preventive interventions for children's mental health: what would work in Australian contexts? *Australian & New Zealand Journal of Psychiatry, 43*(8), 695-710. doi:10.1080/00048670903001893

Bowen, S., Zwi, A. B., Sainsbury, P., & Whitehead, M. (2009). Killer facts, politics and other influences: What evidence triggered early childhood intervention policies in Australia? *Evidence & Policy: A Journal of Research, Debate and Practice, 5*(1), 5-32.

Brand, T., & Jungmann, T. (2012). Implementation differences of two staffing models in the german home visiting program “Pro Kind”. *Journal of Community Psychology, 40*(8), 891-905. doi:10.1002/jcop.21489

Brand, T., & Jungmann, T. (2014). Participant characteristics and process variables predict attrition from a home-based early intervention program. *Early Childhood Research Quarterly, 29*(2), 155-167. doi:10.1016/j.ecresq.2013.12.001

Burstrom, B., Marttila, A., Kulane, A., Lindberg, L., & Burstrom, K. (2017). Practising proportionate universalism - a study protocol of an extended postnatal home visiting programme in a disadvantaged area in Stockholm, Sweden. *BMC health services research, 17*(1), 91. doi:https://dx.doi.org/10.1186/s12913-017-2038-1

Casillas, K. L., Fauchier, A., Derkash, B. T., & Garrido, E. F. (2016). Implementation of evidence-based home visiting programs aimed at reducing child maltreatment: A meta-analytic review. *Child Abuse Negl, 53*, 64-80. doi:10.1016/j.chiabu.2015.10.009

Catherine, N., Gonzalez, A., Boyle, M., Sheehan, D., Jack, S., Hougham, K., . . . Waddell, C. (2016). Improving children's health and development in British Columbia through nurse home visiting: a randomized controlled trial protocol. *BMC health services research, 16*(a), 349. Retrieved from http://onlinelibrary.wiley.com/o/cochrane/clcentral/articles/003/CN-01414003/frame.html doi:10.1186/s12913-016-1594-0

CEBC. (2016). The California Evidence-based Clearinghouse for Child Welfare Scientific Rating Scale. from California Department of Social Services http://www.cebc4cw.org/ratings/scientific-rating-scale/

Corbacho, B., Bell, K., Stamuli, E., Richardson, G., Ronaldson, S., Hood, K., . . . Torgerson, D. (2017). Cost-effectiveness of the Family Nurse Partnership (FNP) programme in England: Evidence from the building blocks trial. *Journal of Evaluation in Clinical Practice, 23*(6), 1367-1374. doi:10.1111/jep.12799

Eckenrode, J., Campa, M., Luckey, D. W., Henderson, C. R., Cole, R., Kitzman, H., . . . Olds, D. L. (2010). Long-term effects of prenatal and infancy nurse home visitation on the life course of youths: 19-year follow-up of a randomized trial.[Erratum appears in Arch Pediatr Adolesc Med. 2010 May 164(5):424]. *Archives of Pediatrics & Adolescent Medicine, 164*(1), 9-15. doi:https://dx.doi.org/10.1001/archpediatrics.2009.240

Ferraro, K. F., & Shippee, T. P. (2009). Aging and cumulative inequality: How does inequality get under the skin? *The Gerontologist, 49*(3), 333-343.

Filene, J., Kaminski, J., Valle, L., & Cachat, P. (2013). Components associated with home visiting program outcomes: A meta-analysis. *Pediatrics, 132*(Supplement 2), S100-S109.

Goldfeld, S., Price, A., Bryson, H., Bruce, T., Mensah, F., Orsini, F., . . . Kemp, L. (2017). 'right@home': a randomised controlled trial of sustained nurse home visiting from pregnancy to child age 2 years, versus usual care, to improve parent care, parent responsivity and the home learning environment at 2 years. *BMJ Open, 7*(3), e013307. doi:https://dx.doi.org/10.1136/bmjopen-2016-013307

Goldfeld, S., Price, A., & Kemp, L. (2018). Designing, testing, and implementing a sustainable nurse home visiting program: right@home. *Ann N Y Acad Sci, 1419*(1), 141-159. doi:10.1111/nyas.13688

Gomby, D. S. (2005). *Home visitation in 2005: Outcomes for children and parents. Invest in kids working paper No. 7*. Retrieved from http://www.ced.org/docs/report/report_ivk_gomby_2005.pdf

Government of South Australia. (2005). *Children, Youth and Women's Health Service. Family Home Visiting Service Outline*. Adelaide, Autralia: The Children, Youth and Women's Health Service.

Hoffman, J. I. E. (2015). Meta-analysis *Biostatistics for Medical and Biomedical Practitioners*: Academic Press.

Holzer, P. J., Higgins, J. R., Bromfield, L. M., Richardson, N., & Higgins, D. J. (2006). The effectiveness of parent education and home visiting child maltreatment prevention programs. *Child Abuse Protection Issues, 24*(Autumn), 1-23.

Horrevorts, E. M., van Grieken, A., Broeren, S. M., Bannink, R., Bouwmeester-Landweer, M. B., Hafkamp-de Groen, E., & Raat, H. (2015). Design of a controlled trial to evaluate the effectiveness of Supportive Parenting ('Stevig Ouderschap'): an intervention to empower parents at increased risk of parenting problems by providing early home visits. *BMC psychology, 3*, 47. doi:https://dx.doi.org/10.1186/s40359-015-0104-1

Huang, X., Lin, J., & Demner-Fushman, D. (2006). *Evaluation of PICO as a knowledge representation for clinical quations.* Paper presented at the Proceedings of the 2006 Annual Symposium of the American Mecial Informatics Association (AMIA 2006), Washington, D.C.

James, E., Freund, A., Booth, A., Duncan, M. J., Johnson, N., & Short, C. E. (2016). Comparative efficacy of simultaneous versus sequential multiple health behavior change interventions among adults: A systematic review of randomised trials. *Prev Med, 89*, 211-223. doi:10.1016/j.ypmed.2016.06.012

Jungmann, T., Ziert, Y., Kurtz, V., & Brand, T. (2009). Preventing adverse developmental outcomes and early onset conduct problems through prenatal and infancy home visitation: The German pilot project "Pro Kind.". *European Journal of Developmental Science, 3*(3), 292-298.

Karoly, L. A., Kilburn, M., Cannon, J. S., & Rand Corp. (2005). *Early childhood interventions: proven results, future promises*. Santa Monica: Rand Corporation Retrieved from http://www.rand.org/pubs/monographs/MG341.html.

Kaye, M. P., Faber, A., Davenport, K. E., & Perkins, D. F. (2018). Common components of evidence-informed home visitation programs for the prevention of child maltreatment. *Children and Youth Services Review, 90*, 94-105. doi:10.1016/j.childyouth.2018.05.009

Kemp, L., Eisbacher, L., McIntyre, L., O'Sullivan, K., Taylor, J., Clark, T., & Harris, E. (2006). Working in partnership in the antenatal period: What do child and family health nurses do? *Contemporary Nurse, 23*(2), 312-320.

Kemp, L., & Harris, E. (2012). The challenges of establishing and researching a sustained nurse home visiting programme within the universal child and family health service system. *Journal of Research in Nursing, 17*(2), 127-138. doi:http://dx.doi.org/10.1177/1744987111432228

Kemp, L., Harris, E., McMahon, C., Matthey, S., Vimpani, G., Anderson, T., & Schmid, M. (2008). Miller Early Childhood Sustained Home-visiting (MECSH) trial: design, method and sample description. *BMC Public Health, 8*, 424.

Kemp, L., Harris, E., McMahon, C., Matthey, S., Vimpani, G., Anderson, T., . . . Aslam, H. (2013). Benefits of psychosocial intervention and continuity of care by child and family health nurses in the pre- and postnatal period: process evaluation. *Journal of Advanced Nursing, 69*(8), 1850-1861. doi:https://dx.doi.org/10.1111/jan.12052

Kemp, L., Harris, E., McMahon, C., Matthey, S., Vimpani, G., Anderson, T., . . . Zapart, S. (2011). Child and family outcomes of a long-term nurse home visitation programme: a randomised controlled trial. *Archives of Disease in Childhood, 96*(6), 533-540. doi:https://dx.doi.org/10.1136/adc.2010.196279

Kendrick, D., Barlow, J., Hampshire, A., Stewart-Brown, S., & Polnay, L. (2008). Parenting interventions and the prevention of unintentional injuries in childhood: systematic review and meta-analysis. *Child Care Health Dev, 34*(5), 682-695. doi:10.1111/j.1365-2214.2008.00849.x

Kitzman, H. J., Olds, D. L., Cole, R. E., Hanks, C. A., Anson, E. A., Arcoleo, K. J., . . . Holmberg, J. R. (2010). Enduring effects of prenatal and infancy home visiting by nurses on children: follow-up of a randomized trial among children at age 12 years. *Archives of Pediatrics & Adolescent Medicine, 164*(5), 412-418. Retrieved from http://onlinelibrary.wiley.com/o/cochrane/clcentral/articles/958/CN-00751958/frame.html doi:10.1001/archpediatrics.2010.76

Lee, S., Aos, S., & Miller, M. G. (2008). *Evidence-based programs to prevent children from entering and remaining in the child welfare system: benefits and costs for Washington*. Olympia: Washington State Institute for Public Policy.

Macdonald, G., Bennett, C., Higgins, J. P. T., & Dennis, J. A. (2010). Home visiting for socially disadvantaged mothers. *Cochrane Database of Systematic Reviews*(10). doi:10.1002/14651858.CD008784

McDonald, M., Moore, T. G., & Goldfeld, S. (2012). *Sustained home visiting for vulnerable families and children: A literature review of effective programs*. Retrieved from Parkville, Victoria:

Meghea, C., Li, B., Zhu, Q., Raffo, J., Lindsay, J., Moore, J., & Roman, L. A. (2013). Infant health effects of a nurse-community health worker home visitation programme: a randomized controlled trial. *Child, 39*(1), 27-35. Retrieved from http://onlinelibrary.wiley.com/o/cochrane/clcentral/articles/572/CN-00845572/frame.html; http://onlinelibrary.wiley.com.ezp.lib.unimelb.edu.au/store/10.1111/j.1365-2214.2012.01370.x/asset/cch1370.pdf?v=1&t=jdmjuxps&s=e57332fc3e2af95cbcb40850b54754d187b49567 doi:10.1111/j.1365-2214.2012.01370.x

Mejdoubi, J., Heijkant, S., Leerdam, F., Crone, M., Crijnen, A., & HiraSing, R. (2014). Effects of nurse home visitation on cigarette smoking, pregnancy outcomes and breastfeeding: a randomized controlled trial. *Midwifery, 30*(6), 688-695. Retrieved from doi:10.1016/j.midw.2013.08.006

Mejdoubi, J., Heijkant, S., Leerdam, F., Heymans, M., Crijnen, A., & Hirasing, R. (2015). The effect of VoorZorg, the dutch nurse-family partnership, on child maltreatment and development: a randomized controlled trial. *PloS one, 10*(4). Retrieved from doi:10.1371/journal.pone.0120182

Mejdoubi, J., Heijkant, S., Leerdam, F., Heymans, M., Hirasing, R., & Crijnen, A. (2013). Effect of nurse home visits vs. usual care on reducing intimate partner violence in young high-risk pregnant women: a randomized controlled trial. *PloS one, 8*(10), e78185. Retrieved from doi:10.1371/journal.pone.0078185

Mejdoubi, J., Heijkant, S., Struijf, E., Leerdam, F., HiraSing, R., & Crijnen, A. (2011). Addressing risk factors for child abuse among high risk pregnant women: design of a randomised controlled trial of the nurse family partnership in Dutch preventive health care. *BMC Public Health, 11*, 823. Retrieved from doi:10.1186/1471-2458-11-823

Miller, T. (2015). Projected Outcomes of Nurse-Family Partnership Home Visitation During 1996-2013, USA. *Prevention Science, 16*(6), 765-777. doi:10.1007/s11121-015-0572-9

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA Statement. *PLoS Medicine, 6*(7), e1000097. doi:10.1371/journal.pmed1000097

Moore, T. G., Arefadib, N., Deery, A., Keyes, M., & West, S. (2017). *The thousand days: An evidence paper*. Retrieved from Parkville, Victoria:

Nievar, M. A., Van Egeren, L. A., & Pollard, S. (2010). A meta-analysis of home visiting programs: Moderators of improvements in maternal behavior. *Infant Mental Health Journal, 31*(5), 499-520. doi:https://dx.doi.org/10.1002/imhj.20269

Nigg, C. R., Allegrante, J. P., & Ory, M. (2002). Theory-comparison and multiple-behavior research: common themes advancing health behavior research. *Health Education Research, 17*(5), 670-679. doi:10.1093/her/17.5.670

Nigg, C. R., & Long, C. R. (2012). A systematic review of single health behavior change interventions vs. multiple health behavior change interventions among older adults. . *Translational Behavioral Medicine, 2*(2), 163-179. doi:10.1007/s13142-012-0130-y

Olds, D. L. (2008). Preventing child maltreatment and crime with prenatal and infancy support of parents: The nurse-family partnership. *Journal of Scandinavian Studies in Criminology and Crime Prevention, 9*(Suppl1), 2-24. doi:http://dx.doi.org/10.1080/14043850802450096

Olds, D. L., Baca, P., McClatchey, M., Ingoldsby, E. M., Luckey, D. W., Knudtson, M. D., . . . Ramsey, M. (2015). Cluster Randomized Controlled Trial of Intervention to Increase Participant Retention and Completed Home Visits in the Nurse-Family Partnership. *Prev Sci, 16*(6), 778-788. doi:10.1007/s11121-015-0563-x

Olds, D. L., Holmberg, J., Donelan-McCall, N., Luckey, D. W., Knudtson, M. D., & Robinson, J. (2014). Effects of home visits by paraprofessionals and by nurses on children follow-up of a randomized trial at ages 6 and 9 years. *JAMA pediatrics, 168*(2), 114-121. Retrieved from http://onlinelibrary.wiley.com/o/cochrane/clcentral/articles/568/CN-01071568/frame.html doi:10.1001/jamapediatrics.2013.3817

Olds, D. L., Holmberg, J. R., Donelan-McCall, N., Luckey, D. W., Knudtson, M. D., & Robinson, J. (2014). Effects of home visits by paraprofessionals and by nurses on children: follow-up of a randomized trial at ages 6 and 9 years. *JAMA Pediatrics, 168*(2), 114-121. doi:https://dx.doi.org/10.1001/jamapediatrics.2013.3817

Olds, D. L., Kitzman, H., Knudtson, M. D., Anson, E., Smith, J. A., & Cole, R. (2014). Effect of home visiting by nurses on maternal and child mortality: results of a 2-decade follow-up of a randomized clinical trial. *JAMA pediatrics, 168*(9), 800-806. Retrieved from http://onlinelibrary.wiley.com/o/cochrane/clcentral/articles/636/CN-01014636/frame.html doi:10.1001/jamapediatrics.2014.472

Olds, D. L., Kitzman, H., Knudtson, M. D., Anson, E., Smith, J. A., & Cole, R. (2014). Effect of home visiting by nurses on maternal and child mortality: results of a 2-decade follow-up of a randomized clinical trial. *JAMA Pediatrics, 168*(9), 800-806. doi:https://dx.doi.org/10.1001/jamapediatrics.2014.472

Olds, D. L., Kitzman, H. J., Cole, R. E., Hanks, C. A., Arcoleo, K. J., Anson, E. A., . . . Stevenson, A. J. (2010). Enduring effects of prenatal and infancy home visiting by nurses on maternal life course and government spending: follow-up of a randomized trial among children at age 12 years. *Archives of Pediatrics & Adolescent Medicine, 164*(5), 419-424. Retrieved from http://onlinelibrary.wiley.com/o/cochrane/clcentral/articles/638/CN-00748638/frame.html doi:10.1001/archpediatrics.2010.49

Olds, D. L., Robinson, J., O'Brien, R., Luckey, D. W., Pettitt, L. M., Henderson, C. R., Jr., . . . Talmi, A. (2002). Home visiting by paraprofessionals and nurses: A randomized, controlled trial. *Pediatrics, 110*(3), 486-496.

Olds, D. L., Robinson, J., Pettitt, L. M., Luckey, D. W., Holmberg, J. R., Ng, R. K., . . . Henderson, C. R., Jr. (2004). Effects of home visits by paraprofessionals and by nurses: Age 4 follow-up results of a randomized trial. *Pediatrics, 114*(6), 1560-1568.

Peacock, S., Konrad, S., Watson, E., Nickel, D., & Muhajarine, N. (2013). Effectiveness of home visiting programs on child outcomes: a systematic review. *BMC Public Health, 13*, 17. doi:10.1186/1471-2458-13-17

Pluddemann, A., Aronson, J. K., Onakpoya, I., Heneghan, C., & Mahtani, K. R. (2018). Redefining rapid reviews: a flexible framework for restricted systematic reviews. *BMJ Evidence Based Medicine*. doi:10.1136/bmjebm-2018-110990

Robling, M., Bekkers, M. J., Bell, K., Butler, C., Cannings-John, R., Channon, S., . . . Torgerson, D. (2016). Effectiveness of a nurse-led intensive home-visitation programme for first-time teenage

mothers (Building Blocks): a pragmatic randomised controlled trial. *The Lancet, 387*(10014), 146-155. doi:10.1016/s0140-6736(15)00392-x

Roman, L. A., Gardiner, J., Lindsay, J. K., Moore, J. S., Luo, Z., Baer, L. J., . . . Paneth, N. (2009). Alleviating perinatal depressive symptoms and stress: a nurse-community health worker randomized trial. *Archives of Women's Mental Health, 12*, 379-391.

Roman, L. A., Lindsay, J. K., Moore, J. S., Duthie, P. A., Peck, C., Barton, L., . . . Baer, L. J. (2007). Addressing mental health and stress in Medicaid-insured pregnant women using a nurse-community health worker home visiting team. *Public health nursing, 24*(3), 239-248.

Sadler, L. S., Slade, A., Close, N., Webb, D. L., Simpson, T., Fennie, K., & Mayes, L. C. (2013). Minding the Baby: Enhancing reflectiveness to improve early health and relationship outcomes in an interdisciplinary home visiting program. *Infant Mental Health Journal, 34*(5), 391-405.

Schardt, C., Adams, M. B., Owens, T., Keitz, S., & Fontelo, P. (2007). Utilization of the PICO framework to improve searching PubMed for clinical questions. *BMC Med Inform Decis Mak, 7*, 16. doi:10.1186/1472-6947-7-16

Schmied, V., Donovan, J., Kruske, S., Kemp, L., Homer, C., & Fowler, C. (2011). Commonalities and challenges: A review of Australian state and territory maternity and child health policies. *Contemporary Nurse, 40*(1), 106-117. doi:10.5172/conu.2011.40.1.106

Sidora-Arcoleo, K., Anson, E., Lorber, M., Cole, R., Olds, D. L., & Kitzman, H. J. (2010). Differential effects of a nurse home-visiting intervention on physically aggressive behavior in children. *Journal of pediatric nursing, 25*(1), 35-45. Retrieved from doi:10.1016/j.pedn.2008.07.011

Sierau, S., Dahne, V., Brand, T., Kurtz, V., Klitzing, K., & Jungmann, T. (2016). Effects of Home Visitation on Maternal Competencies, Family Environment, and Child Development: a Randomized Controlled Trial. *Prevention Science, 17*(1), 40-51. Retrieved from doi:10.1007/s11121-015-0573-8

Sivak, L. C., Arney, F. M., & Lewig, K. A. (2008). *A pilot exploration of a family home visiting program for families of Aboriginal and Torres Strait Islander children: report and recommendations: perspectives of parents of Aboriginal children and organisational considerations*. Retrieved from Canberra, Australia:

Slade, A., Sadler, L. S., De Dios-Kenn, C., Webb, D. L., Currier-Ezepchick, J., & Mayes, L. C. (2005). Minding the Baby: A reflective parenting program. *THe Psychoanalytic Study of the Child, 60*, 71-100.

Sweet, M. A., & Appelbaum, M. I. (2004). Is home visiting an effective strategy? A meta-analytic review of home visiting programs for families with young children. *Child Development, 75*(5), 1435-1456.

Trentacosta, C. J., Hyde, L. W., Shaw, D. S., Dishion, T. J., Gardner, F., & Wilson, M. (2008). The relations among cumulative risk, parenting, and behavior problems during early childhood. *Journal of Child Psychology & Psychiatry & Allied Disciplines, 49*(11), 1211-1219. doi:10.1111/j.1469-7610.2008.01941.x

Victorian Government Department of Education and Training. (2018). *Your Maternal and Child Health Service Visits*. Retrieved from http://www.education.vic.gov.au/childhood/parents/mch/Pages/visits.aspx

Walker, S. P., Wachs, T. D., Grantham, S., McGregor, M. M., Black, C. A., & Nelson, S. L. (2011). Inequality in early childhood: risk and protective factors for early child development. *The Lancet, 378*(9799), 1325-1338. doi:https://doi.org/10.1016/S0140-6736(11)60555-2

Widdup, J., Comino, E. J., Webster, V., & Knight, J. (2012). Universal for whom? Evaluating an urban Aboriginal population's access to a mainstream universal health home visiting program. *Australian Health Review, 36*(1), 27-33. doi:https://dx.doi.org/10.1071/AH10961

Willey, S. M., Cant, R. P., Williams, A., & McIntyre, M. (2018). Maternal and Child Health Nurses work with refugee families: Perspectives from regional Victoria, Australia. *Journal of Clinical Nursing, 21*, 21. doi:https://dx.doi.org/10.1111/jocn.14277

APPENDICES

Appendix A: Search Strategy and Key Terms

Step	Search terms
S1 Social disadvantage	Vulnerable or at risk or at-risk or disadvantage or underprivilege or poor or poverty or impover* or deprived or low SES or low socio-economic-status or low socio economic status or low income or low-income or single-parent or single parent or sole parent or sole-parent or youth or young or teen* or adolescen* or welfare payment or welfare benefit
S2 Mother	Mother or mum or maternal or infant or infancy or newborn or child or minor or toddler or baby or babies
S3 Home	home or house or home-based or home based or home visit or home-visit or home care or home-care
S4 Study design	RCT or randomi* or control* or trial or clinical or random* assign* or random* alloca* or QRCT or quasi* or quasi-ex* or quasiex or meta-analysis or systematic review
S5 Nurse	Nurs* or midwife or midwives
S6 Combining results to yield home visiting programs for socially disadvantaged mothers	S1 and S2 and S3
S7 Restricting S6 to the most rigorous study designs	S6 and S4
S8 Restricting S7 to nurse-delivered programs	S7 and S5

Internally valid?
Externally valid?
Overall?

NICE Quality & Bias checklist

Paper: ref #_____

1.1 Is the source population or source area well described?

1.2 Is the eligible population or area representative of the source population or area?

1.3 Do the selected participants or areas represent the eligible population or area?

2.1 Allocation to intervention (or comparison). How was selection bias minimised?

2.2 Were interventions (and comparisons) well described and appropriate?

2.3 Was the allocation concealed?

2.4 Were participants or investigators blind to exposure and comparison?

2.5 Was the exposure to the intervention and comparison adequate?

2.6 Was contamination acceptably low?

2.7 Were other interventions similar in both groups?

2.8 Were all participants accounted for at study conclusion?

3.1 Were outcome measures reliable?

3.2 Were all outcome measurements complete?

3.3 Were all important outcomes assessed?

3.4 Were outcomes relevant?

3.5 Were there similar follow-up times in exposure and comparison groups?

3.6 Was follow-up time meaningful?

4.1 Were exposure and comparison groups similar at baseline? If not, were these adjusted?

4.2 Was intention to treat (ITT) analysis conducted?

4.3 Was the study sufficiently powered to detect an intervention effect (if one exists)?

4.4 Were the estimates of effect size given or calculable?

4.5 Were the analytical methods appropriate?

4.6 Was the precision of intervention effects given or calculable? Were they meaningful?

5.1 Are the study results internally valid (i.e. unbiased)?

5.2 Are the findings generalizable to the source population (externally valid)?

Overall rating

++ ALL or most of the criteria have been fulfilled (75%)

+ SOME of the criteria have been fulfilled (51 – 74%)

- FEW or NO checklist criteria have been fulfilled (50% and below)

PRISMA Check: Systematic Reviews & meta-analyses

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	

Appendix C: Overall Ranking of the Evidence

OVERALL RANKING OF THE EVIDENCE	
	Definition
Supported	Clear, consistent evidence of benefit. No evidence of harm or risk to participants. A well conducted systematic review or meta-analysis or at least one RCT (with low to moderate risk of bias) found the intervention to be more effective than a control group on at least three child or parent valid outcome measures.
Promising	Evidence suggestive of benefit but more evidence needed. No evidence of harm or risk to participants. At least one RCT (with low to moderate risk of bias) found the intervention to be more effective than a control group on at least one child or parent valid outcome measure.
Evidence fails to demonstrate effect	A well conducted systematic review or meta-analysis or at least one RCT found the intervention to be ineffective compared with a control group. The overall weight of the evidence does not support the benefit of the practice.
Unknown	The data reported across trials is inconsistent. One or more RCTs show a high level of bias. There are insufficient trials to provide an evaluation of the evidence-base.
Concerning practice	At least 1 RCT with low risk of bias where the practice has been shown to have no effect or a negative effect sustained over at least 1 year.

Appendix D: Details of Child Outcomes by Program

Family-Nurse Partnership- Child Outcomes

Author	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Robling (2016), including Appendix	SIGNIFICANT MAIN EFFECTS Cognitive development • Cognitive concern, maternal report 24 months, I: 8.1% vs C: 12.6%, OR 0.61, 95% CI 0.40 to 0.90, *p*=0.013. Language development • Language delay, maternal report at 12 months, I: 11% vs C:19.9%, AOF=0.50, 95% CI 0.35 to .72, *p*<0.001. • Language delay, maternal report at 18 months, I:17.1% vs C:24.2% AOR=.66, 95% CI 0.48 to 0.90, *p*=0.009 • Early Language Milestone percentiles at 24 months: 60.8 vs 55.7 (adjusted mean difference 4.49, 95% CI 0.52 to 8.45, *p*=0.027 Surveillance • Safeguarding procedures higher in FNP (13.6% vs 8.0%, *p*=0.005)	NULL Birth Outcomes • Birthweight (I: 3217.4g vs C: 3197.5g , mean difference 20.75g (97.5% CI: -47.73 to 89.23) • Gestation at delivery • Apgar scores >=7 at 1 and 5 minutes Safety • Hospital/ED presentations and admissions for injuries and ingestions (x-x months) • Social services referrals Psychosocial development Cognitive concern • maternal report at 12 & 18 months
Corbacho (2017)	NA – unable to measure QALYs for children	

Maternal and Early Childhood Sustained Home visiting program – Child Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Kemp (2011)	POSITIVE TREND (DISTRESSED MOTHERS) Cognitive Development • Mental Development Index (Bayley Scales 18 months), *d*=0.58, *p*=0.07	NULL Birth outcomes • Low birth weight <2500g (hospital records) • Pre-term birth <37 weeks Child Health • Child respiratory infection (6-24 months) • Gastrointestinal illness (6-24 months) Psychomotor Development • Bayley Scales of Infant Development II (18 months) Behaviour • Bayley Scales of Infant Development II (18 months)
Kemp (2013)	None	NULL Child health

		Infant admission to special care nursery (in first 6 weeks)

Minding the Baby – Child Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Sadler (2013)	SIGNIFICANT MAIN EFFECTS Infant attachment quality at 12 months (Strange Situation procedure) • Secure attachment (I: 64.4% vs C: 48.8%, *p*=0.028, OR:=0.29, 95% CI: 0.10 to 0.88) • Disorganised attachment (I:27% vs C: 43%, OR=3.10, 95% CI=1.00-9.53). TREND Child Maltreatment (24 months) • Child protection investigations, (I: 0% vs C: 5%, *p*=0.10)	NULL Birth outcomes • Birthweight

Nurse-CHW team – Child Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Meghea (2013)	POSITIVE SUBGROUP Child physical health (low psychosocial resource mothers) • maternal report of an asthma/wheezing/croup diagnosis, *p*=0.01 .	NULL Immunisation • Infant health records compliant with USA schedule by 12 months of age, 84% both arms Well-child visits • C: 6.9 vs I: 6.4 Hospital presentation/admissions • C: 71.1% vs I:73.7% at least one hospital ED visit by 12 months. • C:22.8% vs I: 22.4% had at least on overnight stay in hospital Illness • Medicaid claims for asthma/wheezing/croup diagnosis • maternal report of ear infection, feeding problems, or respiratory infections; • medical records of ear infection, immunisation, or hospitalisation

Nurse-Family Partnership- Child Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Eckenrode (2010)	SUBGROUP EFFECTS Criminal involvement (for girls only)	NULL Graduation rates at 19 years Reproductive behaviours at 19 years

	• proportion arrested by 19 years (I: 10% vs 30%, Relative Risk 0.33, 95% CI 0.13 to 0.82) • proportion convicted by 19 years (I:4% vs C:20%, RR 0.2, 95% CI 0.05 to .85), • fewer incidences of arrest (I:0.10 vsC: 0.54, IRR 0.18, 95% CI 0.006 to 0.54) • fewer incidences of conviction (I: .04 vs C:0.37, IRR 0.11, 95%CI .02 to 0.51). SUBGROUP EFFECTS (low income unmarried mothers) Reproductive behaviour • Subsequent childbearing by 19 years of age (girls only) I:11% vs C:30%, RR 0.35, 95% CI 0.12 to 1.02. • Higher rates of condom use (mean difference 1.01, 95% CI 0.07 to 1.96). Welfare use • less Medicaid use (I: 18% vs C: 45%, RR 0.40, 95% CI 0.18 to 0.87) by age 19 years	• number of sexual partners, • use of birth control, • teen pregnancy, • child-bearing NEGATIVE SUBGROUP (boys born to high risk mothers): more sexual partners IRR, 2.00, 95% CI 1.16 to 3.45.
Kitzman (2010)	POSITIVE (Memphis 12-year follow-up) Use of cigarettes, alcohol or drug use in the previous 30 days • I: 1.7% vs C: 5.1%, *p*=0.04, OR=.31, 95% CI 0.09 to 1.07 Incidence number of substances used in the past 30 days • I: 0.02 vs C: 0.08, *p*=0.02, IR =.22, 95% CI 0.06 to 0.83 Incidence of days of substance use in the past 30 days • I:0.03vs C: 0.18, *p*=0.02, IR = 0.15, 95% CI 0.04 to 0.65 Internalising • I:22.1% vs C: 30.9%, *p*=0.04, OR=0.63, 95%CI 0.4 to 1.0. SUBGROUP EFFECT (mothers with low psychological resources) Peabody Individual Achievement tests • reading and maths (I: 88.78 vs C: 85.70, mean difference =.3.07, 95% CI 0.76 to 5.39, effect size 0.25, *p*=0.009) Group-administered standardised tests -math and reading (grades 1 to 6) • I: 40.52 vs C: 34.85, effect size 0.18, *p*=0.02). GPA scores (reading and math)	NULL • externalising, • total problems, • conduct grades • ever arrested • ever placed in special education • ever retained • sustained attention test

	• grades 1-6 (I:M=2.46, SD=.07 vs .C:M=2.27, SD=.05, *p*=0.03, mean difference = .20, 95% CI 0.20 to 0.37. • grades 4-6 (Ms=2.27 vs 2.08, SDs=0.08 vs 0.06), *p*=0.047, mean difference =.19, 95% CI 0.00 to 0.38	
Miller (2015)	POSITIVE Pre-term first birth • Pooled 5 US trials (Denver, Elmira, Louisiana, Memphis, Orange County, I:8.8% vs C: 10.8% *p*=0.053 Child injury • Pooled Elmira (0-24 months whites only), Memphis (0-24 months unpublished data), Louisiana (0-15 months), I: 37.4% vs C: 64%, *p*<0.001 Child maltreatment • Elmira (4-15 years) 73% vs 44%, relative risk decline 39.7%, 95% CI: 22.3% to 58%, p not reported. Language development • Elmira (language development at age 3 years, -white low income teens, *p*<0.01), Memphis (storytelling and receptive vocabulary at 6 years, *p*<0.05), Denver (language delay at 2 & 4 years, *p*<0.05) Youth substance abuse • Elmira (age 12-15, -67%, *p*<0.05; age 19, ns), Memphis (age 12,I:1.7% vs. 5.1%, -69% *p*=0.04) Youth arrests (lifetime) • Elmira age 11-19, (.86 vs .37, Relative risk decline 57% 95%CI 20-77%)	NULL Birthweight • Denver, Elmira, and Memphis 95% Cis all include 0, ns. Grade repetition • Memphis and Denver pooled *p*=0.32 Youth substance abuse • Elmira (age 19, ns),
Olds (2008)	POSITIVE Maltreatment • Emergency room treatment and physician visits for ingestions and injuries at 2 years (Elmira) Psychosocial development • Intellectual functioning and receptive vocabulary aby age 6 years (Memphis) • Fewer behavioural problems by age 6 years (Memphis) Child life course • At Elmira 15-year follow-up, fewer arrests and adjudications as persons in need of supervision (no statistics reported)	NULL State verified cases of child abuse and neglect by 2 years (Elmira)

	POSITIVE TRENDS Child health • Maltreatment (Memphis, by 2 years, 23% fewer health care encounters for injuries and ingestions, 79% fewer days hospitalised for these) • Mortality (Memphis, child age 9 years, *p*=0.008) Child life course • At Elmira 15-year follow-up NFP children reported fewer sexual partners, fewer convictions, and fewer violations of probation (no statistics reported) SUBGROUP EFFECTS Birthweight • among very young mothers (14-16 years), babies born to nurse-visited women were 395g heavier at birth (Elmira), Preterm birth • among smokers, 75% fewer pre-term births among nurse-visited women (Elmira) Child maltreatment • among low income unmarried teenage mothers, 80% fewer verified cases of child abuse or neglect for nurse-visited than comparison mothers, *p*=0.07 (Elmira) Psychosocial development • Less irritable and fussy 6 month old babies (born to poor, unmarried teens in Elmira) and less emotional vulnerability in response to fear stimuli (for children born to low psychological resource women in Denver) • Among children born to mothers with low psychological recources, higher arithmetic and less aggression on story stems at age 6 (Memphis) • Among children born to low resource mothers, higher GPAs in reading and math at 9 years (Memphis) • At 21 months and 4 years, less language delay and superior mental development among children born to low resource mothers (Denver)	
Olds (2014) Memphis	POSITIVE Mortality by 20 years	NULL All-cause mortality by 20 years • I:0.9% vs C: 2.7%,, *p*=0.11.

	• Preventable-cause death, I: 0% vs C:1.6%, *p*=0.04.	
Olds (2014) Denver	POSITIVE TRENDS Social-Emotional development • Internalising at 9 years, *p*=0.08 • Total problems at age 6 years, *p*=0.08 Cognitive development at 9 years • attention dysfunction, *p*=0.07 POSITIVE SUBGROUP (low psychological resource mothers) • sustained attention over ages 4,6, and 9 years (effect size =0.36, *p*=0.006). • use of therapeutic services at age 6 years (RR=0.46, *p*=0.01), • enrolment in special education or remedial services in the first three years of school (RR=0.57, *p*=0.06). • language tests averaged over ages 2,4, and 6 years, effect size 0.3, (*p*=0.01)	NULL. Social-Emotional development • internalising problems at 6 years of age • externalising at 6 or 9 years of age, • total problems at 9 years of age. Cognitive measures at 9 years • attention dysfunction, • intelligence, • visual attention, • working memory, • academic achievement
Sidora-Arcoleo (2010)	POSITIVE Lower physical aggression • at child age 2 years, *p*<0.01 POSTIVE TREND Mental Development Index • at child age 6 years, *p*<0.10 POSITIVE SUBGROUP • Program effect on age 2 aggression for girls (*p*<0.01) but not boys • Among children born to mothers with high psychological resources, a program effect on physical aggression emerged at 6 years (*p*< 0.05) and age 12 years (*p*<0.05)	NULL • Mental Development Index age 2 years • Peabody Picture Vocabulary Test at 6 years • Aggression at 6, and 12 years

Pro Kind – Child Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Jungmann (2009)	SIGNIFICANT MAIN EFFECTS Psychosocial development • Infant Characteristics Questionnaire, 6 months, intervention infants less difficult (M=15.63, SD=3.61) than comparison group (M=17.34, SD=3.83),*p*<0.05	NULL Birth outcomes • Birthweight Motor development • Bayley Scales of Infant Development (6 and 12 months)

	• Mental Development Index of the Bayley Scales, time x treatment interaction (6 to 12 months), $p<0.05$. At 12 months, infants of nurse visited mothers had higher scores than comparison mothers (Ms=100.25, 86.94; SDs=14.4, 14.77)	
Sierau (2016)	POSITIVE SUBGROUP EFFECT Cognitive development (high risk mothers) • Mental Development Index, risk group x treatment group interaction, $p=0.028$	NULL Psychosocial development • Cognition, Bayley Scales of Infant Development (6-24 months) • Language, standardised tests: ELFRA and SETK at 12 and 24 months) Social-emotional development, • Child Behaviour Checklist (24 months)

VoorZorg – Child Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Mejdoubi (2014)	None	NULL Birth outcomes (Youth Health Care Organisation Data) • Birthweight (control 3147g vs 3144g intervention) • Low birthweight (<2500g; control 11.3% vs intervention 12.3%) • Prematurity (<37 weeks, control 40 weeks vs intervention 39 weeks) • Small for gestational age (C:18% vs I:16%)
Mejdoubi (2015)	POSITIVE MAIN EFFECTS Child Protection Services data (from 8 of 10 agencies) at child age 3 years • 11% intervention vs 19% comparison children had a CPS report (Relative Risk 0.91, 95% CI 0.28 to 3.8, $p=0.04$). Child Behaviour Checklist (child age 24 months) • internalising behaviour problems (17% vs 31%, Relative Risk 0.56, 95% CI 0.24 to 0.94, $p<0.05$).	NULL Child Behaviour Checklist (child age 24 months) • externalising behaviour (25% vs 35%, RR 0.71, 95% CI 0.34 to 1.09, $p=0.12$)

Appendix E: Details of Parent Outcomes by Program

Family-Nurse Partnership-Parent Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Robling (2016)	SIGNIFICANT MAIN EFFECTS Breastfeeding • Breastfeeding or mixed feeding *intentions* (I:58.4% vs C: 50.4%, OR 1.32, 95% CI: 1.02 to 1.70, *p*=0.036) Psychosocial outcomes • Self-efficacy score, 0.44 difference, 95% CI: 0.10 to 0.78, *p*=0.011 • Social Support, 18 months (I: 25.7% vs C: 20.3%) and 24 months (I: 27.9% vs C:23.1%, OR=1.50, 95% CI: 1.06 to 2.12, *p*=0.023 • Partner relationship quality, adjusted difference in means 0.17, 95% CI: 0.28 to 1.20, *p*=0.002 POSITIVE TREND Child Safety • Higher scores over three time-points (12,18,24 months), AOR 1.26, 95% CI: 0.97 to 1.62, *p*=0.08). Maternal life course • Contraceptive use, *p*=0.08 • Homelessness from baseline to 24 months, I:30.4% vs 36.3%, *p*=0.09 OTHER Safeguarding procedures • I:13.6% vs C:8.0%, AOR=1.85, 95% CI: 1.02 to 2.85, *p*=0.005	NULL Maternal health • In full health • Pre-eclampsia/hypertension Smoking reduction • Alcohol and drug use • Maternal weight • Routine dental & antenatal check-ups • Antenatal attendance at day assessments • Unplanned antenatal hospital admissions • Primary care consultations Feeding • Initiation of breast of mixed feeding (43.8% vs 41.4%) • Duration of breastfeeding 6 weeks or more (I: 89.8% vs C:88.2%), duration before cessation (I: 7 days vs C: 14 days) • Introduction of solids • Unhealthy foods score Parenting Skills • Anticipatory parenting score • Prenatal attachment score • Prenatal role strain • Household smoking Maternal-Child interaction • Maternal sensitivity • Maternal intrusiveness • Child responsiveness • Child positive & negative affect scores Maternal psychosocial health • Psychological distress • Depressive symptoms • Post-natal depression • Adaptive functioning Family functioning • Mother and child living apart • Intimate partner violence • Family resources Maternal life-course

		• Subsequent child-bearing (24 months) • Formal education (enrolment and hours) • Employment • Welfare use Use of children's centre, toddler group, social worker, Connexions personnel,
Corbacho (2017)	POSITIVE TREND • QALYs marginally higher for intervention group, mean difference 0.0036, 95% CI: -.017 to 0.025	

Miller Early Childhood Sustained Home visiting program – Parent Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Kemp (2011)	SIGNFICANT MAIN EFFECTS Breastfeeding • Duration I: 16.2 weeks vs C: 8.24 weeks, mean difference 7.88, 95% CI 2.89 to 12.88, *d*=0.49, *p*=0.002 Quality of the home environment (12 to 24 months) • Responsivity, *d*=0.26, *p*=0.02 POSTIVE TREND OR SUBGROUP EFFECT Breastfeeding • Overseas born duration I:26.64 weeks vs C:11.67 weeks, *d*=0.87, *p*<0.001 Quality of the home environment (12 to 24 months) • Responsivity - first time mothers, *d*=0.29, *p*=0.01 ->1 risk factor, *d*=0.21, *p*=0.05 -distressed, *d*=0.24, *p*=0.02 • Organisation of environment ->1 risk factor, *d*=0.19, *p*=0.07 -Distressed, *d*=0.29, *p*=0.01 • Provision of appropriate play materials -first time mothers, *d*=0.34, *p*=0.003 -Australian born, *d*=0.22, *p*=0.04 ->1 risk factor, *d*=0.20, *p*=0.06 -distressed, *d*=0.23, *p*=0.03	NULL Immunisation status (6-24 months) Smoking • Smoke-free household (0-24 months) • Mother never smoked (0-24 months) • Mother gave up smoking (0-24 months) Parent-Child interaction (Free-play observation in clinic environment) The National Institute for Child Health and Development scales • Sensitive stimulating parenting • Detached flat parenting • Engaged child Quality of home environment (HOME) • Avoidance of restriction and punishment Maternal Health and Family Outcomes (0-24 months) • SF-12 (physical and mental subscales) • Depression (EDS) • Social Support • Life Events Inventory • Family functioning (McMaster Family Assessment Device)

	• Maternal involvement -first time mothers, *d*=0.29, *p*=0.02 • Variety in daily stimulation -1 risk factor only, *d*=0.19, *p*=0.07 Maternal Satisfaction • First time mothers, *d*=0.59, *p*=0.02 • Overseas born, *d*=0.54, *p*=0.003 • Distressed, *d*=0.38, *p*=0.05 Maternal Health • Self-report general health at 4-6 weeks post-partum, I: 51% very good or excellent health' vs C: 35%, *d*=0.44, *p*=0.03 •	
Kemp (2013)	POSITIVE SIDS Prevention (n=137) • Knowledge (I: 83.3% vs C: 68.3%, h=.35, *p*=0.04) POSITIVE TREND Birth outcomes • Type of delivery, *p*=0.07 -unassisted vaginal (I:80.2% vs C: 68.8%, h=.25) -assisted vaginal (I:2.8% vs C: 9.7%, h=.30) -caesarean section (I:17% vs C:21.5%, h=.13) Maternal Health • Pregnancy-induced hypertension, h=.40, *p*=0.05	NULL SIDS Prevention (n=81) • Sleep area conforms with SIDS recommendations (I:51.2% vs C:44.7%, h=.12, *p*=0.66 Breastfeeding • Initiation • Fully or partly at 4 weeks Maternal Health • Genitourinary infections in pregnancy Gestational diabetes

Minding the Baby – Parent Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Sadler (2013)	SIGNIFICANT MAIN EFFECTS Childbearing patterns (interview and health records) • birth within 24 months of previous birth, I:1.6% C:15%, *p*=0.019 Immunisation • Compliance with Centers for Disease Control Immunisation Guidelines at 12 months (no statistics reported) Well child check ups • At 12 months (no statistics reported)	NULL Maternal mental health (12 months & 24 months) • Center for Epidemiological Studies Depression Scale (CES-D) • Brief Symptom Inventory Short form (BSI) • Parental Bonding Instrument (PBI) Immunisation • Compliance at 24 months Well child check ups • At 24 months

	POSITIVE (FOR TEEN MOTHERS <20 YRS) Mother-Child Relationship • Disrupted communication (Atypical Maternal Behaviour Instrument for Assessment and Classification- AMBIANCE) at 4 months, (I: 66.6% vs C: 93.8%, *p*=0.05, OR=0.84, 95% CI: 0.01 to 1.01) POSITIVE (FOR LOW EDUCATION MOTHERS ONLY) Reflective functioning over 24 months • Time effect for intervention group, *p*=0.05 • No time effect for control group, *p*=ns	

Nurse-CHW model

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Meghea (2013)	NA	NA
Roman (2009)	SIGNIFICANT MAIN EFFECTS Maternal psychosocial health (CES-D, up to 15 months) • Fewer depressive symptoms (-2.4, *p*=0.04) POSITIVE OVERALL TRENDS Maternal psychosocial health (CES-D, up to 15 months) • Less perceived stress (-3.3, *p*=0.06), • higher mastery (2.9, *p*=0.06) POSITVE SUBGROUP EFFECTS (low psychological resources women) • depressive symptoms (-4.0,*p*=0.02) • stress (-5.8,*p*=0.02).	NULL Maternal psychosocial health • self-esteem • social support

NFP – Parent Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Miller (2015)	SIGNIFICANT MAIN EFFECTS Pre-eclampsia • Elmira and Memphis pooled (I:10.6% vs. C:17.7%, *p*<0.001) Prenatal smoking	NULL Miscarriage in subsequent pregnancies, *p*=0.14 Intimate Partner Violence at child age 6 and 9 years

	• Elmira (p<0.01), Memphis (ns), Denver (p=<0.05) Breastfeeding initiation • I: 28.5% vs C:18.8%, 51.3% relative risk difference, 95% CI 17.8% to 94.3%. Maternal depression • Denver only, 66% reduction Intimate partner violence (0-4years) • Pooled results from Denver, Memphis, Louisiana trial (I:10.9% vs C:13.7%, relative risk decline 20.6%, 95% CI 1.1% to 36.1%. Subsequent childbirth (0-24 months) • Pooled from Elmira, Memphis, and Denver trials: (I: 16.8% vs C:28.0% relative risk decline of 39.9%, 95% CI 23.5% to 52.7%, p<0.001). Abortion within 48 months • Pooled from Elmira, Memphis, and Denver trials: I: 5.3% vs C: 8.7%, relative risk decline of 38.2%, 95% CI 3.3% to 61.8%, p=0.034. TANF payments • Elmira (age 0-15 years, p=0.05) Food Stamps • Elmira (0-15 years, p=0.03) • Memphis (0-12 years, p<0.01)	• Pooled for Memphis and Denver, age 6 p=0.36, age 9 p=0.43 Maternal depression • Memphis 9 years • Elmira 15 years Full immunisation • Elmira (child age 2, whites only, p=0.14) • Memphis (child age 2, p=0.60) Maternal criminal offences • Elmira NFP 70% lower at 15 years, but Memphis 36% higher at 12 years TANF payments • Memphis (age 0-12) • Denver (age 0-4) Food Stamps • Denver (age 0-4) Income Eligibility for Medicaid • Elmira (0-15), Memphis (0-12), Denver (0-6), all ns
Olds (2008)	POSITIVE (statistics not reported in this paper) Maternal Health • Fewer instances of pregnancy induced hypertension (Elmira) • Greater reduction in pre-natal smoking (Elmira and Denver) Parenting • Attempted breastfeeding (Memphis) • Fewer beliefs about child-rearing associated with abuse and neglect by 24 months (Memphis) • Homes more conducive to child development (at 24 months, Elmira and Memphis; trend in Denver) Parent life-course	NULL Prenatal health • Memphis: no overall effect on prenatal care or obstetric emergency services • Prenatal smoking (Memphis) Parenting • Duration of breastfeeding (Memphis) Parental life-course • At 15-year follow-up, no overall program effect on subsequent pregnancies or births, receipt of welfare, or months of employment (Elmira).

	• At 24 months, fewer subsequent pregnancies (Memphis, Denver) • Fewer months on welfare by child age 2 years (Memphis) • At 4-5 years follow-up, fewer subsequent pregnancies, therapeutic abortions, and longer intervals between births; less welfare use, higher rates of living with biological father of child and partners employed longer (Memphis) • By child age 4, longer intervals between birth, less domestic violence (Denver) • At 6 years and 9 years, fewer subsequent pregnancies, longer intervals between births, longer relationships with current partner, fewer months on welfare (Memphis) POSITIVE SUBGROUPS Parenting • By child age 2, among low-resource mothers, NFP more communicative and responsive than comparison (Memphis, Denver) Parental life-course • By child age 4, among low-income, unmarried women fewer pregnancies, longer intervals between births, and greater workforce participation (Elmira, no statistics provided) • At 15 year follow-up, poor unmarried women in NFP had fewer subsequent births, longer intervals between children, fewer months on welfare, fewer months receiving food stamps, and fewer behavioural problems due to substance use, fewer arrests (Elmira)	
Olds (2010)	SIGNIFICANT MAIN EFFECTS Maternal physical health and health behaviour • Role impairment due to alcohol, tobacco and other drug use at	NULL Maternal physical health and health behaviour

	child age 12 years: I: 0.0% vs C: 2.5%, *p*=0.04 Psychosocial health • Maternal mastery, measured from 6 months to 12 years postpartum was significantly higher among NFP than comparison mothers (I: M=101.04, SD=.43 vs C: M=99.6, SD=.28, *p*=0.005, diff= 1.44, 95% CI= 0.43 to 2.45 Family structure/Living arrangements • longer partner relationships (measured at child age 6, 9, and 12 years I: 59.58 months vs C: 52.67 months, *p*=0.02, difference =6.91 95% CI 1.07 to 12.75. Welfare use • Over the period 0-12 years, NFP mothers reported less use of food stamps (Means = 6.27 vs 6.86; Std Errors = 0.19 vs 0.13, *p*=0.01, difference -.59 95%CI -1.04 to -.13) and AFDC-TANF (Means = 4.97 vs 5.47; SE= 0.21 vs 0.14, *p*=0.05, difference -.50 95% CI -1 to 0.00). POSTIVE TREND Family structure • proportion of children placed in foster care from birth to 12 years I: 0.04 vs C: 0.12, 3.3 95% CI 0.86 to 12.88, *p*=0.08 POSITIVE SUBGROUP (high resource mothers) • fewer subsequent pregnancies and longer intervals between births at 12 years, *p*=0.04	• Alcohol, tobacco and drug use at child age 12 years, (9.6 vs 10.4%, *p*=0.76). Psychosocial health • At 12 years, the proportion of mothers reporting symptoms of psychological distress was I: 18.4% vs C: 17.1%, *p*=0.75, OR 1.09, 95% CI 0.64 to 1.85. Family structure and functioning • At child age 12 years, no program effects emerged on the percentage of women co-habiting, partnered or married to the child's biological father (9.7% vs 6.7% for NFP vs Comparison), *p*=0.20. • At 9-12 years, No effect on Intimate Partner Violence, (I: 22.2% vs C: 21.3%, *p*=0.81 Subsequent child birth • No effect, *p*=0.76 Welfare use • Medicaid use from 0-12 years, nor any of the 3 measures (Medicaid, AFDC-TANF, Food stamps) from child age 10-12. Employment • time employed from child age 2 to 12 years, I: 4.50 vs C: 4.64 months, SE=.18 vs 0.12, respectively, *p*=0.54). Criminal involvement • from birth to child age 12 years, no program effect on number of women jailed (I:12.8% vs C: 13.2%, *p*=0.9), or arrested (.49 vs .36, *p*=0.15).
Olds (2014) Memphis	POSITIVE Mortality at 20 year follow up: • maternal all-cause mortality was 2.2% (SE=0.97%) in the SNHV condition, compared with 3.7% (SE=0.74%) for those receiving no visits, and 0.4% (SE=0.43%) for those receiving prenatal and only 2 post-partum visits. The contrast between SNHV and no visiting was	NULL Mortality at 20 year follow up: • SNHV vs no visiting External mortality at 20 year follow up: • sustained nurse visiting vs no visiting

	not significant, *p*=0.19, but the contrast between the combined no visiting conditions, and combined visiting conditions was, *p*=0.008. • external-cause mortality (unintentional injury, suicide, drop overdose, homicide), 0.4%(SE=.44%) of mothers in the SNHV condition had died in the 21 year period following trial enrolment, compared with 1.7% (SE=0.51%) in treatment 1 and 2 combined (no visiting), and 0% in treatment 3 (limited nurse visiting-prenatal + 2 post-natal visits). The contrast between no-visiting and any-visiting was significant, *p*=0.02, but the contrast of sustained visiting with no visiting was not, *p*=0.18. The lack of effect for sustained vs no visiting may be due to limited power to detect an effect.	

Pro Kind – Parent Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Jungmann (2009)	None	NULL Parenting • Nicotine, alcohol and drug use, no statistics reported Maternal mental health • DASS, no statistics reported
Sierau (2016)	SIGNFICANT MAIN EFFECTS • Maternal attachment, 12 months, (Ms=3.45 vs 3.38, SDs=.03 in both conditions), *p*<0.05 • Partnership satisfaction, 6 months, (I:M=3.24, SD=.04 vs C:M=3.15, SD= .04,) *p*<0.05 • parental self-efficacy at 12 months, (I: M=3.71 SD=0.3 vs C:M=3.63, SD=0.03) *p*<0.044 • maternal stress at 12(I: M=1.72 vs C: M=1.80, SDs= .02, .03) and 24 months (I:M= 1.76 vs C:1.86, SDs .03, .03), *p*<0.05 POSITIVE TREND	NULL • Partnership satisfaction at 36 weeks pregnant, 12 months, 24 months • parental self-efficacy at 36 weeks pregnancy and 6 months post-partum • Parenting style (12, 24 months) • mother-child affectivity and mother-child responsivity (assessed at 6, 12, and 24 months), • maternal empathy (assessed at 24 months) • belief in control at 36 weeks, 6 months, 12 months or 24 months

	• Social support Time x Treatment effect (p=0.05) intervention mothers maintained levels of perceived, control experienced a reduction. • Child rearing knowledge Time x Treatment effect, p=0.062	• Subsequent pregnancies • Education

Right@Home - Parent Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Goldfeld (2018)	SIGNIFICANT MAIN EFFECTS (at child age 2 years) Parent Care • Safety of the environment (ES=0.16, p=0.016) • Regular bedtime (OR=1.68, p=0.002), • Warm parenting (ES=.21, p=0.010) • Hostile parenting (ES=-.025, p<0.001) HOME assessment • Facilitation of child's learning (ES=0.22, p=0.001) • Variety in experience (ES=0.18, p=0.016)	NULL (at child age 2 years) Parent Care: • Food choices • Regular mealtimes • Regular bed routine HOME assessment • Parent responsivity • Acceptance of the child • Learning material

VoorZorg – Parent Outcomes

Short Title	POSITIVE EFFECTS	NEGATIVE OR NULL EFFECTS
Mejdoubi (2013)	SIGNIFICANT MAIN EFFECTS Conflict Tactics Scale (32 weeks of pregnancy, participant is victim) • level 2 (severe) psychological aggression (I: 39% vs C:56%, OR:0.55 95%CI 0.32 to 0.94, p<0.05); • level 1 physical assault (40% vs 58%, OR: 0.38, 95% CI 0.22 to 0.66, p<0.001), • level 2 physical assault (20% vs 31%, OR: .57, 95% CI 0.32 to 0.99, p<0.05), • level 1 sexual coercion (8% vs 16%, OR: 0.47, 95% CI 0.19 to 0.90, p<0.05), • multiple types of intimate partner violence (19% vs 31%, OR:0.49, 95% CI 0.28 to 0.86, p<0.05). These effects were all statistically significant.	NULL Conflict Tactics Scale (32 weeks of pregnancy, participant as victim) • level 1 psychological aggression (100% both arms), • level 2 sexual coercion (7 and 6%), • level 1 injury (16% vs 26%). • level 2 injury (both arms 5%). Conflict Tactics Scale (32 weeks of pregnancy, participant as perpetrator) • level 1 psychological aggression • level 2 physical assault level 1 &2 sexual Conflict Tactics Scale (24 months post-partum, participant as victim, Intervention vs Comparison) • level 1 injury (16% vs 23%), • level 2 injury (2% vs 9%), • level 1 sexual coercion (8% vs 15%),

	Conflict Tactics Scale (32 weeks pregnant, participant as perpetrator) • level 2 psychological aggression (46% vs 60%, OR: 0.57, 95% CI 0.35 to 0.94, *p*<0.05) • level 1 physical assault (52% vs 65%, OR: 0.57, 95% CI: 0.34 to 0.95, *p*<0.05) • > 2 forms of violence (19% vs 31%, OR:0.53, 95% CI: 0.30 to 0.94, *p*<0.05) POSITIVE Conflict Tactics Scale (24 months post-partum, participant as victim) • level 1 physical assault (26% vs 44%, OR: 0.46, 95% CI 0.24 to 0.89, *p*<0.05) Conflict Tactics Scale (24 months, participant as perpetrator) • level 1 sexual coercion (3% vs 18%, OR: 0.10, 95% CI 0.02 to 0.56, *p*<0.01) • mean combination of IPV forms (Ms=1.3 vs 1.7, SDs0.1 vs 0.16, 0.40, 95% CI: -0.07 to 0.03, *p*<0.05)	• level 2 psychological aggression (35% vs 47%) • level 2 physical assault (17% vs 25%) • experience of more than 2 types of violence (23% vs 36%). • level 2 sexual coercion (8% vs 5%)) • level 1 psychological aggression (74% vs 73%) Conflict Tactics Scale (24 months post-partum, participant as perpetrator) • level 1 & 2 psychological aggression • level 1 & 2 physical assault • level 2 sexual coercion • level 1 & 2 injury • >2 forms IPV
Mejdoubi (2014)	POSITIVE Self-reported smoking (32 weeks pregnant) • Intervention vs Control using last observation carried forward to address missing data (40% vs 48%, OR: 0.5, 95% CI 0.3 to 0.9, *p*=0.03) Self-reported smoking (2 months post-partum) • Fewer smokers: Intervention vs comparison group (49% vs 62%, OR: 0.5, 95% CI 0.3 to 0.9, *p*=0.02) • Average number of cigarettes smoked per day: Intervention vs control arm (mean 4 +/ sd 7 vs mean 8 +/sd 10, respectively). Beta=4; 95% CI 1.0 to 7.9., *p*=0.01. • Number of cigarettes smoked near the baby: Intervention (M=0, SD=0) comparison (M=2, SD=5),	NULL Breastfeeding initiation • Proportion initiating (78% comparison vs 82% intervention, OR 1.3, 95% CI 0.7 to 2.4),

	beta = 1.6, 95% CI 0.2 to 0.1, *p*=0.03. Breastfeeding • Proportion continuing at six months greater for intervention than comparison (13% vs 6%, OR 2.6, 95% CI 1.0 to 6.8, *p*=0.04).	
Mejdoubi (2015)	SIGNIFICANT MAIN EFFECTS Home Observation Measurement of the Environment (24 months) • Intervention (M=38.3, SD=4.8) vs Comparison (M=36.4, SD=5.9), Relative Risk 1.98, 95% CI 0.16 to 3.8, *p*<0.05).	NULL Home Observation Measurement of the Environment • At 6 months • At 18 months

Appendix F: Meta-analyses overviews

Casillas et al 2016:	
Number and type of studies included	156 studies of 97 distinct samples, published between 1946 and 2015 Interventions included 9 universal and targeted evidence-based home visitation programs delivered by professionals or paraprofessionals for families with children 0-5 years (Early Head Start, Healthy Families America, Healthy Start, Healthy Steps, HIPPY, NFP, Parents as Teachers, Play and Learning Strategies, SafeCare)
Outcomes assessed and overall findings	Outcome areas included: parent knowledge and attitudes, positive parenting, negative parenting, maltreatment, family relationships and environment, parent promotion of child health, parent functioning, birth outcomes, child behaviour, child social development, and child cognitive functioning. The number of samples for each outcome ranged from 15 to 51. Overall, unweighted mean effect sizes suggested home visiting programs positively impact parent knowledge and attitudes (*d*=0.21), positive parenting (*d*=0.26), negative parenting (*d*=0.11), parent promotion of child health (*d*=0.14), parent functioning (*d*=0.06), and child social (*d*=0.07) and cognitive (*d*=0.19) functioning Moderators: 18 implementation factors (covering staff selection, training, supervision, and fidelity monitoring); 4 study characteristics (publication type, study design, comparison group, target population)
Components related to higher overall program effectiveness:	• Staff training (role-playing) • Reflective supervision • Supervision with observation Supervisor with specific training to supervise • Monitoring of program fidelity (occasional or once off) • Fidelity monitored by independent raters • Fidelity focused on quality of home visitor
Quality	High
Filene et al 2013:	
Number and type of studies included	51 articles (range of 9 to 32 studies for each outcome area), published between 1979 and 2010. Interventions included universal and selective home visiting programs implemented in the United States and delivered by either professional or paraprofessional visitors to pregnant women and families with children from birth to 3 years of age.

Outcomes assessed and overall findings	Six areas: birth outcomes, parenting behaviour and skills, maternal life course, child cognitive outcomes, child physical health, and child maltreatment. Overall, a small effect of home visiting programs was observed (*d*=0.20). Effect sizes were positive and significant for: child cognitive outcomes, parent behaviours and skills, and maternal life course outcomes. Moderators assessed: Content components, delivery components, 5 study characteristics
Components shown to be effective on more than one outcome:	• Teaching sensitive and responsive parenting • Teaching discipline and behaviour management • Teaching problem solving techniques
Quality	High
Nievar et al 2010:	
Number and type of studies included	29 studies (N=6,453 families) published between 1980 and 2008 Interventions included home visiting programs targeting at-risk families and lasting at least 1 year (average length of client enrolment was 19.2 months), delivered by licensed professionals (nurses, social workers, counsellors) or paraprofessionals.
Outcomes assessed and overall findings	Maternal parenting behaviour (such as maternal sensitivity, stimulation, parenting practices). A positive effect was reported (weighted mean effect size = 0.37) Moderators assessed: country of program, frequency of visits, training of home visitors, date of study, number of participants
Components shown to be effective:	• Visit frequency: at least 2 visits per month (*d*=0.27), at least 3 visits per month (*d*=0.58)
Quality	Moderate

Appendix G: Quality, Participation and Quantity SNHV Indicators

Quality indicators for SNHV programs

NURSE HOME VISITING		
Content	**Process**	**Provider**
QL A supported SNHV program is offered		
QL 1 % of visits addressing home learning (e.g. talking, reading)	**QL 8** % of families who have their aspirations and goals documented	**QL 24** % of nurse home-visitors with specialised child & family training and at least 2 years nursing experience
QL 2 % of visits addressing parenting issues (e.g. sensitive and responsive parenting, behaviour and discipline)	**QL 9** % of families with continuity of care	**QL 25** % of nurse home-visitors with program/service specific training
QL 3 % of visits in which problem-solving skills are taught	**QL 10** % of families with reported improvement in documented goals	**QL 26** % of staff provided training which included role playing exercises
QL 4 % of antenatal & early post-partum visits where breastfeeding education/support is offered	**QL 11** % of NESB families receiving a translated version of the program/service and/or support from an interpreter	**QL 27** % of staff receiving weekly supervision including reflection (on experiences, thoughts, and feelings about visit) and not merely administration or case-management
QL 5 % of visits that focused on at least one of the key issues identified by the parent as a priority area on referral/enlistment	**QL 12** % of new staff observed implementing the program and assessed for quality	
QL 6 % of families offered program specific support from evidence-based programs (e.g. Triple P; Crib to Cradle; Promoting First Relationship; Smalltalk; Learning to Communicate)	**QL 13** % of women who are asked about their smoking status (and % recorded)	**QL 28** % of staff who have received Family Partnerships Training or an equivalent working in partnership with families program
QL 7 % of families provided information about local and free or low cost community engagement opportunities (e.g. play groups; toy libraries; pram walking sessions; library rhyme or story time)	**QL 14** % of women who are asked about the status of their mental health (and % recorded)	**QL 29** % of nursing staff who have undertaken professional development relevant to their current work in the past 12 months
	QL 15 % of women who are asked about family violence (and % recorded)	**QL 30** % of supervisors provided supervision-specific training
	QL 16 % of women who are asked about alcohol & substance abuse (and % recorded)	**QL 31** % of staff with caseloads as defined by the program/service
	QL 17 % of women with a mental health problem who are referred for psychological intervention	**QL 32** % of staff provided access to multi-disciplinary support
	QL 18 % of women experiencing domestic violence who are referred to an evidence-based support service	**QL 33** % of staff provided training in cultural competence
	QL 19 % of women with drug or alcohol problems referred to an evidence-based support service	
	QL 20 % of women experiencing financial difficulty provided information about avenues for assistance	
	QL 21 % of women given opportunity to provide nurse feedback during program/service implementation	
	QL 22 % of women given opportunity to provide confidential program feedback	
	QL 23 % of women who rate the program and nurse-family relationship highly (average score >80% on satisfaction measures) on exit survey (administered regardless of completion)	

Abbreviations: QL, quality indicator; SNHV, Sustained Nurse Home Visiting; NESB

Participation indicators for SNHV programs

NURSE HOME VISITING	
Participation	
Overall attendance	Frequency of visits
P % of mothers living in adversity who attend a high quality NHV program	
P1 % of women receiving at least 25 home visits by child age 2 years	**P9** % of pregnant women who are visited at home at least twice in the 3rd trimester
P2 % of women retained in program to child age 2 years	**P10** % of women visited at least weekly in the first month following birth
P3 % of women receiving at least 15 home visits by child age 1 year	**P11** % of women visited at least fortnightly to child age 3 months
P4 % of women receiving no more than 10 HV in the 2nd year	**P12** % of pregnant women from disadvantaged groups (HCC, refugee, ATSI, NESB) who are visited at home at least twice in the 3rd trimester
P5 % of funded hours delivered	**P13** % of women from disadvantaged groups (HCC, refugee, ATSI, NESB) who are seen at least weekly from birth to child age 1 month
P6 % of women living in adversity	
P7 % of eligible ATSI women accepting a place	
P8 % of eligible women from NESB accepting a place	

Abbreviations: ; P, participation indicator ; ATSI, Aboriginal or Torres Strait Islander; HCC, health care card; NESB, Non-English speaking background

Quantity indicators for SNHV programs

NURSE HOME VISITING	
Quantity	
Health infrastructure	Health workforce
QN 1 Number of Maternal and Child Health centres by suburb per 10, 000 women of child bearing age	**QN 4** Maternal and Child Health nurse density Number per 10, 000 women of child-bearing age
QN 2 Funded SNHV program places Number per 1, 000 pregnant women	**QN 5** Social care practitioner density Number per 10, 000 women of child-bearing age
QN3 Funded SNHV program hours Number per 1, 000 pregnant women	**QN 6** Community health worker density Number per 10, 000 women of child-bearing age

ACKNOWLEDGEMENTS

Restacking the Odds wishes to acknowledge the contributions made by the following individuals in the preparation of this report. Professor Lynn Kemp (Western Sydney University) and Professor Graham Vimpani (University of Newcastle) provided expert guidance and feedback on the indicators developed to assess SNHV quality, participation and quantity. Jun Guo (MCRI) and Caitlin Macmillan (MCRI) assisted by performing quality and bias checks on the papers selected for inclusion in the literature review.

This work is copyright. No part may be reproduced by any process except in accordance with the provisions of the Copyright Act 1968.