BUILDING A BUSINESS CASE FOR PREVENTIVE HOME VISITING FOR PREGNANT WOMEN AND MOTHERS OF YOUNG CHILDREN:

A REVIEW OF THE LITERATURE

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National Collaborating Centre
for Determinants of Health

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About this document:

In 2009 researchers at the Population Health Intervention Research Centre, University of Calgary conducted a rapid review of research on preventive home visiting for pregnant women and mothers of young children. The purpose was to bring together the best available evidence on early child home visiting, in order to aid in assessment and in the design of effective home visiting interventions in the Canadian context. Following the review, a postscript examining two additional journal articles was included in 2010. Taken together these reviews provide the framework and much of the evidence needed to develop a business case for home visiting programs in Canada. Margaret Leighton and Alan Shiell authored the rapid review and the addendum, or postscript, was authored by Pierre Guenette and Alan Shiell. In 2012 this work was translated from English to French by the NCCDH.

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CHAPTER 1: PREVENTIVE HOME VISITING FOR PREGNANT WOMEN AND MOTHERS OF YOUNG CHILDREN: A REVIEW OF REVIEWS

by Margaret Leighton and Alan Shiell, Population Health Intervention Research Centre, University of Calgary

INTRODUCTION

Across Canada and around the world, home visiting programs have been put in place to improve the immediate condition and long term outcomes of mothers and their young children. These programs vary considerably in their timing and intensity, the skills, experience and training of the visitors and the populations and outcomes they seek to influence. Among the subset of home visiting programs which have been evaluated, there is further variation in measured effectiveness. The body of evidence concerning home visiting and preventative interventions has grown considerably over the past two decades; however, the findings and the studies themselves are heterogeneous in many dimensions. Drawing conclusions from this diverse evidence base presents a challenge for program developers and funders. This review is an attempt to bring together the best available evidence on early child home visiting, in order to aid in assessment and in the design of effective home visiting interventions in the Canadian context.

METHODS

Rationale

The purpose of this rapid review was to bring together evidence on home visiting as a delivery strategy to promote maternal and child outcomes, focusing on review articles only. Given funding and time constraints, it was not possible to carry out a full systematic review: let alone a systematic review of reviews. However, open-the UK Health Development Agency recently published a report that closely matched the goals of this research. This report, "Ante- and post-natal home-visiting programmes: a review of reviews," by Bull, McCormick, Swann, and Mulvihill (2004), covers reviews of home visiting programs published in English between 1996 and 2001. In an effort to bring the findings of the Bull et al. (2004) review up to date, we repeated the search strategy outlined in the report but limited our search to the Database of Abstracts of Reviews of Effect (DARE). We did, however, expand the language constraints to include reviews written in French and we relaxed the date limitations to include reviews which had been entered into DARE up to and including October 2008. The review articles that are summarized in DARE are all quality-assessed, systematic-reviews. In addition, to provide some indication of the work required to complete a full systematic review of reviews we looked at the feasibility of replicating the full search carried out by Bull et al. (2004) across all relevant databases and not just DARE. Initial findings on this, as well as the DARE search strategy, can be found in Appendix A.

Search Strategy

The search strategy employed by Bull et al. (2004) was repeated, relaxing the date limitation, expanding the language restriction to include French language publications and adapting the syntax for an Ovid search of the DARE Database. The initial search identified 80 DARE abstracts as potentially relevant. The titles of these were scanned independently by two reviewers. References passed on to a second screen if there was explicit mention of home visiting and/or a focus on the primary outcomes targeted by home visiting programs (child outcomes, maternal outcomes or parenting outcomes). References were rejected if they: focused explicitly on a delivery setting outside of the home; were treatment rather than preventive programs (e.g., dealing with clinically diagnosed behavioural issues); did not deal with the population of interest (pregnant women or mothers with infants or pre-school children); or were based on evidence from low or middle income countries. Where a title could not be assessed with these criteria or in the event of disagreement between reviewers, the reference was retained and passed onto the second screen (see Appendix B for a flowchart of the search process).

Abstracts and full texts were retrieved for 44 articles. Abstracts and, when necessary, full texts of the retrieved articles

were again assessed independently by the two reviewers to confirm their eligibility. Agreement between reviewers was determined to be strong, with a kappa score of k=72.5 for the title scan (Round 1), and k=82 in the final abstract and full text review (Round 2) (Table 1). Disagreements between reviewers were resolved by discussion. Ultimately, 22 review articles were deemed to meet the inclusion criteria (Appendix C). Data were extracted from these articles by one reviewer (ML).

Round 1	Reviewer A			Round 2	Reviewer A		
Reviewer B	N=80	Keep	Reject	Reviewer B	N=44	Keep	Reject
	Keep	33	8		Keep	19	3
	Reject	3	36		Reject	1	21

Non-systematic search

Further to the DARE search, additional articles of interest were uncovered through non-systematic querying of databases such as ERIC and the CRD, browsing relevant books and journals, chasing references listed by relevant articles, as well as searching for articles citing older papers using the 'find citing articles' feature in Ovid. The quality and approach of these reviews varies greatly, in particular, many are not systematic reviews and so there are questions about the criteria used to select the original studies. Furthermore, some of these papers are reviews of families of interventions, rather than home visiting exclusively; conclusions drawn in the papers therefore include home visiting effects, but these may be moderated by combined programs, or non-home visiting delivery mechanisms. Interesting titles were retrieved and saved, and the most relevant set aside for further reference. Twenty-five of these papers which are additional to the DARE search. (Appendix D)

Search overlaps

The review by Bull et al. (2004) included nine review articles. Our DARE search identified five of those nine; the remaining four include two Cochrane reviews and two meta-analyses that are not currently listed in DARE. Of the 17 additional articles our search produced, four were present in DARE during the time frame covered by Bull et al. (2004), but were not included in that review. One of these was written in French, while the remaining three turned out to be of marginal relevance to home visiting *per se*: that is to say we included them in our review but we were unable to draw clear conclusions about the outcomes of home visiting programs separate from other parenting and child health programs from these studies. This may explain their rejection by Bull et al. (2004). Our search, which also covered the eight years after the Bull et al. (2004) search, identified 13 additional review articles which were published after the time period covered by Bull et al. (2004).

RESULTS

Description of the reviews

The 22 review articles found in DARE and selected for this review of reviews are summarized in Table 2 and described below. The review articles fall into two categories. In the first category are eight papers which are primarily concerned with the delivery mechanism (i.e. home visiting), and examine outcomes secondarily. The remaining 14 papers review the evidence concerning specific outcomes, e.g., reduction in childhood injury or low birth weight. These

reviews typically look across multiple forms of intervention, of which home visiting is one example. Table 2 reports the conclusions of different review papers on individual outcomes. Where a given outcome is examined in the review, the effect of home visiting on that outcome is classified as "improvement," "no change" or "mixed findings." These same conclusions are represented by arrows in the DARE column. The last column, Other, uses slanting arrows to indicate whether the evidence from the non-systematic search suggests a stronger or weaker impact of home visiting on each outcome. Note that this data comes from a heterogeneous body of evidence. These non-DARE reviews are not quality-assessed, and some are reviews of groups of interventions which are not exclusively home visiting.

Table 2. Summary of outcomes, with references and non-DARE review trend

	Group	Domain	Outcome	reference			DARE	Other
				↑	Ø	↔		
A	Child	Physical health	general	4,5			↑	↘
B			immunization status		5,13		Ø	≈
C			breastfeeding & nutrition	7,9,20			↑	↘
D			development	22			↑	↘
E			vision screening		19		Ø	
F		Birth	pre-term birth		1		Ø	↗
G			low birth weight	3	5,14,22		↑ Ø	↘
H			gestational age		5		Ø	
I			neonatal mortality/morbidity		5		Ø	
J		Cognitive	mental health	4,5	11		↑ Ø	
K			intellectual development	4,5,9			↑	↗
L		Social/emotional	behaviour	9			↑	↘
M			emotional development					↗
N	Parenting		parenting skills	9			↑	↗
O			parent-child interaction	22		2	↑ ↔	↗
P			injury	9,16,18			↑	↗
Q			maltreatment	16			↑	↗
R			abuse			18	↔	≈
S			home environment	5,9	10		↑ Ø	↗
T			attitudes					↗
U	Maternal	Health	physical health	4,5			↑	↗
V			mental health	4,5,11			↑	↘
W			post-natal depression	9,15			↑	↗
X			pregnancy		1		Ø	↗
Y		Life	social support	1			↑	↘
Z			life course					↗
Za			service utilization*	4,5			↑	↘
Zb			domestic violence					↗
Zc	Other	Societal	effectiveness of other services	4,5			↑	↘
Zd			reaching lower SES groups	12			↑	↗

Notes: reference numbers 1-22 correspond to the DARE reviews listed in Appendix C. [↑] indicates an improvement in the outcomes, [Ø] indicates no measured effect, [↔] indicates mixed effects. (For outcome Za, "service utilization," increased use is coded as an improvement.)

Trend refers to how the conclusions reported in the non-DARE studies relate to DARE review conclusions. An upwards arrow [↗] indicates additional positive evidence; a dropping arrow [↘] indicates additional evidence questioning a positive conclusion; while [≈] indicates agreement with DARE. Note that this data comes from a heterogeneous body of evidence. These non-DARE reviews are not quality-assessed, and some are reviews of groups of interventions which are not exclusively home visiting.

Reviews of home visiting

Of the eight intervention-specific reviews, six look broadly at home visiting (McNaughton, 2004; Ciliska et al., 1996; Ciliska et al., 2001; Elkan et al., 2000; Blondel & Mellier, 1996; Wade et al., 1999), a seventh review examines the impact of primary prevention (Durlak & Wells, 1997), while the eighth is a review of parenting programs, with some mention of home visiting for comparison (Thomas et al., 1999).

Of the six reviews that look broadly at home visiting, one by McNaughton (2004) does not synthesise outcome results. Ciliska and colleagues (1996) find home visiting to be associated with positive impacts on "physical health, mental health and development, social health, health habits, knowledge and service utilization." The authors note that ineffective studies tend to employ low intensity interventions, and that interventions have greater impacts on higher risk clients. Citing the challenges of achieving statistical significance in health services research, the authors suggest that intervention effects are likely underestimated. They conclude that "home visiting can definitely increase the effectiveness of other medical, social and educational services." In a later review, Ciliska et al. (2001) find similar positive impacts on mothers and babies to those documented in 1996. The authors note a positive influence of home visiting on the home environment, and on the effectiveness of other services. Stronger effects were observed following more intense interventions, and among high-risk clients (with the exception of multiple-drug users). The authors find no evidence that home visiting has a positive effect on the uptake of immunization, the incidence of low birth weight, gestational age or neonatal morbidity or mortality.

Elkan et al. (2000) find that home visiting can lead to improvements in parenting skills, the home environment, some child behavior problems, child intellectual development, unintentional injury, management and detection of postnatal depression and rates of breastfeeding.

Looking strictly at pre-natal home visiting, Blondel and Mellier (1996) do not find strong evidence in support of home visiting during pregnancy. The authors note a small and non-significant decrease in pre-term births in some trials, and no change in hospitalization rates. The review finds a slight tendency (not statistically significant) towards inferior outcomes among home-visited women with an identified complication; however this might be explained through surveillance bias or the nature of the complication itself. While the authors suspect that interventions may have been insufficiently intense to have the intended effects, they note that home visiting appears to strengthen social support networks in a way which is amenable to better health outcomes.

Wade et al. (1999) find some evidence that peer or paraprofessional interventions, either strictly one-to-one or as part of a multifaceted intervention, have a positive effect on child development and parent-child interaction. Multifaceted interventions may affect immunization uptake, preventative care, prenatal visits, use of community resources, child abuse and maternal psychosocial health. There is no evidence that these programs affect low birth weight.

The two final reviews do not address home visiting specifically, but include some home visiting-relevant comparisons between delivery strategies (Durlak & Wells, 1997; Thomas et al., 1999). Durlak and Wells (1997) summarize 177 primary prevention program evaluations. Although the review spans many different interventions, the authors' identification of program variables that moderate outcomes bears some relevance. While the authors conclude that "most types of primary prevention programs achieve significant positive effects," these optimistic findings do not extend to parent training programs, which were "the only type of intervention that did not achieve significant positive mean effects." Furthermore, programs which "primarily sought to modify the child's home situation by educating parents about child development and modifying parental attitudes and child-rearing techniques as needed were homogeneous

in outcome, but not effective." However, transition programs for first time mothers, which include some home visiting programs, did produce "significant positive outcomes." Thomas and colleagues (1999) review the effectiveness of professionally-led parenting groups in promoting child or parent health and development. While the authors are primarily concerned with group-based programming, they conclude that in a comparison with individual parent training, "not only were the outcomes for parents and children better in the group programs, but the programs were very cost effective." According to the review, there is good evidence to support parent groups as a strategy to improve parent, child or parent-child outcomes. The authors note that a comparison of "time spent in home visiting versus group programs versus telephone counseling [found that] group programs required the least professional time per parent/family."

Reviews of outcomes

The remaining 14 articles examine interventions with respect to a particular outcome; either child outcomes (such as psychological development), or maternal and birth outcomes (such as postnatal depression) or parenting outcomes (such as mother-child interaction). Most of these reviews consider a range of interventions, while two include solely studies of home visiting programs.

Eight of the 14 reviews examine child outcomes (Close, 2002; MacMillan, 2000; Roberts, Kramer, & Suissa, 1996; Emmons et al., 2001; Fraser, James, Anderson, Lloyd, & Judd, 2006; Kendrick et al., 2000; Snowdon & Stewart-Brown, 1997; Gepkins & Gunning-Schepers, 1996); three reviews focus on maternal outcomes (Lumley, Austin, & Mitchell, 2004; Brunton & Thomas, 2001; Lu, Lu, & Schetter, 2005) and three reviews look at aspects of parenting (Bowie, 2005; de Oliveira, Camacho, & Tedstone, 2001; Tedstone, Dunce, Aviles, Shetty, & Daniels, 1998). Although some of these reviews delineate results based on intervention type, most draw conclusions on interventions generally; and so the results may only apply in a very limited way to home visiting. Where possible this distinction has been highlighted.

Child outcomes

Of the eight reviews of child outcomes, three address injury and abuse (Close, 2002; MacMillan, 2000; Roberts et al., 1996), one examines interventions to reduce exposure to environmental tobacco smoke (Emmons et al., 2001), one looks at programs for children of parents with mental illness (Fraser et al., 2006), two focus on specific health prevention programs (Kendrick et al., 2000; Snowdon & Stewart-Brown, 1997) and one review evaluates interventions to reduce socioeconomic health differences (Gepkins & Gunning-Schepers,1996).

In a mini-review of accident prevention education programs delivered to parents or carers, Close (2002) finds that neither of two studies offers significant support that such programs reduce the incidence of home accidents in children under five. Although both studies detail the intervention as "individual home safety education delivered at three consecutive child surveillance checks by health care professionals," it is not clear whether these interventions are, or are not, home-based; this mini-review is therefore excluded from the home visiting evidence. Reviewing interventions aimed at preventing child maltreatment, MacMillan (2000) finds that there is "evidence that frequent home visiting by nurses beginning prenatally and extending until the child is two years of age can prevent child maltreatment and associated outcomes (e.g., injuries and health care encounters) among first-time disadvantaged mothers." Home visiting by paraprofessionals or lay visitors is less strongly supported; however, the relevant studies suffer methodological problems which weaken their conclusions. Evidence for other types of interventions remains inconclusive. MacMillan (2000) cautions that, due to the risk of false-positives, screening for maltreatment is not considered beneficial. Roberts and colleagues (1996) examine the effectiveness of home visiting programs in the prevention of child injury and abuse. Noting that "most of the trials included in this review used non-professional home visitors," the authors find good evidence in support of home visiting to prevent injury. Of the eight trials measuring injury prevention, six "reported a lower incidence of injury in the group that received home visits." In contrast, the evidence is more mixed concerning child abuse. Of nine studies evaluating home visiting to reduce child abuse, four trials measure a decrease in the frequency of occurrence of abuse in the visited group, while five trials report an increase. In this area, however, increased surveillance through the presence of the home visitor could contribute substantial bias favoring the

detection of abuse.

In a review of programs to reduce environmental tobacco smoke exposure among young children, Emmons and colleagues (2001) find very weak evidence in favor of home visiting. Looking across all types of interventions, the authors conclude that "none of the studies that have been conducted to date have yielded significant reductions in objective measures of children's exposure," though there is some effect on self-reported exposure. A single study featured home visiting as a strategy; this study found significant parent-reported differences in smoke exposure among infants of smoking mothers, and significant but small condition differences among infants of non-smoking mothers. However, these differences were not seen in an associated objective measure.

Fraser et al. (2006) find limited evidence in support of home visiting interventions for children of parents with mental illness, and then only on surrogate measures of mental health. Looking across multiple interventions, the authors find that data from those studies of moderate or high quality offer "very limited evidence of program effectiveness when assessing wellbeing or illness outcomes for the child." When measuring the absence of psychopathology in childhood as an outcome, the authors find no evidence that home visits from nurses, among many other interventions, are effective. Home visiting-specific evidence suggests that "mothers' depressive mood scores improved, daily stress levels reduced and use of punitive parenting decreased following home visits from RNs. However, there was no evidence that [surrogate markers such as these] resulted in improved mental health in children."

Two reviews focus on aspects of preventive child health; one looking at vaccination uptake (Kendrick et al., 2000), the other at preschool vision screening (Snowdon & Stewart-Brown, 1997). Kendrick and colleagues (2000) do not find evidence to support home visiting as a strategy for increasing the uptake of childhood vaccination. Based on their review, the authors recommend that "other measures may be needed to increase uptake amongst the hard to reach." In their review of preschool vision screening, Snowdon and Stewart-Brown (1997) find no support for either the programs themselves, or for home visiting as a mechanism to carry out the screening. The authors conclude that "providers currently offering screening programs should consider discontinuing them."

Gepkins and Gunning-Schepers (1996) review interventions to reduce socioeconomic health differences; their conclusions offer theoretical support for the involvement of a home visitor in such programs. The review finds that, while merely providing information is effective among higher SES groups, "providing information with personal support appears to be effective for the lower SES groups." The authors conclude that it is often difficult to determine the effect of an intervention on reducing socioeconomic health differences, since health effects are rarely measured.

Maternal outcomes

Three reviews address maternal health outcomes; two of these evaluate programs to reduce the incidence of low birth weight deliveries (Brunton & Thomas 2001; Lu et al., 2005) while the third looks at interventions targeting depression after birth (Lumley et al. 2004). In their review of interventions to reduce low birth weight among teenage mothers, Brunton and Thomas (2001) find moderate but not exclusive support for home visiting as a delivery mechanism. Although implemented in different contexts, with different delivery mechanisms and service providers, "[all] five studies with statistically significant differences provided support and health education as intervention strategies." Although it is "not clear what specific component of any single intervention such as home visiting is effective on birth weight outcomes," the authors found that interventions that were targeted specifically at adolescents and enrolled early in pregnancy, as well as programs that combined a number of strategies, were more effective. No differences were found among ethnic groups. In total, six of the 13 study interventions included in the review reported use of the home as a setting. Lu and colleagues (2005) found minimal support for home visiting as an intervention to prevent low birth weight. In their review of research designs of social support interventions targeting low birth weight, only one study out of 12 demonstrated a significant reduction in that outcome though that did include home visiting as a strategy. However, not one of those 12 studies "met all of the criteria for effective research design," which puts conclusions drawn from this body of research into question.

Lumley et al. (2004), reviewing interventions to reduce depression after birth, offer support for a broad array of counseling interventions. From a set of studies which include several home visiting interventions, the authors find there to be "strong evidence that postnatal counseling interventions (all modalities tested), provided to women with depression or probable depression, by professionals from a variety of backgrounds after specific additional training, will reduce depressive symptoms and depression substantially." There is negligible support for universal interventions or for selective interventions in the prenatal period. The authors conclude that "neither continuity of care, doula support in labor, nurse support in labor, nor postnatal debriefing by a midwife can be recommended as strategies for reducing postnatal depression," nor do they find support for interventions to enhance mother-infant interactions having an effect on maternal depression.

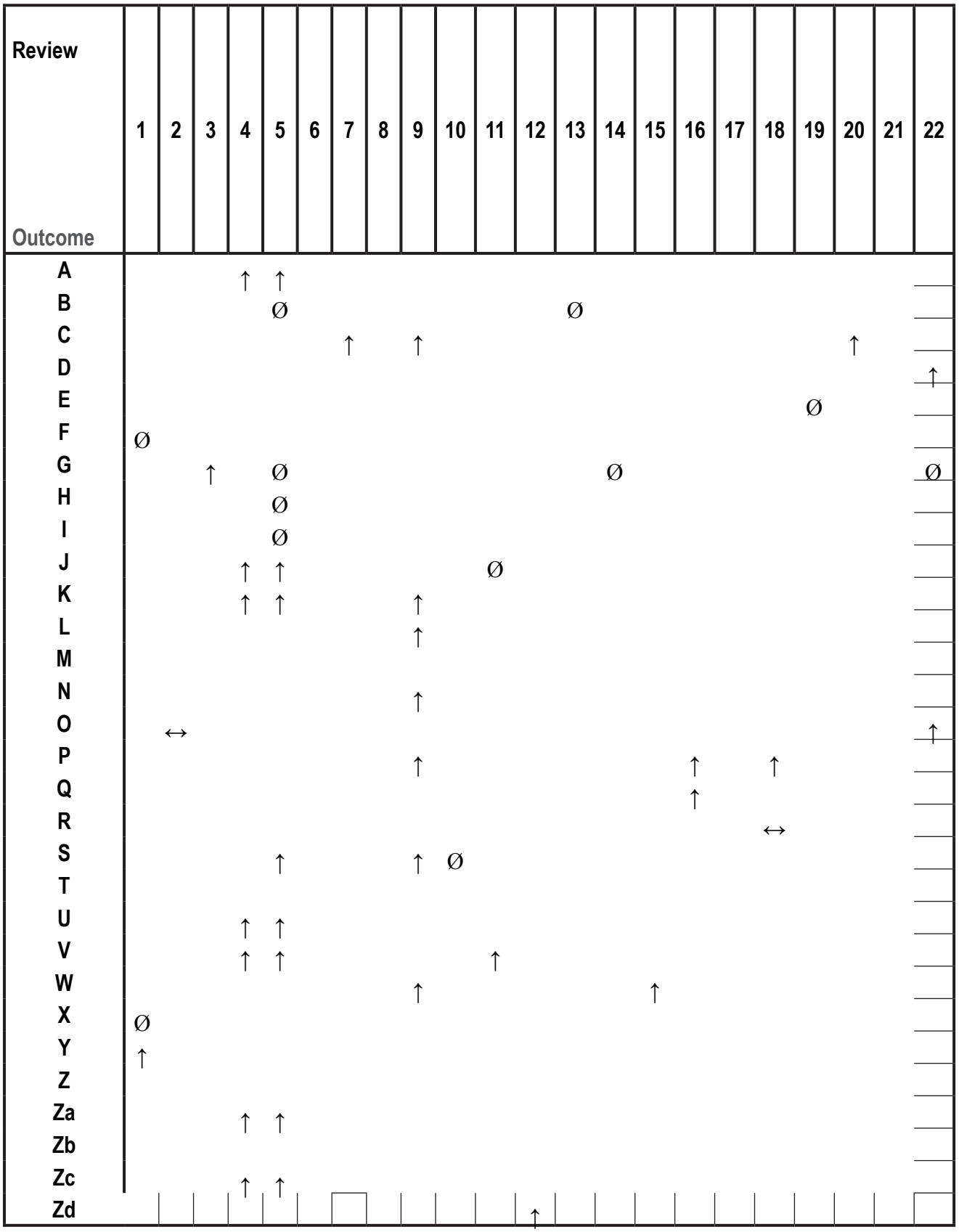
Parenting outcomes

Of the three reviews of mother-child interaction, two focus on feeding (de Oliveira et al., 2001; Tedstone et al., 1998), while one examines mother-child interaction among drug-abusing mothers (Bowie, 2005). The review by de Oliveira and colleagues (2001) offers moderate support for the involvement of a home visitor in interventions to promote breastfeeding. Looking across interventions, the authors conclude that the most effective programs "generally combined face-to-face information, guidance, and support and were long term and intensive." While the qualifications of the personnel involved do not seem related to effectiveness, strategies with little or no face-to-face contact were not found to be effective. Programs during the prenatal period, or which span the prenatal and postnatal periods, are shown to be more effective than those carried out in the postnatal period only. The authors conclude that the most effective strategies are "group sessions during the prenatal phase; home visits during the postnatal phase or in both periods; and the combination of group sessions, home visits, and individual sessions in interventions spanning both periods." In a review of interventions to promote healthy eating in infants less than one year of age, Tedstone et al. (1998) offer limited evidence in support of home visiting. The authors conclude that there is "some evidence to suggest that multiple-contact, long-term interventions are the most likely to be successful."

Reviewing interventions targeted at improving mother-child interactions of drug abusing mothers, Bowie (2005) finds that home visiting in this setting has mixed results. The seven home visiting studies included in the review vary in their findings from no overall effect, to insignificant positive effects, to positive effects. In contrast to results from studies with a different focus (i.e., preventing maltreatment, as reported in MacMillan (2000)) the author finds that, across intervention strategies, "length of time, strength, or dose of the intervention, does not seem to [be] a decisive factor for predicting success."

Table 3 presents a picture of the coverage of the review articles by type of outcome and the conclusions drawn by the review authors.

Table 3. Outcomes measured by individual reviews



Notes: outcomes numbered A-Zd correspond to those listed in Table 2; review numbers 1-22 correspond to the DARE reviews listed in Appendix C. [↑] indicates an improvement in the outcomes, [Ø] indicates no measured effect, [↔] indicates mixed effects. (For outcome Za "service utilization," increased use is coded as an improvement given the belief that new mothers probably do not use health services as much as they should..)

SUMMARY

The reviews described above present evidence relating to home visiting program outcomes, as well as to aspects of those programs which may contribute to their success. This evidence is summarized as follows.

Child outcomes: With the exception of neonates, there is some evidence to suggest improvements in children's physical health generally. Similarly, general improvements were found in mental health, child development generally and intellectual development in particular; however, in the case of children of parents with mental illness, there is no evidence to suggest that any interventions prevent psychopathology. There is substantial evidence that home visiting can reduce rates of injury in the home. Support for home visiting reducing child abuse and maltreatment is not conclusive. There is some evidence that intense nurse visitation can reduce maltreatment, but very mixed findings regarding abuse outcomes. Given the confounding effects of surveillance bias, which would potentially increase detection in visited homes where abuse is taking place, measuring program success as a decrease in reported cases of abuse is questionable. Home visiting is not found to be very effective as a pre-school vision screening technique.

Maternal outcomes: There is substantial evidence that visitation can help detect and manage post-natal depression. Home visiting is associated with improvements in physical health, mental health and development, social health and health habits, and has been found to be an effective method for reaching individuals of low socioeconomic status. Home visiting has been shown to reduce the incidence of low birth weight only among adolescent mothers; results from other populations do not suggest home visiting as a strategy to target low birth weight or gestational age.

Parenting outcomes: Home visiting has been associated with improvements in knowledge and service utilization, as well as increases in the effectiveness of health, social and education services; however, there is no evidence that home visiting programs influence immunization uptake. Although there is some evidence that home visiting can improve the home environment, in the specific case of environmental tobacco smoke exposure there is negligible support that any interventions are significant. There is mixed evidence on the success of home visiting targeted towards mother-child interactions among multiple-drug using mothers; among this population abstinence remains the primary moderator of outcomes. There is considerable evidence that home visiting can increase rates of breastfeeding, and some support for home visiting generally in relation to parenting skills and parent-child interaction.

Program moderators: In general, the most successful home visiting programs are high intensity and involve higher risk clients (with the exception of multiple-drug users). Transition programs for first time mothers are also effective; as are programs which combine a number of intervention strategies. Adolescent mothers have better outcomes in programs which enroll early in pregnancy, and target adolescents specifically. The strongest breastfeeding and healthy feeding outcomes are found in long-term, multiple-contact programs, those that include a pre-natal component, and those which combine group sessions, individual sessions and home visiting.

Home visiting programs which run during pregnancy alone, or that target pregnant women with an identified complication, have not been found to be effective. When combined with other services, home visiting by paraprofessionals may affect immunization rates, improve preventive care and prenatal visits, improve the use of community resources, decrease the incidence of child abuse and improve maternal psychosocial health. Comparing across parent-training programs, group parent training is more cost effective than individual parent training, and group outcomes are better. However, a different study questions the effectiveness of parent training in general, compared with other types of primary prevention.

Research gaps: Despite the 22 systematic reviews examined in this paper (listed in Appendix C), the 25 other review articles (listed in Appendix D), and the more than 200 primary studies which inform this review literature, we are nevertheless unable to draw clear conclusions on home visiting as an intervention. This is due to a number of factors, concerning both existing home visiting programs themselves, and the data and analysis which has come from them. To a great extent, it is not the quantity but the focus of research which prevents us from drawing a clearer picture of home

visiting. In order to move towards stronger findings and clearer conclusions, further research is needed in the following areas.

With an already extensive body of primary studies, further research into the effectiveness of home visiting should start with a more comprehensive examination of existing results. Aggregating results of heterogeneous programs through meta-analysis is problematic, and has been justifiably criticized in the case of home visiting (Olds et al., 2007). However, given the growing body of data which has become available in recent years, a carefully designed aggregation of existing results, with an equally cautious interpretation, is now needed. To be useful, such a meta-analysis needs to be more fine-grained than former studies (Sweet & Appelbaum, 2004), sub-dividing home visiting programs into groups of similar programs which can be meaningfully aggregated. Duration, intensity, target population, context, provider and curriculum or focus should be used to categorize evaluated home visiting programs, and meta-analyses should be carried out only on groupings of demonstrably similar programs.

Results from home visiting evaluations are sometimes complicated by discontinuities between program design and theory, and the outcomes measured in the evaluation. If programs are effecting change in areas which are different from those being measured, either through the explicit intentions of program design or through visiting practices in the home which deviate from that design, evaluation data are likely to misrepresent the effectiveness of the program. An investigation into the consistency of existing studies in this regard would help determine the quality of available home visiting evidence.

Qualitative and experiential data are generally omitted from measured outcomes results. If these findings are at odds with quantitative evaluation data, this may be indicative of the gap between practice and evaluation. A better understanding of the visitor and client experience would assist in the evaluation and the interpretation of outcome results. Further research should explore ways of interpreting and understanding experiential data.

Looking beyond existing data, one aspect of home visiting which has not been clearly addressed in the literature is the negative stigma which allegedly results from participation in a program which targets at-risk mothers. While there is considerable evidence suggesting that targeted programs focus resources on those clients who might benefit most from home visiting services, the stigma implications of such a program have not been thoroughly explored. A better understanding of how this stigma might affect involved individuals, from a reluctance to participate to other negative effects for those who do accept the service, is critical to determining when and where targeted programs might outperform universal ones.

Once the above research issues have been addressed, we should be in a better position to determine what sort of home visiting model or models would be most appropriate for Canada. Is there a single model which, given the implementation settings where the programs will be carried out, best meets the objectives set for home visiting in Canada? If there is a model that might become a standard for Canadian practice, then a Canada-specific adaptation of that model is called for, as well as a thorough, long-term evaluation of that program in a Canadian context.

CONCLUSIONS

These 22 reviews include two reports of equivocal results (some positive findings, some negative findings), 12 reports of null effects (no statistically significant differences) and 33 reports of positive impacts. For nine of the outcomes examined (general child health, breastfeeding, child injury, cognitive development, maternal physical health, maternal mental health, post-natal depression, use of health services and use of other resources) there is evidence from at least two reviews of positive impact, and no evidence to the contrary. For a further six outcomes (child physical development, social behavior, parenting, maltreatment, social support for the mother, and reach to families with lower socio-economic status), there is evidence of positive impact from at least one review, and no evidence to the contrary. We have not yet assessed, however, the extent of overlap among the original studies being cited in each of the reviews. Thus, we cannot say at this moment how many original studies support the conclusion that home visiting is effective in each of these

15 outcome domains. The greater the number of original studies that report positive outcomes, the more robust the conclusion that home visiting is effective. Conversely, multiple reviews of the same original study could exaggerate the strength of evidence generated by that single program.

Furthermore, there is large variation in the characteristics of the home visiting programs being examined across the 22 reviews. While it is possible that different types of home visiting programs affect different outcome domains, there is an indication in the conclusions drawn in the review articles that intensive, well-resourced programs of long duration provided by well-trained staff are more likely to be effective in all but very special circumstances.

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APPENDIX A: SEARCH STRATEGY

The following search strategy was adapted from *Appendix 1: Search Strategy* in Bull et al. (2004), and applied to the CRD Database of Abstracts of Reviews of Effect accessed through Ovid. Modifications were made from the original search strategy only with respect to dates (limitations were removed) and syntax translations for the Ovid system.

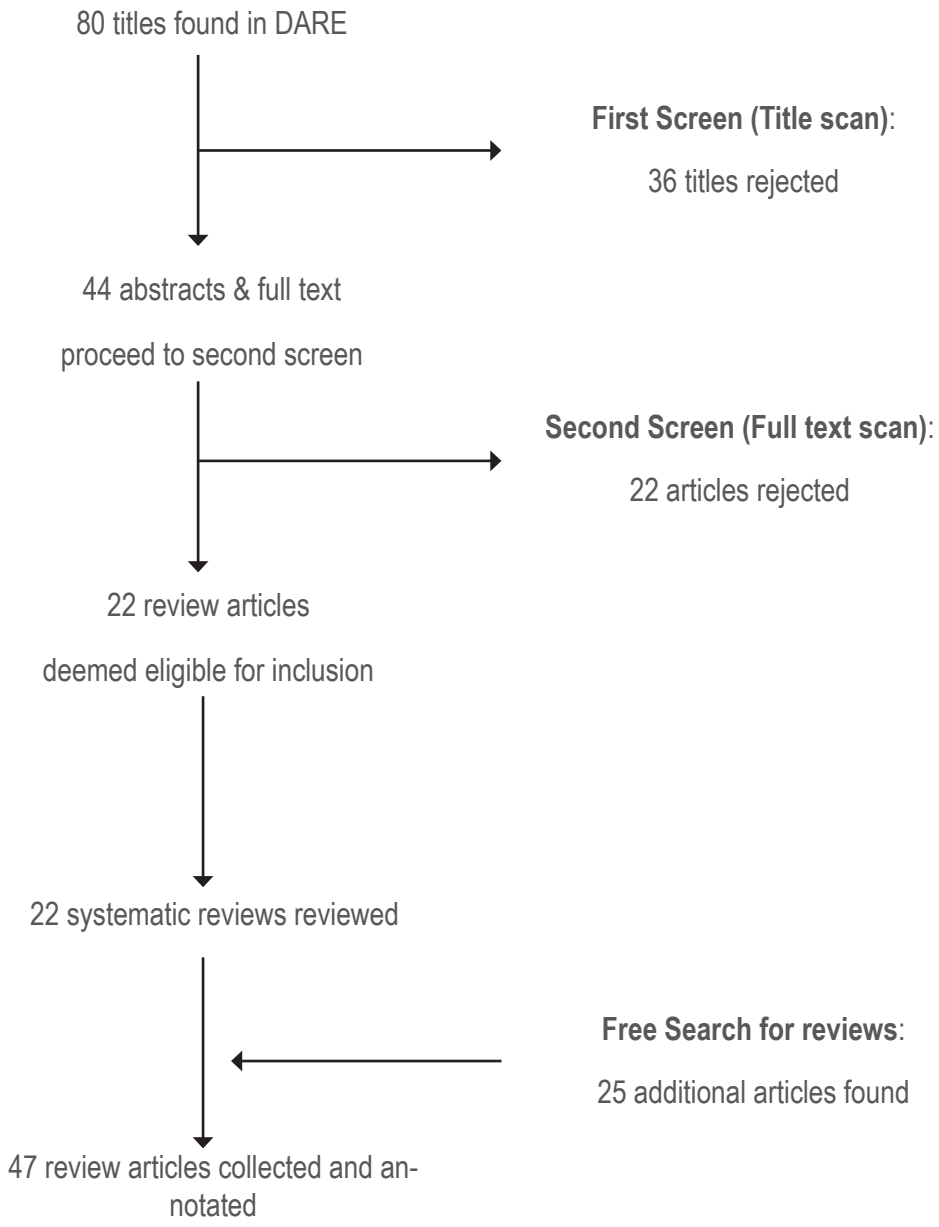
1. (family or families).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
2. (parent or parents).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
3. (child or children or newborn or neonat$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
4. (mother$ or baby or babies).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
5. 1 or 2 or 3 or 4
6. (home visit$ or health visit$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
7. house call$.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
8. social worker$.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
9. (parent$ adj3 (education or class$ or training or program$ or skill$)).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
10. ((prenatal or ante natal or antenatal or post natal or postnatal) adj3 (class$ or training or education)).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
11. (district nurs$ or community nurs$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
12. 6 or 7 or 8 or 9 or 10 or 11
13. ((improv$ or increas$) adj3 (health or wellbeing or well being)).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
14. (reduc$ adj3 (mortality or morbidity or health inequ$ or social variation$ or social inequ$)).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
15. (support or encourage$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
16. ((maternal or mother$) adj3 health).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
17. ((parent$ or mother$) adj1 (child or infant) adj1 relationship$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
18. (child$ adj1 (development or welfare or abuse or health)).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
19. 13 or 14 or 15 or 16 or 17 or 18
20. 5 and 12 and 19

Notes on the feasibility of a full systematic review

As indicated in the body of our report, we searched only the Database of Abstracts of Reviews of Effect. We have, however, explored the feasibility of updating one systematic review of reviews that we found (that is the HDA 2004 evidence briefing: "Ante- and post-natal home-visiting programmes: a review of reviews" by Bull and colleagues) and undertaking a full systematic review of reviews through to 2008. The most sophisticated searches detailed by Bull et al. (2004), when applied to EMBASE, Medline, Cochrane, Sociological Abstracts, CINAHL, Social Science Citation Index, DARE and HTA, with updated dates and the inclusion of French language results, yield approximately 1170 titles (before deletion of duplicates). Less well-defined searches, which were applied to TRIP, PsychINFO and Sociological Abstracts, produced 4580 titles (duplicates included).

Thus in total, some 5,750 titles and abstracts would have to be screened to eliminate duplicates and assess eligibility. From past experience we would expect one-fifth of these to pass the first screen. Thus we would need to retrieve 1,150 articles and check the full text of these to confirm eligibility. Since we have already identified more than 40 relevant review articles, it is difficult to gauge how many new titles such a systematic search would yield. We do not expect it to be high, however, and so the value of the exercise lies more in the knowledge that the search has been comprehensive.

APPENDIX B: FLOWCHART OF THE SEARCH PROCESS



APPENDIX C: DETAILED SUMMARY OF THE 22 SYSTEMATIC REVIEWS FOUND IN DARE

The 22 systematic reviews found in DARE are listed below. The numbers correspond to the study numbers cited in Table 2 and Table 3. One-page summaries of the reviews themselves, and the data extracted from the reviews, follow this list.

(1) Blondel, B., Mellier, G. (1996). Les visites à domicile pendant la grossesse: revue des essais randomisés et questions soulevées [Home visits during pregnancy: review of randomized trials and open questions]. Journal of Gynecology Obstetrics Biology of Reproduction, 25(5), 515-522.

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(6) Close, J. (2002). Does accident prevention education reduce the incidence of childhood accidents in the home? British Journal of Community Nursing, 7(12), 639-644.

(7) de Oliveira, M. I., Camacho, L. A., Tedstone, A. E. (2001). Extending breastfeeding duration through primary care: a systematic review of prenatal and postnatal interventions. Journal of Human Lactation, 17(4), 326-343.

(8) Durlak, J. A., Wells, A. M. (1997). Primary prevention mental health programs for children and adolescents: a meta-analytic review. American Journal of Community Psychology, 25, 115-152.

(9) Elkan, R., Kendrick, D., Hewitt, M., Robinson, J. J., Tolley, K., Blair, M., . . . Brummell, K. (2000). The effectiveness of domiciliary health visiting: a systematic review of international studies and a selective review of the British literature. Health Technology Assessment, 4(13), 1-339.

(10) Emmons, K. M., Wong, M., Hammond, S. K., Velicer, W. F., Fava, J. L., Monroe, A. D., Evans, J. L. (2001). Intervention and policy issues related to children's exposure to environmental tobacco smoke. Preventive Medicine, 32(4), 321-331.

(11) Fraser, C., James, E. L., Anderson, K., Lloyd, D., Judd, F. (2006). Intervention programs for children of parents with a mental illness: a critical review. International Journal of Mental Health Promotion, 8(1), 9-20.

(12) Gepkens, A. Gunning-Schepers, L. J. (1996). Interventions to reduce socioeconomic health differences. A review of the international literature. The European Journal of Public Health, 6(3), 218-226.

(13) Kendrick, D., Hewitt, M., Dewey, M., Elkan, R., Blair, M., Robinson, J., . . . Brummell, K. (2000). The effect of home visiting programmes on uptake of childhood immunization: a systematic review and meta-analysis. Journal of Public Health, 22(1), 90-98.

(14) Lu, Q., Lu, M. C., Schetter, C. D. (2005). Learning from success and failure in psychosocial intervention: an evaluation of low birth weight prevention trials. Journal of Health Psychology, 10(2), 185-195.

(15) Lumley, J., Austin, M., Mitchell, C. (2004). Intervening to reduce depression after birth: A systematic review of the randomized trials. International Journal of Technology Assessment in Health Care, 20(2), 128-144.

(16) MacMillan, H. L. (2000). Preventive health care, 2000 update: prevention of child maltreatment. Canadian Medical Association Journal, 163(11), 1451-1458.

(17) McNaughton, D. B. (2004). Nurse home visits to maternal–child clients: a review of intervention research. Public Health Nursing, 21(3), 207-219.

(18) Roberts, I., Kramer, M. S., Suissa, S. (1996). Does home visiting prevent childhood injury? A systematic review of randomised controlled

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(20) Tedstone, A., Dunce, N., Aviles, M., Shetty, P., Daniels, L. (1998). Effectiveness of interventions to promote healthy feeding in infants under one year of age. London: Health Education Authority.

(21) Thomas, H., Camiletti, Y., Cava, M., Feldman, L., Underwood, J., Wade, K. (1999). Effectiveness of parenting groups with professional involvement in improving parent and child outcomes. Region of Hamilton-Wentworth, ON: Social and Public Health Services Division.

(22) Wade, K., Cava, M., Douglas, C., Feldman, L., Irving, H., O'Brien, M. A., . . . Thomas, H. (1999). A systematic review of the effectiveness of peer/paraprofessional 1:1 interventions targeted towards mothers (parents) of 0-6 year old children in promoting positive maternal (parental) and/or child health/developmental outcomes. Hamilton, ON: Effective Public Health Practice Project (EPHPP).

APPENDIX D: 25 REVIEWS NOT IN DARE

The 25 reviews not found in DARE are listed below.

(23) Aos, S., Lieb, R., Mayfield, J., Miller, M., Pennucci, A. (2004). *Benefits and costs of prevention and early intervention programs for youth: Technical appendix* (04-07-3901). Olympia, WA: Washington State Institute for Public Policy.

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(25) Bilukha, O., Hahn, R. A., Crosby, A., Fullilove, M. T., Liberman, A., Moscicki, E., . . . Task Force on Community Preventive Services. (2005). The effectiveness of early childhood home visitation in preventing violence: A systematic review. *American Journal of Preventive Medicine*, *28*(2, Supplement 1), 11-39.

(26) Blok, H., Fukkink, R. G., Gebhardt, E. C., Leseman, P. P. M. (2005). The relevance of delivery mode and other programme characteristics for the effectiveness of early childhood intervention. *International Journal of Behavioral Development*, *29*(1), 35-47.

(27) Bull, J., McCormick, G., Swann, C., Mulvihill, C., Health Development Agency. (2004). *Ante- and post-natal home-visiting programmes: a review of reviews: Evidence briefing* (1st Edition). Health Development Agency.

(28) Evanson, T. A. (2006). Addressing domestic violence through maternal-child health home visiting: what we do and do not know. *Journal of Community Health Nursing*, *23*(2), 95-111.

(29) Geeraert, L., Van den Noortgate, W., Grietens, H., Onghena, P. (2004). The effects of early prevention programs for families with young children at risk for physical child abuse and neglect: a meta-analysis. *Child Maltreatment*, *9*(3), 277-291.

(30) Gomby, D. S. (2005). *Home visitation in 2005: Outcomes for children and parents. Invest in kids working paper 7*. Sunnyvale, CA: Committee for Economic Development Invest in Kids Working Group.

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(37) Lee, S., Aos, S., Miller, M. (2008). *Evidence-based programs to prevent children from entering and remaining in the child welfare system: Benefits and costs for Washington* (08-07-3901). Olympia, WA: Washington State Institute for Public Policy.

(38) Lundahl, B. W., Nimer, J., Parsons, B. (2006). Preventing child abuse: A meta-analysis of parent training programs. *Research on Social Work Practice*, *16*(3), 251-262.

(39) MacLeod, J., Nelson, G. (2000). Programs for the promotion of family wellness and the prevention of child maltreatment: a meta-analytic review. *Child Abuse & Neglect*, 24(9), 1127-1149.

(40) McNaughton, D. B. (2000). A synthesis of qualitative home visiting research. *Public Health Nursing*, *17*(6), 405-414.

(41) Nelson, G., Westhues, A., MacLeod, J. (2003). A meta-analysis of longitudinal research on preschool prevention programs for children. *Prevention & Treatment*, 6(31).

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CHAPTER 2: TOWARDS A BUSINESS CASE FOR HOME VISITING PROGRAMS: A Postscript to Preventive Home Visiting for Pregnant Women and Mothers of Young Children: A Review of Reviews by Pierre Guenette and Alan Shiell, Population Health Intervention Research Centre, University of Calgary

SUMMARY

Our previous report (a review of reviews examining the effectiveness of home visiting programs) provided some indication of the effects of home visiting but fell short of what was required to develop a business case.

In this post script, we examine two additional reviews of home visiting that were not eligible for inclusion in the Review of Reviews. Both synthesize the available evidence, quantifying the impact of home visiting programs.

The first review (by Sweet and Appelbaum (2004)) identifies six domains where home visiting programs have a statistically significant positive impact. It also allows us to illustrate the complexities involved in developing a business case.

The second review (by Aos and colleagues (2004) in Washington State) addresses those complexities. It takes a subset of the immediate impacts of home visiting programs and through extensive further analysis develops an estimate of cost-benefit. Their results suggest that targeted home visiting programs generate benefits worth more than the costs, returning $2.28 for every $1 invested. Aos concluded that home visiting programs offered good value for money even though not every program was effective.

Taken together both reviews provide the framework and much of the evidence we need to develop a business case for home visiting programs in Canada.

There is still some work to do however. We need to compare the characteristics of programs being planned or implemented in Canada and the populations they are intended to serve with those that were the subject of the reviews to ensure that the estimates of effectiveness are indeed applicable to practice here. We also need to interrogate the data that Aos used to populate his models, to substitute Canadian data where possible, and re-run his analyses where necessary, to generate Canada-relevant estimates.

This new work will change the cost-benefit results, but the magnitude of the benefits revealed by Aos' work suggests that his conclusion will be robust.

PREFACE

In their report to the National Coordinating Centre on the Determinants of Health, Leighton and Shiell (2009) presented the results of a rapid 'review of reviews' examining the effectiveness of home visiting interventions for pregnant women and mothers of young children.

That report set out to 'bring together evidence on home visiting as a delivery strategy to promote maternal and child outcomes' as one step towards the preparation of a business case for home visiting that public health authorities might use to inform their resource allocation decisions.

Resource constraints limited the search that the authors could undertake to review articles that had already been identified, rated for the quality of their methods and included in the Database of Abstracts of Reviews of Effect (DARE). This increased the efficiency of the search and screening steps and ensured that the review of reviews could focus more on the results of review articles that had already passed a rigourous assessment of their quality. After screening and reviewing titles and abstracts in the DARE database and evaluating full copies of all articles that appeared relevant, 22 review articles were examined and summarized.

The results were a little disappointing. None of the review articles found in DARE provided any formal synthesis of

the results of the studies that had been examined. Results were mixed with positive impacts documented on some dimensions of outcome but many non-significant and equivocal results as well. Study design issues were plentiful with reports of low statistical power, poor control of confounding, and frequent mis-match between the theory underpinning the intervention and the outcomes that were measured. The programs also varied enormously in the client group, the outcomes deemed to be important and the content of the program, its intensity and its mode of delivery.

Leighton and Shiell (2009) concluded that 'intensive, well-resourced programs of long duration provided by well-trained staff are more likely to be effective in all but very special circumstances'. They were not however able to advance the preparation of a business case beyond this.

In the period since completion of the review of reviews, we have had an opportunity to go back over the search criteria and the articles it surfaced. Prominent among the list of review articles identified by our searches but that were not included in DARE (which therefore meant that the quality of the review had not been assessed) were two notable pieces of work, each of which presented the results of a meta-analysis of the home visiting literature. Each in its own way provides important pieces of the information needed to compile a business case for investment in home visiting. In this postscript to the original report by Leighton and Shiell (2009) we describe the two reviews and explore the extent to which they enable a business case to be prepared.

INTRODUCTION

There are several definitions of 'business case' but one that reflects best how we interpreted the term comes from the UK Association for Project Management, who suggests that, a business case:

'provides justification for undertaking a project, in terms of evaluating the benefit, cost and risk of alternative options and rationale for the preferred solution. Its purpose is to obtain management commitment and approval for investment in the project.' (http://www.apm.org.uk/Definitions.asp).

The motivation for undertaking the review of reviews referred to above was to assess whether the evidence required to compile a business case for home visiting programs was available. In effect this meant focusing on the effectiveness of home visiting: that is their impact on outcomes deemed valuable including future cost offsets. Estimates of the costs of implementing the programs, whilst being informed by the characteristics of program delivery described in the review articles, would be based on information about the resources required (staffing, office space etc.) to deliver actual programs in the Canadian context.

To this end, our reliance on DARE as the source of quality-assessed review articles was a little misleading. None of the review articles we found listed in DARE provided summary (that is synthesized) estimates of program effectiveness. Coverage of DARE is less than complete, however, and our searches identified several review articles pertinent to home visiting that had not yet made it into the DARE database. It was obvious that some of these 'non-DARE' reviews were high quality (their search strategy was systematic and inclusion and exclusion criteria were clearly stated), but as we were unable to evaluate all of the 'non-DARE' studies systematically we took the decision not to feature them in the original report.

Two in particular appeared to offer important insights as each one presented a synthesis of some aspect of the home visiting evidence. We have singled these out for further consideration in this postscript. The first of these is a paper by Monica Sweet and Mark Appelbaum (2004) that reviewed and synthesized the evidence from 60 individual studies of home visiting programs. The second is a report by Steve Aos and colleagues (2004) at the Washington State Institute for Public Policy, which also presents a meta-analysis of the effectiveness of home visiting, but does so in a way that complements the work of Sweet and Appelbaum (2004).

In the section that follows, we use the work of Sweet and Appelbaum (2004) to highlight what is known about the effectiveness of home visiting programs, and also what is not known. To this end we describe possible causal pathways

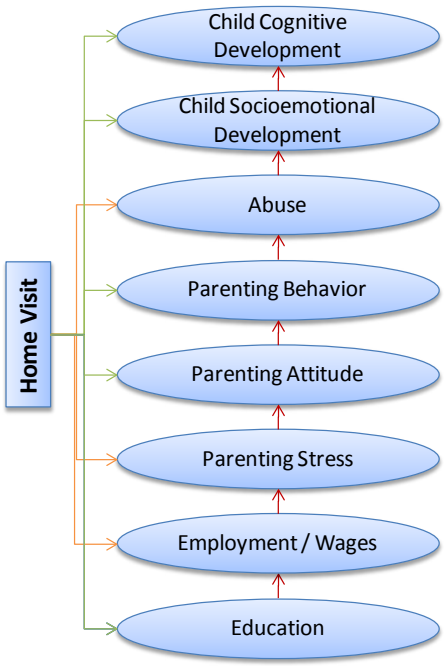
between a home visiting intervention and its final impacts of interest. For brevity we focus on the paths leading to each of four major categories of cost-offsets, representing savings in the future costs of education, health, criminal justice and social welfare, ignoring, for purposes of clarity only, the improvements in health, school performance, employment and social behaviour that bring about these savings. In the section afterwards, we describe how Steven Aos and colleagues (2004) filled in some of the gaps.

Sweet and Appelbaum: The Effectiveness of Home Visiting

Sweet and Appelbaum (2004) reviewed 60 home visiting interventions conducted since 1965. Three-quarters of these were programs open only to families deemed to be 'at-risk' because of their socio-economic or demographic circumstances (e.g., low income, welfare dependency, drug abuse, teenage mother). Fewer than 10% of programs enrolled all families irrespective of 'need'.

They identified 10 categories of 'outcome': child cognitive and socio-emotional development; child abuse (actual and potential); parenting stress, behaviour and attitudes; and maternal education, employment and reliance on public assistance. The meta-analysis suggested statistically significant effect sizes in six of the 10 categories of outcome (Figure 1). For brevity we have collapsed the two categories of child abuse into one and rolled reliance on welfare under employment and wages.

Figure 1: Initial Effects of a Home Visiting Programme



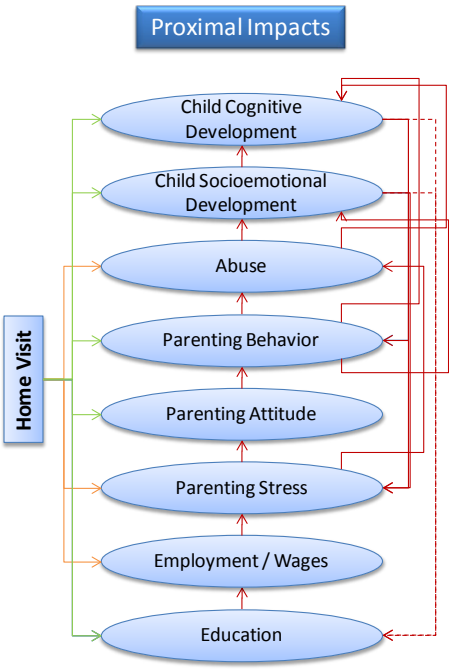
Based on Sweet and Appelbaum

Such information is necessary for the development of a business case but not sufficient. Ultimately we need to trace the impact of home visiting on each of these categories of outcome through to the final effects on child and maternal health and well-being.

The first step is to acknowledge the connections among these initial outcomes. A child's cognitive development, for example, might also be a function of parental attitudes and stress. Home visiting might therefore have both a direct

effect on a child's cognitive development because of the activities that the home visitor organizes, plus an indirect effect mediated through any changes brought about in the parent. The sum of the direct effects of home visiting plus the indirect effects, we label 'proximal impacts' (Figure 2).

Figure 2: Proximal Impacts of the Home Visiting Programme



The second step is to trace the impact of these proximal effects into 'distal' or more distant changes in behaviour and achievement. We track the causal pathway for education-related outcomes in Figure 3, health-related outcomes in Figure 4, criminal justice in Figure 5 and welfare or social services in Figure 6. For brevity we focus only on the cost-offsets consequent to effective home visiting. We do not include the health and educational outcomes that bring about these savings.

Figure 3: Drivers of Education Cost Offsets

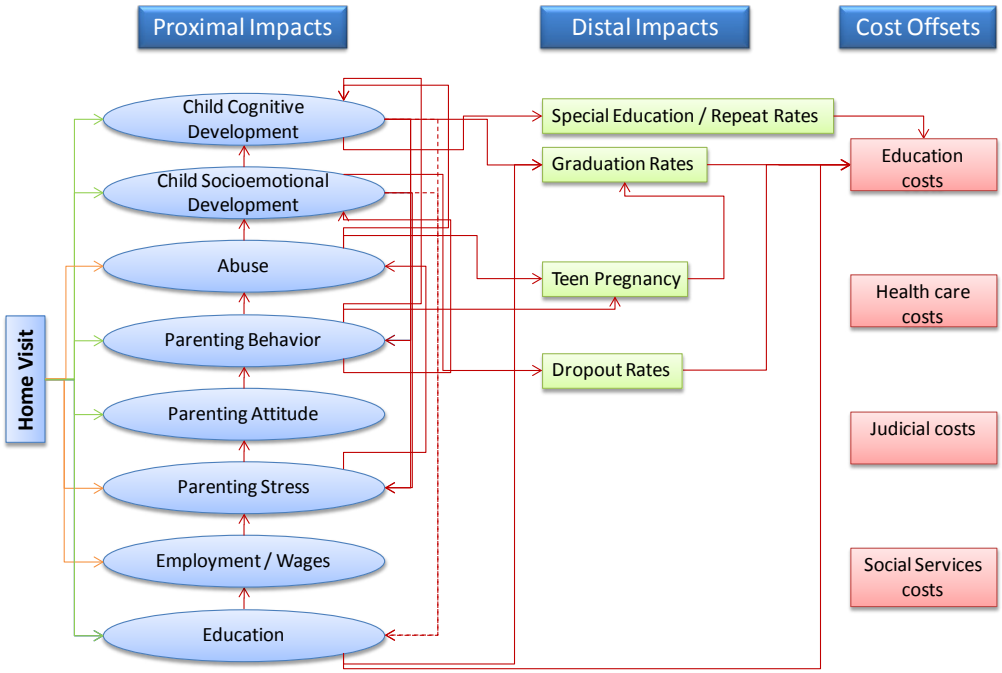


Figure 4: Drivers of HealthCare Cost Offsets

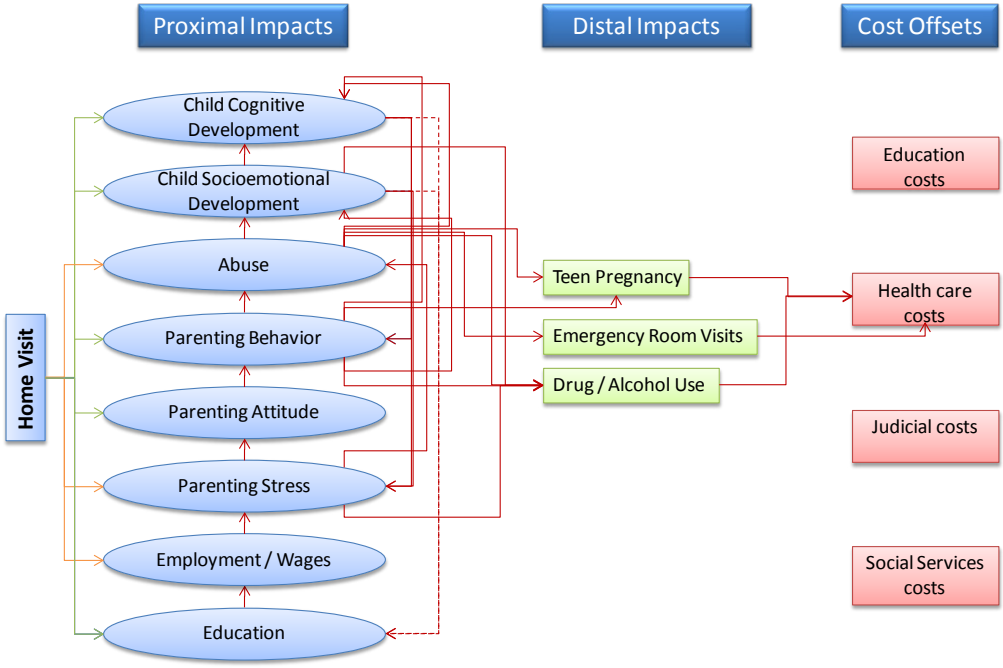


Figure 5 Drivers of Judicial Cost Offsets

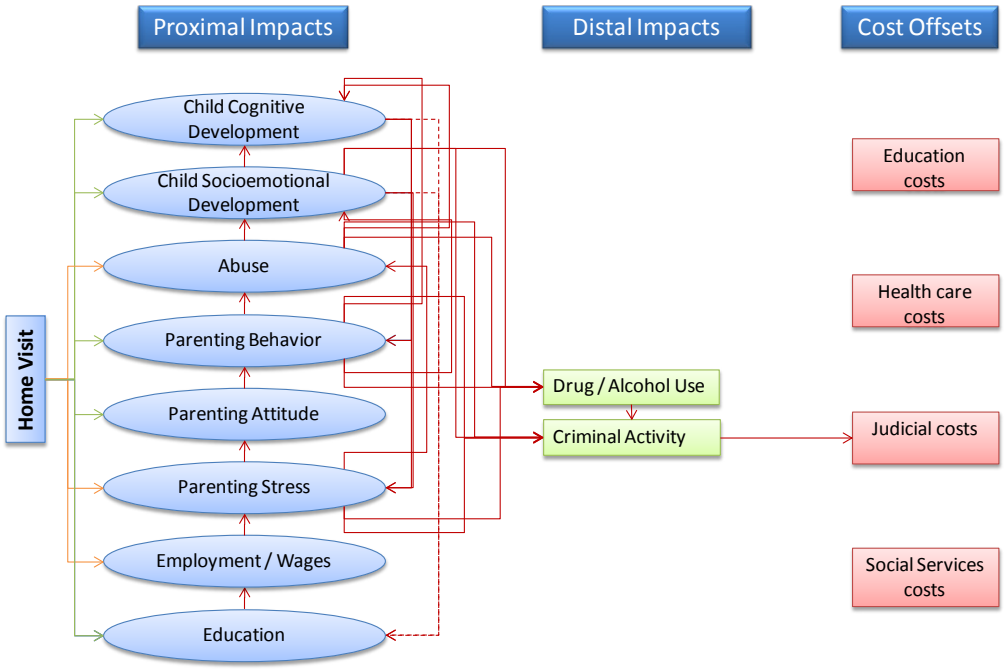
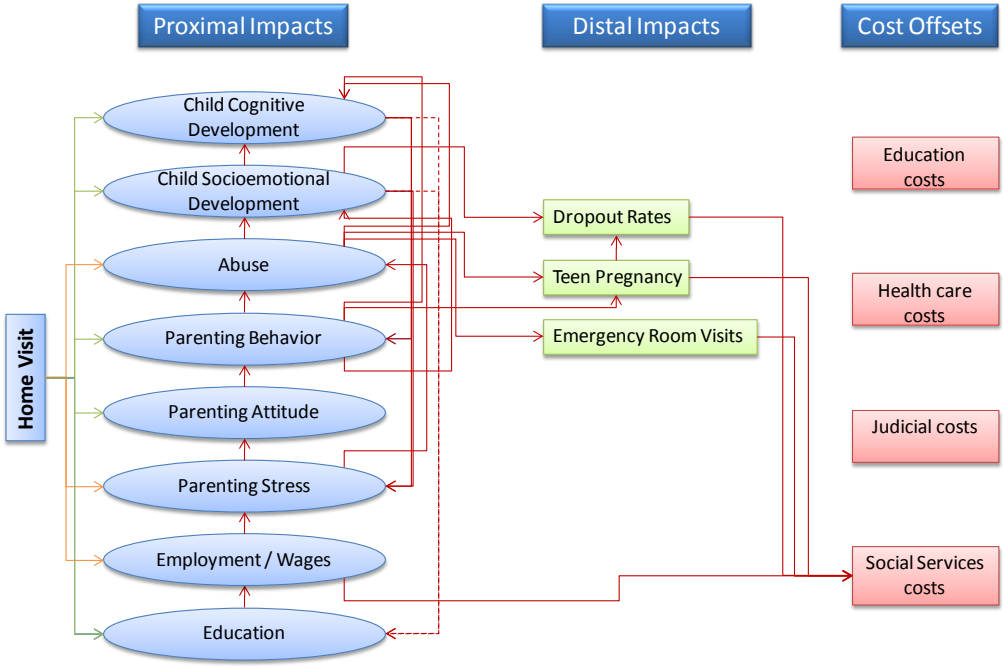
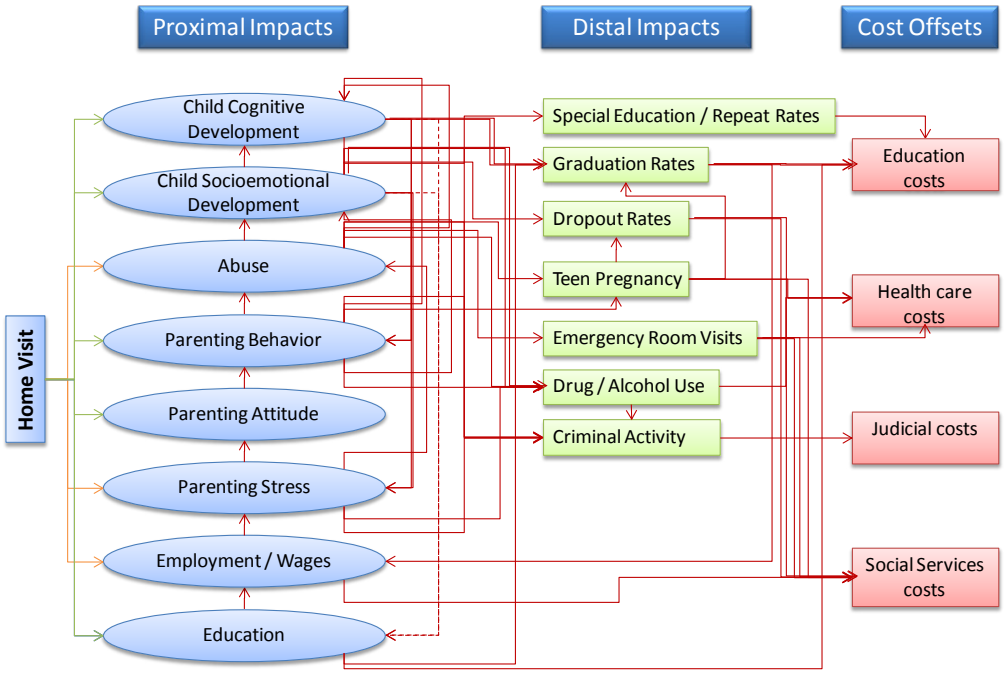


Figure 6 Drivers of Social Services Cost Offsets



The full complexity of the task facing those who seek to produce the business case for home visiting can be seen if we draw the complete causal chain (Figure 7).

Figure 7 Complete Cost Offset Model



To produce the business case we need to quantify each of the relationships depicted by arrows in this diagram. Our initial review of reviews identified where some of the links existed but provided us with no quantifiable evidence. The review by Sweet and Appelbaum (2004) quantifies the direct effect of home visiting programs but provides an incomplete picture of the proximal effects (it did not consider the indirect effects of home visiting for example) and nothing on the size of the distal effects. For this we need to look elsewhere.

Aos and Colleagues: Benefits and Costs of Preventive Programs

This is where the work of Steve Aos and colleagues at the Washington State Institute for Public Policy comes in.

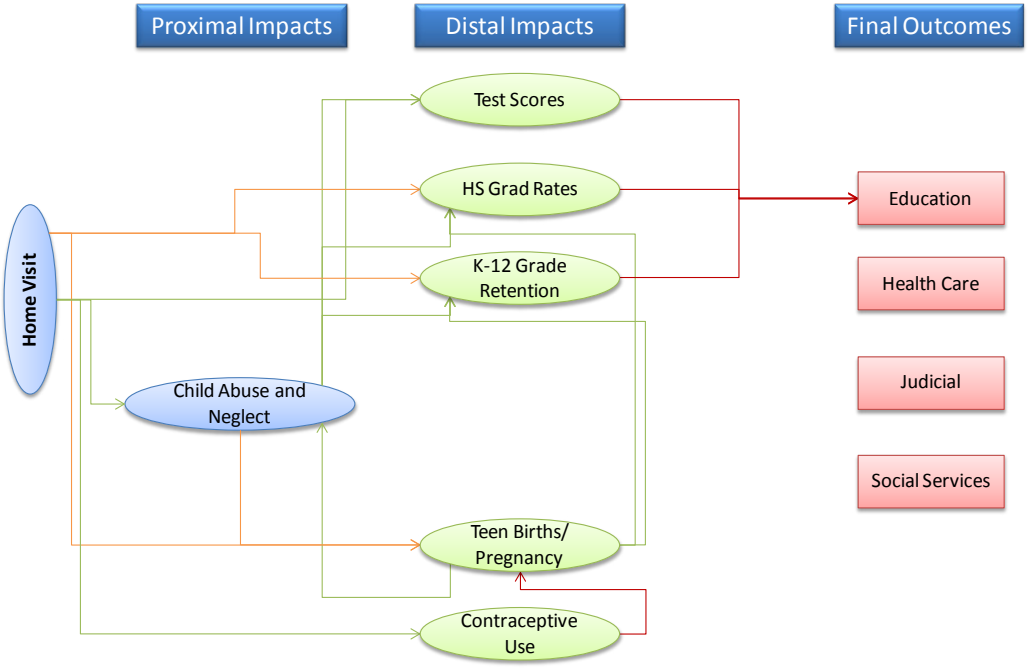
Aos and colleagues were charged with informing decision makers in Washington State's Legislature on which preventive programs aimed at children and young people offered the best return on dollars invested. Home visiting was one of a number of forms of intervention considered in the evaluation. The legislature was interested in seven categories of outcome: crime; substance abuse; educational outcomes such as test scores and graduation rates; teen pregnancies; teen suicide attempts; child abuse or neglect; and domestic violence: however, only two of these (educational achievement and child abuse) were found to be responsive to home visiting. While there is some overlap between the outcomes considered by Aos and his colleagues and those reflected in the work of Sweet and Appelbaum there are notable differences also. For example, Aos did not consider relevant public health outcomes such as injury or accident prevention as these lay beyond the remit for this particular study.

Unlike Sweet and Appelbaum, however, Aos did quantify the cost-effectiveness of home visiting, by considering the indirect effects described above, and by extending the analysis through to the final impacts on relevant health and educational outcomes. The analysis is partial in that it focuses on outcomes that could be readily expressed in monetary terms, but in calculating a return on investment to home visiting Aos makes explicit the information we need to compute a similar business case for Canada.

The Aos review is based on 19 original evaluations of home visiting, of which 10 also appeared in the review by Sweet and Appelbaum. This was supplemented by several studies that were not necessarily directly associated with home visiting but that quantified connections further along the causal chain.

The impact of home visiting on *educational achievement* was tracked through to changes in test scores and reductions in grade retention for the children, and increases in high school completion among young mothers. Separate evidence of the effect that each of these has on expected lifetime employment and earnings was then used to translate the changes into an expected increase in income over a child's life, providing a monetary estimate of the benefits of home visiting (Figure 8). Fewer children being held back a grade also makes for lower costs of education in the future and the savings expected from this route were also estimated.

Figure 8 Effects on Educational Outcomes

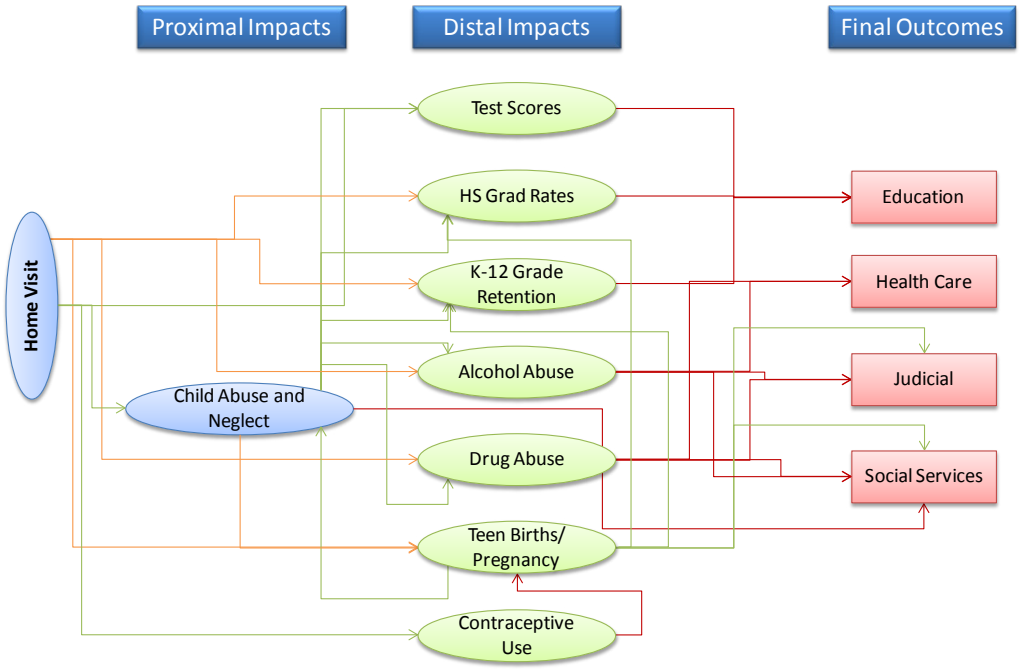


The second category of benefit / cost-offset considered by Aos was the impact that home visiting had on *child abuse and neglect*. This includes: (i) the public sector costs of dealing with cases of child abuse (monitoring, assessment, placement etc.); (ii) the longer term impact that child abuse has on costs of health care; and, (iii) the impact that child abuse has on subsequent outcomes. This last category adds much complexity, as child abuse has been linked with poor educational outcomes (providing a connection to the costs and benefits described in the previous paragraph), to criminal and delinquent behaviour, to drug and alcohol abuse and to teen pregnancy. Thus one also needs to quantify the indirect effects of home visiting on outcomes of interest.

The work required to evaluate the full effects working through a reduction in child abuse and neglect is extensive. Taking crime as an example, Aos first had to quantify the costs of one criminal episode. Seven categories of crime were identified and fourteen categories of cost (policing, courts, detention etc.). A series of regression and other analyses were performed on each category of cost to come up with estimates of the unit cost of one criminal event.

These were the only two categories of outcome found by Aos to be responsive to home visiting programs. The full extent of the causal pathways quantified by Aos is shown in Figure 9.

Figure 9 Full Model Evaluated by Aos and Colleagues



Towards a Business Case

Sweet and Appelbaum provide a good indication of the range and size of benefits that might be expected from implementation of a home visiting program that shared the characteristics of those included in the review. However, it does not provide sufficient information on the consequent changes that home visiting brings about and thus cannot by itself inform the development of a business case.

In contrast, Aos does present the essence of a business case, albeit a partial one in that not all of the effects noted by Sweet and Appelbaum are followed through to estimates of outcome and cost offset. Aos computes an estimate of the cost of home visiting programs and by comparing this with his estimates of the monetary value of the benefits he can also calculate a return on investment.

His estimate of the costs of home visiting programs (US$4,892 in 2002 prices) is based on information taken from a small sub-set of the interventions covered in his review. The monetary value of the benefits generated was US$10,969 (of which 85% represents the increased earnings that accrue to an individual who does better at school). Thus, home visiting programs generate net benefits (benefits *minus* costs) worth US$6,077 or a benefit to cost ratio (benefits *divided* by costs) of US$2.28. Thus every $1 invested in home visiting generates a return of $2.28.

One question then is can we apply this result to policy in Canada? Three issues need to be considered.

The first concern is whether by restricting their evaluation to the subset of outcomes identified by the Washington State Legislature Aos and colleagues have overlooked any harmful effects of home visiting. In this instance, a more complete evaluation would come up with a less attractive answer. (Note that the exclusion of any important benefits such as injury is less important as their inclusion in the evaluation would merely reinforce the conclusion that home visiting is a worthwhile use of resources). Sweet and Appelbaum do not report any harmful effects and of the 22 review articles that were examined in our original 'Review of Reviews' only two studies reported equivocal results (some positive / some negative) and then only for two categories of outcome (from among 30 that had been measured). So, with one exception, while the risk of harm cannot be ignored it would not appear to be significant. The exception is the possibility of stigma induced by targeted interventions such as those reviewed by Aos and by Sweet and Appelbaum.

Unfortunately, as we noted in the Review of Reviews, none of the studies we examined measured this.

The second issue also relates to the targeted nature of the programs that were evaluated by Aos and by Sweet and Appelbaum. More than 90% of the programs evaluated by Sweet and Appelbaum were targeted to some extent on families deemed to be at risk. Aos does not describe the characteristics of the programs included in his synthesis but by the degree of overlap with the work of Sweet and Appelbaum, these too are likely to be targeted. Targeted programs tend to be more effective than universal programs, at least along the dimensions of outcome that were measured. There are likely also to be differences in the costs of targeted versus universal programs, not least because coverage of the latter is considerably greater. Care would need to be taken therefore in extrapolating from the results discussed here to programs that might involve different sorts of client groups.

A third consideration is the parameter values used by Aos and colleagues to quantify costs and benefits. Aos used rates specific to Washington State in the USA. Rates of return to additional years of education, the unit costs of policing, the judicial system, and health care, and the value we might ascribe to the health and social outcomes of home visiting might all be very different in Canada. Each of these will affect the cost-benefit results. There may also be differences in the cost structures of the Canadian police, justice and health systems, which might mean that the statistical analyses carried out by Aos need to be re-run: that is, it is not just a case of substituting Canadian values into the calculations performed by Aos.

Thus, while it is the case that the work of Aos is very supportive of home visiting, there is still a need to develop a business case for the Canadian context.

This would need to consider the characteristics of the programs being considered in the Canadian setting and how comparable they are with those evaluated by Aos to ensure that estimates of effectiveness are applicable.

CONCLUSION

The Review of Reviews provided cautious encouragement to the development of a business case but little that was tangibly useful beyond this. In Sweet and Appelbaum's meta-analysis we see what makes an economic evaluation of home visiting so complicated, but we also see that targeted home visiting programs are indeed effective in a number of important domains. In the economic evaluation reported by Aos and colleagues, we see that the value of these effects most likely exceeds the costs of the programs.

The final net-benefit or benefit to cost ratio will be different for Canada. However, the magnitude of the benefits revealed by Aos' work suggests that his conclusions will be unchanged as a result of the re-working.

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