

REVIEW OF RESEARCH on Home Visiting for Pregnant Women and Parents of Young Children

—by David Olds and Harriet Kitzman

This article has been drawn from an extensive literature review prepared by the authors for the Packard Foundation's The Future of Children, Winter 1993

Home visiting to pregnant women and parents of young children is a strategy that has caught the imagination of policy and program planners concerned with the improvement of maternal and child health (National Commission to Prevent Infant Mortality, 1988, 1989; Olds, 1992; Public Health Service, 1989; U.S. Advisory Board on Child Abuse and Neglect, 1990, 1991; United States General Accounting Office, 1990). The National Commission to Prevent Infant Mortality has included home visiting as a central component of its strategy to improve the outcomes of pregnancy and reduce the rates of infant morbidity and mortality in the United States (National Commission to Prevent Infant Mortality, 1988; 1989). The Expert Panel on the Content of Prenatal Care has recommended that home visiting be included as part of an augmented set of services for low-income, at-risk women (Public Health Service, 1989). The U.S. Advisory Board on Child Abuse and Neglect has declared child maltreatment a national emergency, has identified home visiting as the most promising method of addressing this pernicious problem, and has called for the development of a national home visiting program for all new parents (Public Health Service, 1989; U.S. Advisory Board on Child Abuse and Neglect, 1991). In 1991 the General Accounting Office had issued a report encouraging Congress to increase its level of support for home visiting services through an expansion of Title XIX of the Social Security Act (United States General Accounting Office, 1990). In the meantime, many states have begun to increase their support of home visiting services through a variety of Medicaid service categories (United States General Accounting Office, 1990). To what extent does the evidence on the effectiveness of home visiting support this surge of interest?

In this article, we review randomized trials of home-visiting programs that were aimed at reducing the rates of preterm delivery and low birthweight, and promoting the health and development of parents and young children. The review is divided into four major sections: prenatal programs aimed at preventing preterm delivery and low birthweight; programs designed to improve the health and development of low-birthweight or preterm infants and their parents; programs established to enhance the well-being of children from families at social or economic risk; and those few studies that evaluated program costs and savings due to averted use of other services and increases in government tax revenues.

This review focuses on randomized trials because these studies, when adequately designed and conducted, produce substantially better estimates of

program effects than do estimates derived from other types of research. By comparing the home-visited and control groups on the outcome of interest at the end of the study, the investigator can determine with a specified degree of statistical confidence the extent to which the differences observed between program and control groups are due to chance.

Prenatal Programs, Preterm Delivery, and Low Birthweight

None of the seven randomized trials of prenatal programs established to reduce the rates of preterm delivery and low birthweight found that home visiting reduced overall rates of preterm delivery or low birthweight (Oakley, Rajan, & Grant, 1990; Villar et al., 1992; Bryce, Stanley, & Garner, 1991; Dawson et al., 1989; Spencer, Thomas, & Morris, 1989; Graham et al., 1992; Olds, Henderson, Tatelbaum, et al., 1986). One study carried out in Elmira, New York, however, produced a significant reduction in the rates of preterm delivery among women who smoked cigarettes and an increase in birthweight among very young adolescents, two groups at increased risk for preterm delivery and low birthweight (Olds, Henderson, Tatelbaum, et al., 1986).

While none of the seven programs produced overall effects on the rates of preterm delivery and low birthweight, it should be emphasized that most of the trials failed to include program elements that are likely to improve pregnancy outcomes. To be effective, visitors must have detailed plans for not only teaching women about the risks and values of certain behaviors, but must be competent to help them devise individualized strategies for behavioral change. It is in these areas that standard prenatal care often fails, and home-visiting programs have the potential to make a difference. A corollary to this is that the positive effects of prenatal programs are likely to be focused on women with identifiable risks for preterm delivery or low birthweight. The failure of most trials carried out to date is, in our view, largely a reflection of inadequate causal models underlying the program design and a failure to concentrate the services on women with specific risks that are amenable to change.

With respect to improvement in maternal health outcomes, only two of the seven studies examined this issue and only one achieved success. Nurse-visited women in the Elmira trial reduced the number of cigarettes smoked and improved the quality of their diets over the course of pregnancy in contrast to women assigned to a comparison group (Olds, Henderson, Tatelbaum, et al., 1986). Comparable gains were not noted in a Latin American home visitation trial (Villar et al., 1992). The paucity of research on the improvement of health-related behaviors during pregnancy is lamentable because evidence suggests that at least certain types

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of health-related behaviors (such as maternal smoking) can be altered, with positive effects on birthweight (Sexton & Hebel, 1984).

All of the seven randomized trials of prenatal home visiting carried out to date included some psychosocial component in the home-visiting program (e.g., the provision of emotional support from the home visitor, the involvement of family members and friends), yet only three studies examined the influence of these components on outcomes. Investigators in the Elmira trial found that nurse-visited women, in contrast to comparison women, reported that their partners showed greater interest in their pregnancies at the end of gestation, and were more likely to be accompanied to the labor room by a support person (Olds, Henderson, Chamberlin et al., 1986). In the London trial, there was no program effect on depression at the end of pregnancy, but nurse-visited women reported fewer worries about the child in the newborn period (Field et al., 1982). In the Latin-American trial, the home-visited group reported more favorable expectations about delivery than did women in the control group (Villar et al., 1992). These results indicate that aspects of pregnant women's psychosocial functioning *can be* enhanced.

To be effective, programs must be clear about how they expect to improve the outcomes of pregnancy, and they must have sufficient contact with women to be able to achieve those objectives.

These types of mixed results can be found with respect to the ability of home visitation services to improve the mother's use of routine prenatal care, reduce maternal hospitalization during pregnancy, and reduce newborn intensive care use. In the Elmira study, women visited by nurses made better use of the Supplemental Food and Nutrition Program for Women, Infants and Children (WIC) and attended childbirth education classes more frequently than did their counterparts in the comparison group (Olds, Henderson, Chamberlin et al.,

1986). No other study reported on women's use of other health and human services in spite of considerable program emphasis on promoting this aspect of women's behavior.

In interpreting the general absence of program effects on preterm delivery and low birthweight, it is important to note that five of the trials were based on the assumption that preterm delivery and low birthweight could be reduced by reducing women's levels of psychosocial stress through the enhancement of their social support. In three of the trials, the home-visitors were even instructed to *avoid* teaching pregnant women about health-related behaviors (van Doornick et al., 1980; Spencer, Thomas, & Morris, 1989; Oakley, Rajan, & Grant, 1990; Bryce, Stanley, & Garner, 1991). Only three of the tested programs systematically attempted to improve women's health-related behavior (Olds, Henderson, Chamberlin et al., 1986; Villar et al., 1992; Graham et al., 1992). To be effective, programs must be clear

about how they expect to improve the outcomes of pregnancy, and they must have sufficient contact with women to be able to achieve those objectives.

Programs for Parents and their Preterm and Low Birthweight Newborns

Five randomized trials were identified which involved services for parents and their preterm or low birthweight babies (Scarr-Salapatek & Williams, 1973; Field et al., 1980; Barrera, Rosenbaum, & Cunningham, 1986; Resnick, Armstrong, & Carter, 1988; Resnick et al., 1987; Brooten et al., 1986). Four of the five focused on enhancing child development by improving some aspect of parental caregiving. All of these four studies are remarkably consistent in showing that home-visiting programs can increase the intellectual test performance of preterm and low birthweight newborns. In evaluating these studies, it is important to note that at least one (the Miami trial) employed infant test items in the home-visit protocol, so it is difficult to determine the extent to which the higher scores on the infant tests reflect superior cognitive development as opposed to the children's simply learning to solve the test items (Field et al., 1980).

Moreover, two of the studies had trouble maintaining contact with the families for assessments of program impact. In the first Philadelphia study, 93% of the intervention group, but only 60% of the control group were available for end-of-study assessments (Scarr-Salapatek & Williams, 1973). Similarly, the Florida trial was able to assess only 60% of the original sample at 12 months and 24% of the sample at 24 months (Resnick et al., 1987).

Two of the three studies which examined some aspect of the child's physical health as an outcome found positive service effects on the infant's weight gain and overall development. Among those three studies that examined program effects on various aspects of maternal caregiving, all found that at the end of the program, visited families provided homes that were more stimulating for the child's development. The teenaged parents of preterm babies visited in the Miami trial exhibited better interactive behavior with their infants, displayed more realistic attitudes towards child-rearing, and reported that their children had less difficult temperaments than did teenaged parents of preterm babies in the comparison group (Field et al., 1980). Investigators in the Ontario study composed two models of home-visiting programs and found that, compared to controls, parents enrolled in either type of home visiting program provided better home environments and better qualities of interaction with their children, with those enrolled in the parent-child interaction program functioning particularly well (Barrera, Rosenbaum, & Cunningham, 1986). Finally, investigators in the Florida trial found that parents visited at home provided more positive verbal interactions and fewer negative verbal interactions with their

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children (Resnick, Armstrong, & Carter, 1988).

Parents and Children at Social and Economic Risk

Nineteen randomized trials aimed at improving the health and wellbeing of children born to low-income families have been examined (Gutelius et al., 1977; Gutelius et al., 1972; Thompson et al., 1982; Field et al., 1982; Madden, O'Hara, & Levenstein, 1984; Olds, Henderson, Chamberlin et al., 1986; Olds, Henderson, & Kitzman, in press; Olds, Henderson, Tatalbaum, et al., 1988; Scarr & McCartney, 1988; Booth et al., 1989; Powell & Grantham-McGregor, 1989; van Doorninck et al., 1980; Infante-Rivard et al., 1989; Wasik et al., 1990; Gray et al., 1979; Siegel et al., 1980; Barth, 1991; Barth, Hacking, & Ash, 1986; Hardy & Streett, 1989; Lambie, Bond, & Weikart, 1974; Jester & Guinagh, 1983; Osofsky, Culp, & Ware, 1988; Epstein & Weikart, 1979; Larson, 1980). We have divided these trials into two broad categories: studies aimed at improving children's intellectual functioning, and studies aimed at preventing maltreatment, enhancing child health or mitigating behavioral problems.

The available evidence suggests that programs that employ nurses, are based on more comprehensive service models, and provide services to poor, unmarried teen parents stand a greater chance of influencing qualities of parental caregiving and the child's intellectual functioning than do narrowly focused programs staffed by paraprofessionals provided to a broad audience.

Fifteen trials placed significant emphasis on children's cognitive and language development by encouraging parents to be more actively involved in promoting their children's intellectual functioning. We have reviewed the studies that included an assessment of program impact on children's mental development and aspects of parental caregiving as a separate group, because the measures employed for these domains are either standardized or have acceptable reliability. Consequently, for this group of studies, we can begin to discuss what factors contribute to program success.

The results of those trials focusing on enhancing a child's mental development are mixed. Out of the 15 studies that examined program influence on children's mental development, six found significant overall program effects (Gutelius et al., 1977; Gutelius et al., 1972; Thompson et al., 1982; Field et al., 1980; Powell & Grantham-McGregor, 1989; Lambie, Bond, & Weikart, 1974; Jester & Guinagh, 1983). In at least one of these studies, however, the findings must be questioned because the final analysis was carried out on groups reconstituted from an extremely complex design in which there were high levels of attrition (Jester & Guinagh, 1983), leading us to question the equivalence of the groups on which the final analysis was performed.

In two of the studies there were modest indications that parental behavior was affected by the

program, although there were no indications of program impact on children's intellectual functioning. In the New York City trial, the outcome measures for an increase in maternal teaching behaviors were tied directly to the content of the program materials. Since improved maternal teaching behaviors did not result in improved child intellectual functioning, the full meaning of the program effects is not clear (Madden, O'Hara, & Levenstein, 1984). The findings from the Colorado trial were limited to teens and Hispanics, and the authors offer no explanation as to why Hispanics should benefit more than other ethnic groups (Dawson et al., 1990; Dawson, van Doorninck, & Robinson, 1989). Because these isolated findings are not part of a coherent pattern of results, they are more likely to be chance findings that are not reflective of program impact. Moreover, this trial had substantial attrition. By the end of the 12th month of the child's life, 45% of the control group and 27% of the visited group were unavailable for assessments.

The evidence suggests that low-income, unmarried teenagers are particularly responsive to these types of programs. Three of the programs that produced positive effects on children's intellectual functioning served low-income, unmarried, Black teenaged mothers (Gutelius et al., 1977; Gutelius et al., 1972; Thompson et al., 1982; Field et al., 1982). The fourth served low-income mothers in Kingston, Jamaica (Powell & Grantham-McGregor, 1989). A fifth program carried out in Elmira, New York produced positive effects on the mental development of children whose mothers were primarily poor, white, unmarried teenagers (Olds, Henderson, Chamberlin et al., 1986; Olds, Henderson, Tatalbaum et al., 1986; Olds et al., 1988). In contrast, of the studies that failed to produce positive effects, only one focused on low-income, unmarried teenagers (Kansas); it consisted of a narrowly defined program carried out by paraprofessionals (Field et al., 1980).

The available evidence suggests that programs that employ nurses, are based on more comprehensive service models, and provide services to poor, unmarried teen parents stand a greater chance of influencing qualities of parental caregiving and the child's intellectual functioning than do narrowly focused programs staffed by paraprofessionals provided to a broad audience. This is not to suggest that paraprofessional programs cannot produce positive effects. Rather, most paraprofessionally staffed programs examined in randomized trials have consisted of narrowly focused programs, which typically have been less successful.

Preventing Child Abuse

With respect to the prevention of child abuse, we now have six trials which have examined this outcome — Elmira (Olds, Henderson, Chamberlin, et al., 1986; Olds, Henderson, Tatalbaum et al.,

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1986; Olds et al., 1988); Colorado 1 (Dawson et al., 1990; Dawson, van Doorninck, & Robinson, 1989); Colorado 2 (Gray et al., 1979); Greensboro (Siegel et al., 1980); California (Barth, Hacking, & Ash, 1986); and Baltimore (Hardy & Streett, 1989). It is particularly difficult to determine whether programs have prevented child abuse and neglect, because there are no standardized measures of maltreatment (Leventhal, 1982) and definitions of maltreatment vary among studies. Most programs have relied upon a combination of reviews of state child protective service (CPS) records and children's medical records.

None of the studies produced overall reductions in the rates of child abuse and neglect derived from reviews of state CPS records. The absence of effect using CPS records should not be interpreted as an indication of program failure, however, because these data underestimate the frequency with which child maltreatment occurs and are prone to detection biases. Visitors in all states are required to report suspicion of maltreatment to the state child welfare agency, so families who receive home visiting are more likely to be detected as maltreating. While there are attractions in relying on the state-defined legal definition and corresponding state records, problems with ascertainment bias and underestimates of the rates make reliance on CPS records an insufficient basis for the determination of child maltreatment.

One study (Elmira), nevertheless, showed a reduction in the rates of state-verified cases of child abuse or neglect among women at greatest risk for care-giving dysfunction, based on standard sociodemographic risk characteristics. In that study, four percent of the children born to nurse-visited poor unmarried teens had verified cases of child maltreatment during the first two years of the child's

life compared to 19% of their counterparts in the comparison group. The reduction in state-verified cases of child abuse was corroborated by corresponding reductions in punishment and increases in the number of appropriate play materials observed in the children's homes at 10 and 22 months postpartum, and by reductions in emergency-room visits for injuries and ingestions during the second year of the child's life (Olds, Henderson, Chamberlin, et al., 1986). During a two-year period after the program ended, nurse-visited maltreated children lived in homes that were considerably more conducive to their intellectual social development, and they paid

substantially fewer visits to the emergency room and physicians office for injuries and ingestions than did their counterparts in the comparison group (Olds, Henderson, & Kitzman, in press). However, no differences in reported child abuse were realized

during the two-year period after the program ended (Olds, Henderson, & Kitzman, in press).

The absence of program effect on rates of child maltreatment derived from CPS records in other studies should not be viewed automatically as an indication that the program failed to reduce child maltreatment. Home visitors in all states are mandated reporters of suspected child maltreatment, so they are likely to identify emerging cases of child abuse and neglect at relatively early stages and report it to CPS, while the corresponding cases of maltreatment in the control groups are less likely to be detected until they become more serious and observable. There are indications that this type of detection bias may have operated in at least two of the programs (Dawson, van Doorninck, & Robinson, 1989; van Doorninck et al., 1980; Gray et al., 1979). Thus, maltreatment may be reduced by the provision of home-visiting, but its incidence may be detected unequally for the home-visited and control groups.

It is important, in this regard, to note that two of the six trials found significant changes in children's encounters with the health-care system that suggest reductions in either child abuse or neglect. The first Colorado trial found a significant reduction in hospitalization for serious injury, presumably due to abnormal parenting (Gray et al., 1979). The Baltimore trial of a single paraprofessional home-visitor found that the home-visited children made better use of preventive health services (well-child care), had fewer hospitalizations overall, and a lower proportion of cases with severe monilial diaper rash (which health-care providers believe is a reflection of parental caregiving) (Hardy & Streett, 1989). The Baltimore trial is particularly impressive because positive findings were observed for several outcomes that create a coherent picture of reduced caregiving dysfunction.

Studies of Costs and Benefits

Only a few of the randomized trials conducted on home visitation have examined the financial costs and benefits of home-visiting programs for pregnant women and parents of young children. The Philadelphia study of home-visiting following early discharge of low birthweight newborns showed that the visited group spent 11 fewer days in the hospital, weighed 200 grams less, and were 2 weeks younger at discharge than control infants. The mean hospital charge for the early-discharge group was \$47,520 vs. \$64,940 for the control group, and the mean physician's charge was \$5,933 vs. \$7,649. The mean cost of the home-visiting program was \$576, which produced a mean net savings of \$18,560 for each infant (Brooten et al., 1986).

A similar randomized trial was carried out to assess the safety and cost savings associated with the early discharge of full-term newborns. It showed

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that infants and parents who received a program of daily nurse-visiting could be discharged as early as 12 hours after delivery; the median age at discharge for the visited group was 26 hours, compared to 68 hours for the control group. The investigators estimated that the cost of the program (salaries of nurse practitioners, paramedical personnel, and medical consultants, as well as automobile expenses and home-care supplies) was approximately equaled by the hospital costs saved through early discharge (Yanover, Jones, & Miller, 1976). This study and the Philadelphia trial cited above were designed explicitly to reduce costs associated with the postpartum hospitalization of women and their newborns.

In the Elmira trial, the investigators assumed that, if institutionalized, the costs of the program would be covered by government. They therefore compared the cost of the program (nurses' salaries, benefits, supplies, travel, secretarial help, supervision, and agency indirect expenses) expressed in

1980 dollars to the cost of government services (also expressed in 1980 dollars) averted through the first four years of the child's life. Averted government-service costs were estimated by comparing the nurse-visited and comparison group with respect to the costs of Aid to Families with Dependent Children (AFDC), food stamps, Medicaid, child protective services and foster care, as well as increases in government revenues generated by income taxes from the women's participation in the work force. The savings that resulted from averted use of other government services and from increases in government tax revenues were discounted at 3% per year. On average, the prenatal and postpartum program cost about \$3,200 for 2-1/2 years of home visiting, or about \$1,280 per year. Low-income families (those most likely to use government services) used about \$3,300 less in other government services (government service costs minus tax revenues) during each of the first four years of the index child's life than did low-income families

in the comparison group. About 80% of the cost savings were concentrated in reductions in AFDC and food stamp payments, and about a third of the savings for low-income families overall were due to a reduction in unintended subsequent pregnancy. These cost savings may continue as the children grow older, but the families have not yet been followed beyond the children's fourth year of life (Olds et al., 1993).

The range of costs for home visiting is quite wide. In the paraprofessional program carried out in Denver by Dawson and colleagues (Dawson et al., 1990; Dawson, van Doorninck, & Robinson, 1989),

the cost of the service was estimated at \$1,224 per family per year, including salaries for the home visitors and project nurses, mileage, and indirect costs. This figure is similar to the costs of the Elmira program staffed by nurses at about the same time, and less than the cost of Home Start, which was estimated at \$1,750 per year per family in 1974 dollars (Love et al., 1976).

Hardy and Streett calculated that their Baltimore program cost about only \$60,000 to serve 131 families for a 24-month period (1989). These costs included salaries, fringe benefits, telephone, and administrative costs. The average total program cost was \$458 per family for two years, or \$229 per year. Although the total number of scheduled visits was only nine during the entire two-year period, the cost of the program was nevertheless remarkably low, especially since the program was carried out in the mid-1980s. Because the cost of this program is so dramatically different from the cost of others, it may not have included all of the same elements in the cost calculation.

Conclusions

Research on the effectiveness of home visiting is in its infancy. While data on program effectiveness for particular populations ranges from the spectacular to the disappointing, the potential value of home-visiting has only begun to be tapped with existing research designs, methods, and program models. In general, narrowly focused home visiting programs did not take advantage of many opportunities for the promotion of numerous aspects of maternal, child, and family health, and the evidence suggests that, at least for programs serving low-income, at-risk parents, those programs were less successful. Moreover, many of the studies failed to measure what the programs tried to affect, which has limited our ability to fully assess program impact and process. In addition, there is considerable room for learning more about the internal workings of such programs, including the impact of the home visitor-parent relationship, the role of program content, and the effects of frequency, timing, and duration of visitation on program success. The presence of so many variables that may affect the outcome of home visiting, of course, complicates the work of program evaluators. We should not be disheartened, however, in that the results from even these early trials can guide program and policy planners in their search for more effective preventive interventions.

Should government invest in home visiting? While there is some evidence that some home-visiting programs are at least revenue neutral from the standpoint of government spending, it must be remembered that program success varies considerably along the dimensions outlined in this review. The problems faced by vulnerable families in our society are so immense and the costs of failing to address these problems so great, that we cannot wait

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The problems faced by vulnerable families in our society are so immense and the costs of failing to address these problems so great, that we cannot wait for a definitive body of research before we begin to take action. We must set such programs in motion, however, with full awareness that the way the way is not well marked, and that we must continue to invest in efforts to understand how to improve these preventive interventions.

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TOLL-FREE HELP: Nationwide Numbers for Child Abuse and Neglect Services

800-227-5242	American Association for Protecting Children
800-448-3000	Boystown National Hotline
800-I-AM-LOST	Child Find Hotline
800-422-4453	Child Help USA
800-999-9999	Covenant House Hotline
800-221-2681	Family Services of America
800-A-WAY-OUT	Hotline for parents considering abducting their children
800-272-0012	Kevin Collins Foundation
800-872-5437	Missing Children Help Center
800-843-5678	National Center for Missing and Exploited Children
800-222-1464	National Child Safety Council
800-222-2000	National Council on Child Abuse
800-333-SAFE	National Domestic Violence Hotline
800-999-5599	National Information Center for Children and Youth with Handicaps
800-KIDS-006	National Resource Center on Child Sexual Abuse
800-231-6946	National Runaway Hotline
800-621-4000	National Runaway Switchboard
800-442-HOPE	National Youth Crisis Hotline
800-782-SEEK	Operation Lookout, National Center for Missing Youth
800-421-0353	Parents Anonymous (except in California)
800-352-0386	Parents Anonymous (in California)
800-627-3675	Red Flag/Green Flag Resources (sexual abuse prevention materials for children and young women)
800-333-1069	Tough Love (problem teens)
800-236-1222	Tri-County Council on Domestic Violence and Sexual Assault
800-HIT-HOME	Youth Crisis Hotline (child abuse, runaways)