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Systematic review: An exploration of core componentry characterizing effective sustained nurse home visiting programs

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Article type : Review

Abstract

Aims: To identify the core components or potential ‘active ingredients’ of sustained nurse home visiting (SNHV) programs that have demonstrated positive effects on maternal or child health, psychosocial development, or self-sufficiency outcomes among disadvantaged families in high-income countries.

Design: Systematic review with narrative summary.

Data sources: Programs were identified from searches of several reputable evidence clearinghouses and the following bibliographic databases: Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO and Cochrane Central Register of Controlled Trials. Year of publication was originally restricted from 2008 to 2018, with additional searches conducted up to 2019.

Review methods: This review of SNHV program componentry builds on a previous evaluation of program effectiveness. Programs were selected for inclusion if they had been tested in a randomized or cluster-randomized controlled trial (RCT/CRCT). Componentry characteristics related to program delivery, nurse provider and outcome-specific intervention content were then extracted.

Results: Comparison of the seven eligible programs showed seven common core components: antenatal commencement, support to child age 2 years, at least 19 scheduled visits and experienced or highly qualified nurses with program-specific training, caseloads of approximately 25 families, regular supervision and multi-disciplinary supports. Outcome-specific program content was generally not well-reported.

Conclusion: The findings from this review have utility in guiding the development of minimum standard benchmarks and best-practice recommendations for SNHV programs and call for more detailed publication of core content componentry in the SNHV literature.

Impact: Identification of the core componentry underpinning program effectiveness should inform policy decisions on program selection, adaptation for specific populations and quality control. Such evidence-based decision making should in turn lead to better maternal and child outcomes among disadvantaged families in high-income countries, reducing societal and economic burdens of inequity.

Key words: active ingredients, adverse childhood experiences, child health, home visiting, maternal health, nurses, parenting behavior, program componentry, psychosocial development, systematic review

1 INTRODUCTION

Children who experience early adversity (e.g. poverty, maltreatment, exposure to domestic violence, parent mental health difficulties) are at increased risk of further disadvantage across a range of domains including health, psychosocial functioning, education and economic prospects (Goldfeld & Hayes, 2012; Hughes et al., 2017; Shonkoff, 2012; Shonkoff & Phillips, 2000). The detrimental effects of social and economic disadvantage cause considerable and persistent individual suffering and substantive societal burden (Doyle, Harmon, Heckman, & Tremblay, 2009 ; Woolfenden et al., 2013). Early intervention to address childhood disadvantage and subsequent inequities makes moral, biological and economic sense (Bullock, 2019; Doyle et al., 2009 ; Heckman, 2006; Shonkoff & Phillips, 2000). As parents play a critical role in the early stages of child growth and development, interventions that offer support and skill development for parents are well-placed to shift the life course trajectories associated with childhood adversity and inequities.

1.1 Background

With a history dating back to the late 1800s (Duffee, Mendelsohn, Kuo, Legano, & Earls, 2017) nurse home visiting represents a parent skill development strategy designed to promote health equity through a focus on disadvantaged families and on prevention and early intervention. Sustained Nurse Home Visiting programs (SNHV) are delivered by nurses or midwives, over an extended period, often at least two years. The theoretical underpinnings of such programs typically include human ecology (Bronfenbrenner, 1979), self-efficacy

(Bandura, 1977) and human attachment (Bowlby, 1969). The effects of SNHV programs, relative to usual services, have been tested in randomized controlled trials (RCTs) since the 1970s across several countries and health care system contexts. Such evaluations have been conducted in the USA (Olds, 2008), UK (Robling et al., 2016), Australia (Goldfeld, Price, & Kemp, 2018; Goldfeld et al., 2019; Kemp et al., 2013), Germany (Jungmann et al., 2015) and the Netherlands (Mejdoubi et al., 2015), with all reporting positive effects across a range of maternal outcomes (Molloy, Beatson, Harrop, Perini, & Goldfeld, 2020).

Internationally, government investment in home visiting programs is high (Avellar & Supplee, 2013; Corbacho et al., 2017; Sandstrom, 2019; Stamuli, Richardson, Duffy, Robling, & Hood, 2015) and implementation of SNHV programs is a popular policy option (Kemp et al., 2019). For example, the Maternal and Early Childhood Sustained Home-visiting (MECSH) program has been rolled out in several parts of Australia, the UK and South Korea (Kemp anderson, Travaglia, & Harris, 2005; Kemp, Cowley, & Byrne, 2017). Similarly, the Nurse Family Partnership (NFP) has been adapted for use in several countries and serves more than 40,000 US families annually (Nurse-Family Partnership, 2018). While both programs are supported by the evidence, adaptations to suit local contexts are both pervasive and necessary (Kemp, 2016). As such, it is imperative that researchers identify the core components underpinning effective evidence based SNHV programs (Filene, Kaminski, Valle, & Cachat, 2013; Kemp, 2016; Sandstrom, 2019). Core components include aspects of delivery, provider characteristics and specific content. Identification of core components is also important for the purposes of developing new programs, improving existing programs, monitoring implementation quality and shaping public health policy.

Program componentry has been explored in the broader home visiting literature (which incorporates programs of shorter duration, that do not specifically target disadvantaged/vulnerable families and are often delivered by paraprofessionals rather than nurses). Several meta-analyses capitalizing on this broader literature (Casillas, Fauchier, Derkash, & Garrido, 2016; Filene et al., 2013; Nievar, Van Egeren, & Pollard, 2010) have identified important factors but the findings have been mixed and in some cases the influence of certain factors has been difficult to assess (e.g. due to insufficient data, inadequate description of program details). In one meta-analysis (Nievar et al., 2010), more frequent home visiting was associated with larger effects on maternal behaviours (e.g. responsive parenting), while another found several implementation factors (related to staff training, supervision and fidelity monitoring processes) were associated with program effectiveness

(Casillas et al., 2016). A third meta-analysis provided evidence that specific content (e.g. problem solving, developmental norms and appropriate expectations, discipline and behaviour management strategies and responsive and sensitive parenting) is associated with program effectiveness (Filene et al., 2013). Despite this relatively robust evidence base, it is unclear to what extent such findings apply to SNHV programs. For some time now, there have been calls to elucidate the core components of nurse home visiting programs more specifically. In a review of 13 nurse home-visiting studies some 15 years ago, McNaughton et al observed that:

“Without explication of specific interventions, home visiting remains a “black box” or an unknown intervention, impossible to replicate and therefore limiting the value of many experimental studies for influencing public policy and nursing practice.”

(p.217) (McNaughton, 2004).

Identification of key componentry has significant implications for practice and yet no systematic review has critically analysed the characteristics of effective SNHV programs to identify core components. Policy-makers and public health practitioners need to know what qualities are likely instrumental in the success of SNHV programs so that measures can be taken to ensure appropriate selection, adaptation and high-quality implementation of programs (Kemp, 2016); paving a way forward that focuses on quality implementation and either complements or is independent of proprietor licencing arrangements.

2 THE REVIEW

2.1 Aims

This investigation builds on a previously published systematic review of SNHV program effects on maternal and child outcomes (Molloy et al., 2020). It aims to identify the core components of effective SNHV programs, with a view to informing subsequent development of quality indicators for best-practice implementation in SNHV programs, based on the highest levels of evidence. To this end, we focus on SNHV programs that have demonstrated positive effects in RCTs or cluster-RCTs. In the absence of experimental manipulation of core components, identification of those common to the most rigorously tested programs that have demonstrated positive effects should be instructive.

The research questions investigated are:

1. What aspects of program componentry (such as program-level structure and provider characteristics) do the most rigorously tested and effective SNHV programs have in common?
2. What specific program content (and its delivery) might plausibly account for the effectiveness of rigorously tested SNHV programs on the relevant outcomes?

2.2. Design

Following best-practice guidelines for systematic reviews (Kelly, Moher, & Clifford, 2016; Liberati et al., 2009; Pluddemann, Aronson, Onakpoya, Heneghan, & Mahtani, 2018), the protocol for this study was established prior to its conduct and registered with PROSPERO (Molloy et al., 2020). In accordance with the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009), a detailed account of the data sources, study selection, data abstraction and quality assessment procedures has been published in a previous paper comparing SNHV effects on child and maternal outcomes (Molloy et al., 2020). The present study investigates the program componentry underpinning the SNHV programs included in that review. Data extraction occurred concurrently for both the investigation of program effectiveness and program componentry.

2.3 Search methods

The initial search was conducted across 4 electronic databases (Medline, CINAHL, PsycINFO and the Cochrane Central Register of Controlled Trials) and covered a period of 10 years (from January 2008 to mid-February 2018). The search strategy was designed by two experienced reviewers (RB, CM) and took the form: (social disadvantage) AND (mother, infant) AND (home) AND (nurse) AND (study design). Search terms are detailed in the registered protocol and online supplementary material (see Table S1). Additional publications were identified by searching the reference lists of included studies, consulting content experts, maintenance of a Mendeley library alert and google scholar searches for each of the included SNHV programs (up until September 2019).

Several reputable evidence clearinghouses (HOMVEE; Blueprints for Healthy Youth Development; California Evidence-Based Clearinghouse for Child Welfare; and Promising Practices Network on Children Families and Communities) were also searched using the terms 'nurse' and 'home visit'.

2.4 Selection criteria

Journal articles were included if they described a program that: (a) commenced during pregnancy or prior to the child's first birthday; (b) had an intended duration of at least 12 months; (c) was predominantly (To be considered predominantly nurse-delivered at least 50% of the program content had to be delivered by nurses, or 50% of program participants had to receive content from nurses.

) delivered by registered nurses or midwives visiting women face to face in their homes; and (d) had been trialled in an RCT or CRCT, comparing the program with usual services.

Programs were excluded if they (a) did not specifically target disadvantaged mothers, (b) recruited only clinical subgroups (e.g. mothers with post-natal depression) or specific populations other than mothers (e.g. fathers only, foster carers), (c) were designed for families with children who had specific developmental disabilities or chronic illnesses, (d) aimed to address one specific outcome only (e.g. smoking, breastfeeding), (e) had been trialled only in low- or middle-income countries, (f) had not been compared with usual treatment, or (g) otherwise failed to meet our definition of SNHV. A list of excluded studies is published with the review of SNHV program effectiveness (Molloy et al., 2020).

2.5 Search outcomes

A random sample of 15% of the identified publications were double coded by an independent reviewer. At neither the title/abstract nor full-text stages of screening were there any discrepancies in retention or rejection decisions (i.e. 100% agreement).

As described elsewhere (Molloy et al., 2020), the database searches identified 1,933 unique publications. A total of 30 publications met inclusion criteria and an additional paper (Kemp et al., 2019) was identified following completion of the outcomes review, bringing the total to 31 publications.

2.6 Quality appraisal

Each program evaluation was assessed using an adapted version of the National Institute for Health and Care Excellence (NICE) quality appraisal checklist for quantitative intervention studies (NICE, 2012). This measure includes 23 items covering participant characteristics, allocation to trial arms, assessment of outcomes including blinding and analysis methods. Each item was scored 0, 0.5, or 1.0 and then summed to yield a total score. For pragmatic purposes, evidence quality was rated high for programs scoring at least 75% of the possible total, low for those scoring less than 50% and moderate in the range of 51% to 74%. It should be noted that even studies of relatively high quality may carry some risk of bias. As such,

readers are referred the online supplementary material accompanying the review of SNHV effects (Molloy et al., 2020) for more detailed study quality analysis. As is recommended practice for systematic reviews (Shea et al., 2017), details of trial funding and management of potential conflicts of interest were also checked.

2.7 Data abstraction

Information about the population, intervention, comparison condition, outcomes and study design, was extracted for each included publication. Population information included the country of evaluation, types of social disadvantage targeted and sample demographics. Intervention information covered service delivery processes (e.g. frequency and duration of intended and delivered visits), provider details (e.g. qualifications, years of experience, training, support) and program content (e.g. topics covered during visits, timing of specific interventions). Information about social validity (e.g. nurse/family satisfaction) and intervention cost was also recorded. Comparison conditions were described, and results were recorded for a range of child and maternal outcomes (spanning physical health, psychosocial development, parenting practices and maternal self-sufficiency). Very few sibling and paternal outcomes have been included in SNHV program evaluations. The full list of included outcomes is published elsewhere (Molloy et al., 2020). Where included publications indicated that program details were published prior to 2008 these earlier publications were also sourced.

2.8 Synthesis

To inform minimum standards and best-practice benchmarks for SNHV program implementation, this review compares process, provider and content componentry associated with the most rigorously tested SNHV programs. Delivery processes (e.g. timing, frequency and duration of visits) and provider characteristics (e.g. nurse qualifications, experience, training) are described for those SNHV programs that have demonstrated statistically significant positive program effects ($p < .05$) on at least one child or maternal outcome (in at least one moderate or high quality RCT or CRCT). The rationale for focusing on randomized trials was to increase confidence that effects could be attributed to programs and by extension, to the componentry of effective programs. As content componentry targets specific outcomes, we also considered it instructive to identify the relevant program content characterising programs that have demonstrated statistically significant and positive program effects on specific outcomes. That is, this review sort to document detailed information about

the interventions within SNHV programs that had positive effects on the specific outcomes targeted. For example, where a program had positive effects on breastfeeding, we sort to identify what information nurses had provided about breastfeeding, when it was provided and how often. This information was also sort for programs reporting null effects, with a view to comparing content across effective and ineffective programs. Although primarily descriptive, the synthesis of information across the selected programs is useful for discerning the componentry that is associated with positive effects, established in rigorously tested programs.

3 RESULTS

3.1 Characteristics of included studies

Thirty-one publications including two reviews met inclusion criteria. These studies identified seven SNHV programs: the Family Nurse Partnership (FNP; Corbacho et al., 2017; Owen-Jones et al., 2013; Robling et al., 2016), Maternal Early Childhood Sustained Home visiting program (MECSH; Kemp et al., 2007; Kemp et al., 2008; Kemp et al., 2013; Kemp et al., 2011); Minding the Baby (MtB; Ordway et al., 2014; Ordway et al., 2018; Sadler et al., 2013; Slade et al., 2019; Slade et al., 2005); Pro Kind (Brand & Jungmann, 2012, 2014; Jungmann et al., 2015; Jungmann, Ziert, Kurtz, & Brand, 2009; Sandner, Cornelissen, Jungmann, & Herrmann, 2018; Sandner & Jungmann, 2017; Sierau et al., 2016); right@home (Goldfeld et al., 2017; Goldfeld et al., 2018; Goldfeld et al., 2019; Kemp et al., 2019); VoorZorg (Mejdoubi et al., 2014; Mejdoubi et al., 2015; Mejdoubi et al., 2013; Mejdoubi et al., 2011); and Nurse Family Partnership (NFP; Kitzman et al., 1997; Miller, 2015; Olds, 2008; Olds, Henderson, Tatelbaum, & Chamberlain, 1986; Olds et al., 2002). Note that journal articles published prior to 2008 were selected only in cases where these were cited by studies meeting the inclusion criteria and considered necessary for ascertaining program componentry. For a detailed description of trial characteristics see Molloy et al. (2020).

As described previously (Molloy et al., 2020), study quality was rated high for four programs (MECSH, right@home, VoorZorg, FNP) and moderate for the remainder (Minding the Baby; Pro Kind; NFP). In moderate quality studies, it was unclear if potential sources of bias had been adequately addressed, however, there was no indication of systematically significant bias across the papers for any one program. All programs demonstrated a statistically significant and positive main effect on at least one child or maternal outcome (for details concerning subgroup effects and trends see Molloy et al. (2020)). Common

components are identified for process (Table S2, online supplement) and provider variables (Table S3, online supplement). Outcome-specific content is presented in Tables 2 and 3).

3.2 Process componentry

Process componentry was well-documented (with all programs including information about commencement, program and visit duration, number of intended and delivered visits and scheduling of visits). All SNHV programs commenced prenatally. Several enrolled women prior to the third trimester (Voor Zoorg, FNP, Pro Kind), whereas others allowed (MECSH, right@home, NFP) or required (MtB) later enrolment. All programs concluded at child age two years. The number of intended visits ranged from approximately 24 (MECSH, right@home) to 91 (MtB). The mean number of visits delivered ranged from 16 (MECSH) to more than 70 (MtB). All programs appear to offer at least three prenatal visits and most include weekly visits in the first four to six weeks following birth, with frequency of visits tapering out at different rates thereafter. It is worth noting that the right@home trial reported very high rates of uptake (97% commencement), completion (87% to child age two years) and engagement (72% received 75% of scheduled visits) (Kemp et al., 2019).

3.3 Provider componentry

For all seven programs, nurse visitors were certified and for all but one of the programs, nurses had either a post-graduate qualification or highly relevant prior experience working with disadvantaged communities or in the maternal and child health field specifically. Programs evaluated in high quality trials involved nurses delivering all the program curriculum (with families receiving supplementary support from social workers where indicated). In contrast, programs that alternated nurse and social worker visits or had been delivered in a tandem model (In tandem models, nurses predominantly delivered the first part of the program and then social workers delivered the remainder.) for many participants, have been evaluated in moderate quality trials.

Program-specific training was reported for all programs, but the timing, amount and delivery of training was generally not well-described. Four programs included training specifically targeting communication style, usually indicating a strengths-based approach. Caseload was reported for six programs and ranged from 18 to 30 families per full-time nurse. For all programs, nurses received regular supervision. Information about supervision regularity was reported for five programs and indicated, at minimum, monthly frequency. Of five programs including information about supervision content, all indicated an emotional

component. Finally, information about continuity of care was reported for four programs. In each case, it appears that most families were served by the same nurse visitor for the program duration.

3.4 Outcome-specific content

For all programs, content covered maternal and child health, child safety, child development and parenting skills, use of social and community resources and maternal self-sufficiency (e.g. family planning, education goals, employment). Though nurses were provided manualized curricula, all programs encouraged adaptations to suit family needs. Table 1 shows the outcomes on which each of the seven SNHV programs demonstrated positive statistically significant main effects. Tables 2 and 3 shows the corresponding outcome-specific program content reported for successful child and maternal outcomes, respectively.

3.4.1 Outcome-specific content related to child outcomes

Table 2 shows that among programs with statistically significant main effects on child outcomes, detailed information about outcome-specific program content is lacking.

Contributing factors are clearest for dental health, language/communication development and obesity prevention. For these outcomes, there is information about specific content or how often the relevant content was or should have been delivered. Pro Kind publications suggest dental health can be improved when SNHV programs include four dentistry-dedicated visits, specialist training of nurses and use of promotional products. For obesity prevention, MtB publications describe specific content (e.g. introduction of solids, hunger cues) and some aspects of delivery (e.g. sensitivity to relevant cultural norms and family beliefs). The 12-session Learning to Communicate program delivered as part of right@home appears effective (particularly in unadjusted analyses) when about 70% of participants receive at least 8 of the monthly doses from child age 12 months. Detailed information about outcome measurements and statistics is presented in Table S4 (online supplement).

3.4.2 Outcome-specific content related to maternal outcomes

Table 3 summarizes the outcome-specific program content information reported for maternal outcomes. Details of outcome measurements and statistics are presented in Table S5 (online supplement).

Several program evaluations provided specific content information pertaining to maternal behaviours that have a direct impact on child physical health. For breastfeeding, VoorZorg publications suggest early encouragement (i.e. beginning in pregnancy), emphasis of

advantages (e.g. antibodies in breast milk), problem-solving activities with the mother following birth and addressing barriers (e.g. support, depression) are important factors. For smoking cessation, VoorZorg publications indicate the utility of early instruction (during pregnancy), discussion of harmful effects, explicit attention to smoking at every visit and a specific motivational and counselling intervention (V-MIS). For child safety outcomes, the right@home trial suggests use of the Child Accident Prevention Foundation Australia Kidsafe audit (available at www.kidsafe.com.au), with safety discussed in 40% of visits. To increase parent knowledge of SIDS, it may be critical to deliver sleep/settling information and SIDS risk reduction information in the prenatal phase (to at least 50% of families) and to ensure that 80% of postnatal visits include sleep content (as in MECSH).

Several programs with positive effects on parenting approach measures provided at least limited description of the relevant content. Right@home results support the use of the Promoting First Relationships program, provision of video feedback, motivational interviewing techniques and most visits including parent-infant interaction content. Use of parent-infant interaction activities were also noted in other programs with positive effects (namely MECSH and MtB), though fewer details were provided.

For maternal psychosocial health outcomes, positive effects have been observed on intimate partner violence (IPV), partner satisfaction and mental health. VoorZorg findings suggest IPV can be reduced when: child safety and relationships are discussed at every visit, strategies are shared with both partners, the Power and Control Wheel is discussed with mothers alone and risks (e.g. stress, financial dependence or housing) are addressed. Descriptions of Pro Kind indicate that partner participation in home visits may be important for partner satisfaction, with about one in five visits including the partner.

For maternal physical health outcomes, MECSH and right@home descriptions indicate that including health activities in a large proportion of both antenatal and postnatal visits is important. For example, approximately two thirds of MECSH families received antenatal maternal health, physical activity and nutrition interventions. Similarly, more than 90% of right@home visits included maternal health activities. For maternal dental health behaviour, Pro Kind is instructive (with specialist training of nurses, promotional products and four dedicated visits).

4 DISCUSSION

To identify the potential active ingredients of effective SNHV programs, informing the development of minimum standards and recommendations for best-practice implementation this review investigated process, provider and content componentry underpinning seven rigorously tested SNHV programs that have demonstrated positive effects for mothers and/or their children. Results indicate potential minimum standards for process and provider componentry and identify important details of outcome-specific content. Analysis of core process components suggests SNHV programs should include: prenatal commencement; support to child age 2 years; approximately 25 scheduled visits, of 60 minutes duration; and 3 prenatal visits, followed by weekly visits in the first month after birth, with tapered frequency thereafter. Analysis of provider componentry suggests nursing staff should have highly relevant prior experience or appropriate post-graduate qualifications; program-specific training including substantive attention to communication and collaboration with families; a case load of about 25 families (ideally no more than 30, equivalent full time); and monthly supervision including an emotional component. Continuity of care for families and access to multi-disciplinary support are also common components of effective SNHV programs. Analysis of outcome-specific content (and its delivery) indicated substantive information gaps, but also identified some useful clues as to effective interventions.

It is important to acknowledge that a lack of variation across several process components (e.g. commencement, duration, scheduling) is likely attributable to the fact that several programs are NFP-adaptations (FNP, VoorZorg, Pro Kind) and two others are intimately related (right@home is based on MECOSH). Although such uniformity provides cumulative evidence that these processes work, the lack of variation also makes it difficult to determine minimum standards. In contrast, substantive variation across the number of delivered visits facilitates some speculation as to how many visits are necessary (though not necessarily sufficient) for positive outcomes.

Analysis of provider componentry revealed some gaps in detailed reporting of several provider components. For example, information about nurse experience (in years), continuity of care (nurse drop-out and percent of families on which this had an impact) and program specific training (such as timing and duration) was often not reported. Though information about nurse training in forming a positive relationship (e.g. via communication style) was explicitly reported for four programs, all stressed the importance of a positive working alliance between the nurse visitor and family. We suspect that in the absence of such a relationship, program effectiveness would be undermined or compromised. Consistent with

this, qualitative and quantitative evidence from process evaluations of SNHV programs indicates that the relationship is crucial to program success (Brand & Jungmann, 2014; Zapart, Knight, & Kemp, 2016).

The analysis of content componentry showed that for many outcomes, there is a severe lack of information. Even in cases where programs had positive effects, outcome-specific content was often not reported. For example, 'problem-solving' and addressing maternal beliefs about infant crying and feeding were considered key components of the VoorZorg breastfeeding intervention, but additional information about specific barriers (e.g. mastitis) and facilitators (e.g. low cost, antibodies in breast milk and contraceptive benefits) was not thoroughly described. Though it may seem obvious that such issues should be covered in SNHV programs, it is not clear which were covered in each program or if training in these areas might explain why some programs have successfully increased breastfeeding duration where others have not. This point is equally applicable to many outcomes.

Comparison of programs tested in high versus moderate quality trials revealed only one consistent difference in process or provider characteristics; only programs where nurses delivered all the core curriculum (with supplementary support from social workers) had been tested in high quality trials. This indicates a need for more rigorous evaluation of programs where social workers deliver a substantive proportion of visits.

4.1 Limitations

Following best-practice guidelines for restricted systematic reviews (Pluddemann et al., 2018), the literature search was conducted across multiple major scientific databases, trial registries and relevant reputable evidence clearinghouses. Study selection decisions were verified by a second reviewer and detailed appraisals were conducted to assess study quality. Although program selection was restricted to RCT-level evaluations published in journals since 2008, this approach has important strengths. Indeed, it places emphasis on the most rigorously and recently trialled programs increasing applicability of findings to contemporary health care systems. All but one of the included programs were trialled in the last 20 years. As noted by others, the conclusions drawn from restricted systematic reviews are often similar to those obtained in full reviews and provide adequate and more timely advice for practice and policy decisions (Ganann, Ciliska, & Thomas, 2010).

The analytic approach adopted for this review involved identification of (a) process and provider componentry common to rigorously evaluated SNHV programs and (b)

outcome-specific content componentry of effective programs. It is possible the identified common componentry also characterizes programs that have failed to demonstrate an effect on any child or maternal outcome. However, no such programs tested in RCTs were identified. This could reflect some publication bias and highlights the importance of publishing null effects. For outcome-specific content componentry it is also possible that ineffective programs have used the same or similar content. However, given the general lack of detail reported for outcome-specific program content (even when programs are successful) and variability in metrics when outcome-specific dose information is presented (e.g. percent of families, percent of visits, percent of time), this seems unlikely (see online supplement Table S6 for a comparison of outcome-specific content reporting across programs affecting specific outcomes and those that reported null effects on similar outcomes).

There are likely to be several contributing factors to the lack of detail in reporting the outcome-specific content delivered in SNHV programs. These may include licencing concerns, intended flexibility in delivery of program curricula to suit family needs and interests and journal article word count restrictions. Yet, in the interests of progressing the science of SNHV, it is important to overcome the barriers each presents and document exactly what is delivered within SNHV programs. Only a handful of SNHV publications describing experimentally tested programs have focused explicitly on providing critical details of the specific interventions (Kemp, 2016; Kemp et al., 2019; Kemp et al., 2007), though even these lack important information.

While this review has taken a first step toward identifying key componentry of effective SNHV programs, further research is needed to explore the magnitude of effects associated with each aspect of componentry. In future studies, meta-analytic techniques could be used to explore moderating effects of program componentry. Such analyses have been conducted for home visiting broadly (e.g. Filene 2013; Casillas 2016) and would be possible for SNHV specifically if a larger pool of SNHV studies were identified, perhaps by including non-randomized trials, unpublished literature, or less recent evaluations in such a review. This is important as such information could improve the overall efficiency of programs. Of course, further experimental work is also required to determine which components are necessary or sufficient to effect change, which have interactive effects and for whom. There are growing calls within the home visiting literature to use a range of innovative and experimental methods to better identify active ingredients for more tailored implementation (Supplee & Duggan, 2019). Most program components in SNHV programs have not been

experimentally manipulated, though there are some exceptions. For example, some specific interventions provided within SNHV models to address IPV (Jack et al., 2019) and depression (Ammerman et al., 2013) have now been experimentally evaluated.

5 CONCLUSIONS

Implementation of SNHV programs is popular in high-income countries and requires substantive financial investment. Adaptations to evidence-based programs are both inevitable and pervasive when implemented beyond the research context (Kemp, 2016). For these reasons, it is critical that program developers, policymakers and practitioners have the best available evidence to determine which aspects of program componentry are associated with effectiveness (and therefore perhaps more essential or core) and which might be suitable candidates for adaptation to suit local conditions/contexts. Drawing from the best available evidence, the results of this review identified several aspects of program componentry that characterize tried and tested programs. The findings are instructive for setting minimum standard benchmarks and monitoring of program fidelity during implementation. Simultaneously, the results point to a clear need for SNHV researchers to publish more detailed descriptions of nurse providers and more precise information about the program content targeting specific outcomes.

Conflict of interest statement:

Professor Goldfeld was instrumental in the design, implementation and prior evaluations of one of the programs included in this review. To manage this potential conflict of interest, she was not involved in: initial review protocol development, screening of papers for inclusion, data extraction, or assessment of study quality. The remaining authors have no conflicts of interest or financial relationships relevant to this article to disclose.

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Table 1. Outcomes with statistically significant main effects by program

	FNP (UK, 2009-14)	MECSH (Australia, 2005-08)	MtB (USA, 2002-16)	Pro Kind (Germany, 2006-12)	right@home (Australia, 2013-14)	VoorZorg (Netherlands, 2007-09)	NFP (USA, 1978-95)
Child Outcomes							
Child Physical Health			Obesity	Dental care		Maltreatment	Accidents/Injuries
Child Psychosocial & Psychomotor Health	Language Psychomotor development		Attachment Externalizing	Temperament	Communication	Internalizing	Language Fear
Parent Outcomes							
Breastfeeding	Intentions	Duration				Duration	Initiation
Child Safety		SIDS knowledge			Safety		
Parenting Approach/Style [†]		Responsive	Reflective functioning	Attachment	More warmth, less hostile	HOME total	Beliefs
Parenting Efficacy		Enablement		Self-efficacy	Efficacy & enablement		
Compliance			Immunisation Well-child check ups				
Home Learning				Activities (less passive)	HOME (facilitation and variety)		‘conductive to learning: HOME’
Smoking						Pre & post-natal	Prenatal
Maternal Physical Health		General health 4-6 weeks after birth		Prenatal dental knowledge & prophylaxis; postnatal dental visits	Post-natal: global health		Antenatal: pre-eclampsia, hypertension

Maternal Psychosocial Health	Partner satisfaction, Social support	Calmativ prescriptions, Stress, Partner satisfaction	IPV experience & perpetration	IPV, cohabitation
Maternal self-sufficiency		Family planning: child bearing		Family planning Employment Welfare use

IPV = intimate partner violence; HOME = Home Observation Measurement of the Environment; [†]Though not direct measures of parenting style per se, reflective functioning and attachment are considered precursors to sensitive and responsive parenting, and are therefore included here.

Table 2. Outcome-specific content linked to positive main effects for children

Outcome	Programs with positive main effects	Outcome-specific program content & its delivery
Maltreatment investigation	VoorZorg	• 'Child safety' addressed at every visit • Consequences of maltreatment discussed
Dental health	Pro Kind	• Four dedicated visits • Box of oral health care products • Home visitors receive training from a dentist, with content of module described with reference to Meyer et al. (2014) which describes content relating to oral hygiene and dietary counselling
Accidents and injuries	NFP	Outcome-specific content and delivery not reported
Obesity	MtB	• Recognition of hunger cues • Engagement while feeding • Early introduction of solids • Information about nutrition, food preparation, and choices • Information about link to presence of television in bedroom • Family-centred approach to maternal fears and beliefs about food • Sensitivity to and 'softening' of cultural and community norms
Language & communication	FNP	• Child communicative signals (NOS)
	right@home	• Learning to Communicate program utilized in MECSH (Kemp et al., 2008): includes 12 sessions, delivered monthly beginning at 1 month (ref). 71.6% of participants received at least 8 sessions, M=9, SD=3.7, Med=9.5, range 0-21)

		• Small Talk module (developed for children 12-47 months; www.smalltalk.net.au; 4.3% received at least 3 of 5 sessions, M=0.6, SD=0.9, Med=0, range 0-4) • Language program content was delivered in more than 10% of antenatal and 40% of postnatal visits.
Attachment	MtB	• Infant-parent psychotherapy (delivered by Masters-qualified clinicians) is explicitly linked to attachment • Individualized reflective functioning (emphasized by both nurse and clinical social worker). Example activities include hands-on play, observation and digital videos of parent-infant dyad, journaling and scrapbooking to build reflective functioning skills. • Authors note importance of infant-parent psychotherapy and reflective functioning interventions in context of also providing developmental guidance, counselling, crisis intervention, and case-management • Treatment manual is referenced in early MtB publication ^a
Internalizing	VoorZorg	• Effect tentatively attributed to decline in IPV and maltreatment rather than internalizing-specific content. • Child safety & relationships content addressed every visit (among 6 key domains) • IPV risk addressed by: reduce stress, increase financial independence and housing assistance • Power and Control Wheel discussed with mothers alone • Strategies for emotional regulation, communication, de-escalation & listening (both partners). Content repeated each session if IPV present.
Externalizing	MtB	Outcome-specific content and its delivery not reported • Hypothesized parental reflective functioning would mediate program effect (not supported, but authors suggest specific components of it might mediate)
Difficult temperament	Pro Kind - Pilot	Outcome-specific content and its delivery not reported
Fear	NFP	Outcome-specific content and its delivery not reported

Aggression

NFP

Outcome-specific content not reported

- Parenting skills (e.g. less harsh discipline, more positive discipline) identified as important but specific content, timing, and dose of such information not reported.
- Hypothesized intervention effect could be mediated by verbal ability and/or maternal psychological resources (not supported by data)

^a MtB researchers (Slade et al., 2005) stated that space restrictions precluded elaboration of content and cited the program manual (Slade et al. (2004). *Minding the baby: A working manual*. New Haven, Conn.: Yale Child Study Center).

Table 3. Outcome-specific content related to positive main effects for maternal outcomes

Outcome [†]	Programs with positive main effects	Outcome-specific program content
Parenting Outcomes		
Breastfeeding intentions & initiation	FNP & NFP	Outcome-specific content and its delivery not reported
Breastfeeding duration	MECSH	62.6% women received information about infant feeding - Further details about content, timing, dose not reported ('information, advise, and support').
	VoorZoorg	- Important adaptation from NFP was 'offering more information about breastfeeding and emphasizing the advantages of breastfeeding' (e.g. cognitive, immune, and bonding) - Encouraged early (i.e. pregnancy) - Problem-solving with mother following birth (including addressing beliefs regarding crying and infant satisfaction/supply) - Recognize and address barriers (e.g. support, depression)
Smoking	NFP	Outcome-specific content and its delivery not reported
	VoorZorg	- More emphasis (than NFP) on instruction to stop smoking during pregnancy - Smoking behaviors addressed at every home visit - Specific smoking intervention (V-MIS) utilized

		• V-MIS (minimal intervention strategy for midwives) counselling strategy tailored information to motivational stage of pregnant woman (7 steps outlined in 2014 paper) • Harmful effects of smoking on baby discussed but not explicit if this includes information about increased risks such as orofacial clefts, still birth, low birthweight, preterm delivery, SIDS, or later respiratory disease for example
Child Safety	MECSH	• 49.5% of families received prenatal sleep/settling information including SIDS risk reduction information, and most received this postnatally. • Recommended more explicit focus on SIDS prevention behaviours in prenatal visits. • Specifics of SIDS risk reduction information not reported. • >80% of postnatal visits included sleep/settling content
	right@home	• Child Accident Prevention Foundation Australia Kidsafe audit included in program content (comprehensive list of home safety items available at www.kidsafe.com.au) • Audit delivered in >30% of prenatal visits and 10% postnatal visits; household safety discussed in >40% prenatal and postnatal visits
Parenting Approach	MECSH	• 90.1% of families received parent-infant interaction activities at the first post-natal home visit • Specifics not reported
	right@home	• Promoting First Relationships program (11 sessions intended, with more available if indicated). Delivered: 75.9% received at least 8 sessions, M=9.6, SD=4.1, Med=10, range 0-24) • Video feedback (6 sessions). Delivered: 59.9% received at least 4 sessions, M=4.3, SD= 2.8, Med = 4, range 0-12. • Motivational interviewing

		• >80% postnatal visits included parent-infant interaction content, >40% postnatal visits included Promoting First Relationships program in
	VoorZorg	Outcome-specific content and its delivery not reported
	NFP (Olds 2008)	Outcome-specific content and its delivery not reported
Reflective functioning	MtB: Phase I & II combined	• Manual includes ‘various approaches’ to individualized promotion of reflective functioning. • Example activities include hands-on play, observation and digital videos of parent-infant dyad play and care routines, journaling and scrapbooking with suggested statements to facilitate recognition of maternal and infant thoughts, feelings, and intentions. • Both nurse and social worker model reflective stance during visits
Maternal attachment	Pro Kind (positive effects for attachment but not parenting style or maternal-child interaction)	• Partners in Parenting Education (PIPE) module including information and modelling of emotionally responsive parent-child interactions • PIPE was used in only 4.5 sessions on average. • Visitors spent 30% of time on parenting issues during the visits after birth (intended time was 40–50%). • Lack of video feedback cited as possible reason for lack of effects on observed interaction and parenting style measure • During pregnancy, the parenting component included reflection on mothers’ own childhood, expectations of the child’s behaviour and self-efficacy, and information on fetal development to increase maternal sensitivity and attachment
Home learning environment	Pro Kind	• Home visitors demonstrate cognitively stimulating activities (e.g. reading or looking at books together, floor play), and motivate a reduction in passive activities (e.g. watching television)

	right@home	• More specific information not reported • Learning to Communicate and Small Talk (see Language entry)
	NFP	Outcome-specific content and its delivery not reported
	MtB	Outcome-specific content and its delivery not reported
Immunisation & Well-child Checks		
Maternal Physical Health		
Antenatal & postnatal health	MECSH	• 70.3% families received antenatal maternal health intervention, 100% receive maternal health activity at first postpartum visit • 64.8% families received antenatal physical activity intervention and 78.9% at first postnatal visit • Nutrition interventions delivered to 65.9% families in antenatal visits and 80.3% families at first postnatal visit. • 65.9% families received intervention to address expectations of having a baby in the prenatal period
	right@home	• 94.2% of antenatal visits and 90.8% of postnatal visits included maternal health activities • ~60% of antenatal and ~50% postnatal visits included physical activity, ~60% antenatal and ~45% postnatal visits included maternal nutrition content • Specific content not reported
	NFP	Outcome-specific content included teaching women signs and symptoms of pregnancy complications with emphasis on urinary tract infections, sexually transmitted diseases, and hypertensive disorders. Nurses measured blood pressure 'when needed'.
Dental health behaviours	Pro Kind	• Four dedicated visits

		- Box of oral health care products - Home visitors receive training from a dentist, with content of module described with reference to Meyer et al. (2014) publication which outlines oral hygiene and dietary counselling content
Maternal psychosocial health		
Family functioning	FNP NFP	Outcome-specific content and its delivery not reported
	Pro Kind	~20-25% of visits during pregnancy and the first year of life included the partner (Brand & Jungmann 2012), 21.5% overall (Brand & Jungmann 2014) - Note that partner participation predicted retention for high risk families and attrition for low risk (Brand & Jungmann 2014)
Anxiety/Stress/ calmatives	Pro Kind	Home-visitor training included an update on specific challenges such as postpartum depression (Brand & Jungman 2012). Content not otherwise specified.
Intimate partner violence	VoorZorg	- Child safety & Relationship domains addressed every visit - IPV risk addressed by: reduce stress, increase financial independence and housing assistance - Power and Control Wheel discussed with mothers alone - Strategies for emotional regulation, communication, de-escalation & listening (both partners). Content repeated each session if IPV present.
	NFP	Outcome-specific content and its delivery not reported
Maternal self-sufficiency		
Family planning, Employment,	MtB	Nurses counsel mothers to select and effectively use a contraceptive method following child birth.

Education, Welfare use	Sadler (2013) reported 12% of nurse time was spent on maternal life course content and stated that attending to the mothers' reproductive health was a major thrust of nurse efforts.
NFP	Nurses assisted mothers to clarify and set goals to complete education, find work, plan future pregnancies. More detailed content information (e.g. information on different contraceptive methods) not reported.

[†] Though positive effects on parenting efficacy are presented in Table 3, efficacy-specific content was not coded (we would argue that programs build parenting efficacy by providing information about specific parenting skills and increasing competence in those areas, rather than presenting information about feelings of self-efficacy per se. It is possible programs include activities whereby parents reflect upon their progress or monitor goal attainment, but this was not reported).