SCHOOL of PUBLIC POLICY

23
Nurse Family Partnership (Denver)

Douglas J. Besharov
Peter Germanis
Caeli A. Higney
and
Douglas M. Call

September 2011

Maryland School of Public Policy
Welfare Reform Academy
www.welfareacademy.org

Part of a forthcoming volume
Assessments of Twenty-Six Early Childhood Evaluations
by Douglas J. Besharov, Peter Germans, Caeli A. Higney, and Douglas M. Call

Note: This report is open to public comments, subject to review by the forum moderator. To leave a comment, please send an email to welfareacademy@umd.edu or fill out the comment form at http://www.welfareacademy.org/pubs/early_education/chapter23.html.

23
Nurse Family Partnership (Denver)

The Nurse Family Partnership (NFP) operated in Denver, Colorado from 1994 to 1997. It was designed to "help low-income, first-time parents start their lives with their children on a sound course and prevent the health and parenting problems that can contribute to the early development of antisocial behavior."[1] The program had three main objectives: (1) to improve women's health-related behaviors during pregnancy; (2) to aid parents in the attainment of parenting skills and thus improve their children's health and development; and (3) to enhance the maternal life-course development of participating women by encouraging family planning, educational development, and self-sufficiency. The Denver evaluation was a three-armed, randomized trial designed to address the question of "whether the sporadic weak effects typically found for paraprofessional home visiting could be improved if paraprofessionals were provided with well-developed program guidelines and thorough training and supervision in a program model grounded in epidemiology and theory."[2] It differed from the two previous trials in Elmira, New York and Memphis, Tennessee in that it sought to examine the effectiveness of home-visiting by both nurses and paraprofessionals.

David Olds, professor of pediatrics at the University of Colorado Health Sciences Center, JoAnn Robinson, director of developmental research at the Prevention Research Center for Family and Child Health at the University of Colorado Health Sciences Center, and their colleagues (the "NFP team") evaluated the program. Olds earlier developed and evaluated the precursor programs in Elmira, New York and Memphis, Tennessee.

At the program's conclusion, there were a number of positive results for nurse-visited mothers and their children compared to the control group which was not the case for paraprofessional-visited women and their children. However, at the age-four follow-up, many of the positive differences for nurse-visited women and their children had disappeared. The positive impacts of the program were concentrated only among children with mothers with low

---

[1]David Olds, Peggy Hill, and Elissa Rumsey, "Prenatal and Early Childhood Nurse Home Visitation," *Juvenile Justice Bulletin* (November 1998): 1.

[2]David L. Olds et al., "Effects of Home Visits by Paraprofessional and by Nurses: Age 4 Follow-Up Results of a Randomized Trial," *Pediatrics* 114, no. 6 (December 2004): 1560.

psychological resources. As with the Elmira and Memphis evaluations, one concern is that the evaluation was conducted by the same group that designed the intervention and has yet to be independently evaluated.

Program Design

Program group. The Denver trial targeted women in twenty-one clinics serving low-income women in the Denver metropolitan area. The women were invited to participate in the trial if they had no previous live births and either qualified for Medicaid[3] or had no private health insurance. Of the participating women, 85 percent were unmarried, 47 percent were Mexican American, 35 percent were white, 15 percent were black, and 3 percent were American Indian or Asian.

Services. The program consisted of home visits made by either a trained, experienced nurse with a nursing degree (BSN) or by a paraprofessional with a high school education. Although the paraprofessionals had no college preparation, the NFP team notes that "extensive efforts were made to ensure that the paraprofessionals were well suited for this work."[4] Both nurses and paraprofessionals were provided with a one-month training course before they began working with families in the study.

The visits began during pregnancy and continued until the child reached two years of age. Both nurses and paraprofessionals followed detailed program guidelines that covered the personal health and development of the mothers and their children, although some program protocol were adopted to accommodate the paraprofessionals. Services included parent education, social support, and referrals to other health and social services. The visitors also focused on helping the mothers to improve their relationships with key family members and friends, especially their mothers and the fathers of their children.

Both paraprofessionals and nurses managed caseloads of about twenty-five families each, but the paraprofessionals had twice the level of supervision as nurses. The paraprofessionals completed an average of 6.3 home visits during pregnancy and 16 visits during infancy (the first two years of the child's life), while the nurses completed an average of 6.5 visits during pregnancy and 21 visits during infancy. The difference between the number of visits completed by the paraprofessionals and the nurses during infancy was statistically significant.

---

[3]At the time of the recruitment (between March 1994 and June 1995), Medicaid eligibility in Colorado was extended to women at 133 percent of the federal poverty level.

[4]David L. Olds, JoAnn Robinson, Ruth O'Brien, Dennis W. Luckey, Lisa M. Pettitt, Charles R. Henderson, Rosanna K. Ng, Karen L. Sheff, Jon Korfmacher, Susan Hiatt, and Ayelet Talmi, "Home Visiting by Paraprofessionals and by Nurses: A Randomized, Controlled Trial," *Pediatrics* 110 (2002): 487.

The Evaluation. Low-income women were recruited to participate in the trial from twenty-one antepartum clinics in the Denver metropolitan area between March 1994 and June 1995. Of the 1,178 low-income, pregnant women invited to participate, 735 were randomized into one of three groups (control group, paraprofessional home visitor group, or nurse home visitor group). Participants were stratified by maternal race/ethnicity, maternal gestational age at enrollment (either less than or greater than thirty-two weeks), and geographic region of residence. They were then randomly assigned to one of three groups—the control group, the paraprofessional group, or the nurse group. The control group received free developmental screening and referral services for their children at six, twelve, fifteen, twenty-one, and twenty-four months. The paraprofessional group received these services plus home visits by a paraprofessional during pregnancy and infancy, and the nurse group received these services plus home visits by a trained nurse during pregnancy and infancy.

Compared with those women who refused to participate (either actively or passively), the randomized women were more likely to be Hispanic (45 percent of randomized women versus 37 percent of active refusals and 39 percent of passive refusals) and less likely to smoke cigarettes (27 percent of randomized women versus 44 percent of active refusals and 32 percent of passive refusals). The groups were similar on other major sociodemographic characteristics such as age, race, language preference, and marital status.[5]

The reported outcomes examine the impact of the two home-visiting programs compared to the control group. The findings also single out one major subgroup—mothers with low psychological resources. This variable is based on a composite of the women's intelligence, mental health, and sense of mastery, and was dichotomized at the 50th percentile of the raw scores. The procedure split the women into two groups: a low-functioning group (40 percent of the sample) and a high-functioning group (60 percent of the sample).

Major Findings

At the program's conclusion, results showed positive impacts for nurse-visited mothers and their children on both cognitive and behavioral measures, and limited impacts for paraprofessional-visited mothers and their children. However, by the age-four follow-up, many of the initial positive impacts had disappeared, and were concentrated mainly among nurse-visited children with mothers with low psychological resources.

Cognitive. For the paraprofessional-visited group, at age two, there were no statistically significant differences on measures of the children's language and mental development. At the age-four follow-up, there were no statistically significant difference on children's language skills, as measured by the Preschool Language Scales, or executive functioning, a composite index

[5]Olds, et al., 2002, 487.

measuring attention and performance on inhibitory control tasks. However, children born to mothers with low psychological resources measured significantly higher (at the 0.10 level) on the executive functioning measure than did the control group (98.4 vs 95.5, an effect size of 0.29 SD).

For the nurse-visited group, at age two, significantly fewer children in the program group exhibited language development delays than in the control group (6 percent vs. 12 percent), but there were no statistically significant differences for measures of the children's average mental and language development. Program group children who were born to women with low psychological resources, however, had significantly higher average scores on measures of mental development (90.2 vs. 86.2) and language development (101.5 vs. 96.9) than children in the program group. Also, fewer of these program group children experienced language development delays (7 percent vs. 18 percent).

At the age-four follow-up, there were no significant differences between the nurse-visited program group and the control group as a whole. However, nurse-visited children born to mother's with low psychological resources demonstrated better language development (91.4 vs. 86.7, an effect size of 0.31 SD) and superior executive functioning (100.1 vs. 95.5, an effect size of 0.47 SD), compared to the control group.

School readiness/performance. Data apparently either not collected or not reported.

Socioemotional development. For paraprofessional-visited children, at six months, there were no statistically significant differences on three emotional development measures. At the age-four follow-up, there was no significant difference on the measure of emotional regulation between the program and control groups.

For nurse-visited children, at six months, children in the program group were "less likely to exhibit emotional vulnerability in response to fear stimuli" compared to children in the program group, but there were no other significant differences for two other emotional development measures. Nurse-visited children with mothers with low psychological resources were also significantly more likely to display emotion in response to anger or joy stimuli.At the age-four follow-up, there was no significant difference on the measure of emotional regulation between the program and control groups.

Health. Data on health status for children apparently not collected or reported.

Behavior. For paraprofessional-visited children, at age two, there was no significant difference in mother-reported measures of behavioral problems. Mother-child pairs interacted with one another more responsively than those in the control group (significant at the 0.10 level). At the age four follow-up, paraprofessional-visited children and their mothers displayed more sensitive and responsive interactions during the free-play session, compared to the control group.

However, there were no statistically significant effects on these children's emotional regulation or behavioral adaptation, or on mothers' reports of externalizing behavior problems.

For nurse-visited children, at age two, there was no significant difference in mother-reported measures of behavioral problems. Mother-child pairs interacted with one another more responsively than those in the control group. At the age-four follow-up, nurse-visited children born to mothers with low psychological resources demonstrated better behavioral adaptation during testing at age four, but there were no statistically significant effects on mother-child interaction, children's emotional regulation, or externalizing behavior problems.

Crime/delinquency. Data apparently either not collected or not reported.

Early/nonmarital births. Data apparently either not collected or not reported.

Economic outcomes. Data apparently either not collected or not reported.

Effects on parents. For paraprofessional-visited women, when the children were age two, women in the program group were significantly less likely (at the 0.10 level) to have had a subsequent pregnancy (33 percent vs. 41 percent) or to have had a subsequent birth (13 percent vs 19 percent) compared to the control group. There was no statistically significant differences on tobacco use, use of preventive services, use of emergency services, education achievement, employment, or welfare receipt.

At the age-four follow-up, paraprofessional-visited women had significantly better mental health (an effect size of 0.03 SD), better sense of mastery (an effect size of 0.20 SD), and were employed longer on average (an effect size of 0.11 SD) compared to the control group. In addition, paraprofessional-women were significantly less likely to be married (32.2 percent vs. 44.0 percent), less likely to live with the father of their child (32.7 percent vs. 43.1 percent), less likely to live with a partner (52 percent vs. 60.6 percent, at the 0.10 level), less likely to have had a subsequent miscarriage (6.6 percent vs. 12.3 percent), and less likely to have had a subsequent low-weight newborn (2.8 percent vs. 7.7 percent). There were no statistically significant differences on measures of the number of subsequent pregnancies, subsequent live births, number of months between the first and second child, months with current partner, months receiving welfare or Medicaid, high school graduation, subsequent abortions, three measures of substance abuse, domestic violence, or use of child care.

For nurse-visited women, when their children were age two, program group women had significantly fewer subsequent pregnancies (29 percent versus 41 percent), significantly fewer subsequent births (12 percent versus 19 percent), and were employed longer on average in the second year of the study (6.9 months vs. 5.7 months). Nurse-visited smokers had significantly greater reductions in cotinine levels compared to their control group. There was no statistically

significant difference in the use of preventive or emergency services, educational achievement, or welfare use.

At the age four follow-up, nurse-visited mothers had longer intervals between the births of their first and second children (when there was a second child), compared to the control group (24.5 months versus 20.4 months, an effect size of 0.32 SD). Nurse-visited women were also less likely to have experience domestic violence in the past six months (6.9 percent vs. 13.6 percent) and reported enrolling their children less frequently in preschool, Head Start, or licensed day care (54.4 percent vs. 65.9 percent). There were no statistically significant effects on subsequent pregnancies, subsequent live births, sense of mastery, educational achievement, employment, use of welfare, mental health, drug use, behavior problems related to drug use, marriage, or living with a partner or father of the child.

Benefit-cost findings. Apparently a benefit-cost analysis was not performed. The approximate total cost of the program was about $9,900 per family for nurses and about $6,700 per family for paraprofessionals (in 2005 dollars).[6]

Overall Assessment

The project was carefully evaluated by David Olds, professor of pediatrics at the University of Colorado Health Sciences Center, JoAnn Robinson, director of developmental research at the Prevention Research Center for Family and Child Health at the University of Colorado Health Sciences Center, and their colleagues.

Program theory. According to Olds, the conceptual framework guiding the design of the nurse-visitation program and its evaluation was based on evidence that "suggests that parental behavior is the most immediate, powerful, and potentially alterable influence on child health during pregnancy and the early years of the child's life."[7] Through nurse and paraprofessional home visits, the program sought to improve women's health-related behaviors, parenting skills, and personal development, as well as children's health and development. The evaluation, designed to assess improvements in child health and development, parental health-related behaviors, and qualitites of parenting skills, was appropriate within this context.

Program implementation. The trial was conducted in public- and private-care clinic settings serving low-income women in the Denver metropolitan area. The nurse and paraprofessional programs were based on the nurse-delivered programs conducted in Elmira, New

[6]Olds, et al. 2002.

[7]David L. Olds, "Home Visitation for Pregnant Women and Parents of Young Children," *American Journal of Diseases of Children* 146 (June 1992): 705.

York (see chapter 18) and Memphis, Tennessee (see chapter 19). The NFP team notes, however, that the Denver trial "incorporated a greater focus on infants' affective development and on parent-infant communication of emotion."[8]

Nurse home visitors were required to have a nursing degree and experience in community or maternal and child health nursing. Paraprofessionals were only expected to have a high school education and were, in fact, excluded if they had college preparation in "the helping professions." The original program protocols were adapted to accommodate the skills of paraprofessionals by changing the way things such as maternal and child health were addressed. The nurses and paraprofessionals both received a month of extensive training before they began conducting home visits.

Both paraprofessionals and nurses managed caseloads of about twenty-five families each, but the paraprofessionals had twice the level of supervision as nurses (two supervisors per ten paraprofessionals compared to one supervisor per ten nurses). The paraprofessionals completed an average of 6.3 home visits during pregnancy and 16 visits during infancy (the first two years of the child's life), while the nurses completed an average of 6.5 visits during pregnancy and 21 visits during infancy, a difference that was statistically significant. By the end of the program, 48 percent of the paraprofessional-visited families had discontinued their participation in the program, while only 38 percent of the families visited by nurses had done so.

Assessing the randomization. There were no reported problems in the randomization process. A comparison of the randomized women across a wide range of baseline characteristics indicated that the groups were comparable, with one exception: paraprofessional-visited families had higher incomes than did nurse-visited families.[9] The range of baseline characteristics collected was considerably broader than those found in most projects and included information about the women's socioeconomic characteristics, mental health, personality characteristics, health-related behaviors (such as smoking and drug use), and intellectual functioning. The NFP team used an extensive array of covariates to refine their estimates.

Assessing statistical controls in experimental and nonexperimental evaluations. The evaluation was based on random assignment, so selection bias should not be a serious problem.

Sample size. The overall sample of the Denver intervention consisted of 735 women and their newborn children. Of these women, 255 were assigned to the control group, 245 to the paraprofessional-visited group, and 235 to the nurse-visited group.

[8]Olds et al., 2004, 1562.

[9]Olds, et al., 2004, 1562.

Attrition. Attrition was low throughout the project. Eleven women in the control group experienced fetal demises or infant deaths, as did eight women in the paraprofessional group and eleven women in the nurse group. Additionally, six women in the control group placed their child up for adoption, as did three women in the paraprofessional group and one woman in the nurse visited group. Thus, about 93 percent of the control group sample, 96 percent of the paraprofessional group sample, and 95 percent of the nurse group sample were available for the age four follow-up interviews.

Including just those cases where infants survived and were not adopted, the NFP team achieved an overall response rate of 91 percent (92 percent for the control group, 90 percent for the paraprofessional group, and 92 percent for the program group) at the age four follow-up interviews. The response rate was also high for the age four child assessments, with an overall rate of 87 percent (89 percent for the control group, 85 percent for the paraprofessional group, and 88 percent for the nurse group).

Data collection. The data collection relied on a various standardized tests, parent surveys, and in-home assessments.

Measurement issues. At thirty-six weeks of gestation, all participating women were interviewed to assess their health-related behaviors and their use of other preventative and emergency services (such as childbirth education, emergency housing, and food banks). Urine was also collected at this time and was measured for nicotine, marijuana, and cocaine intake. Women were subsequently interviewed at twelve, fifteen, twenty-one, and twenty-four months postpartum to assess the frequency and spacing of subsequent pregnancies and births. At the age two follow-up, women were also asked about their educational achievement, participation in the work force, and use of welfare. It does not appear, however, that these responses were validated with a secondary data source. Children's language development was tested at twenty-one months, and their mental development was tested at twenty-four months.

The main source of information for the age four follow-up was an in-home assessment. Research staff members conducted interviews with the participating women, mother-child interactions were observed in a free-play session, home environments were assessed, and children were assessed in their homes using Preschool Language Scales and a series of cognitive tasks. Mothers reported the frequency and timing of subsequent pregnancies and births, their educational achievement, participation in the workforce, welfare use, drug use, and experience of physical violence. Again, however, it does not appear that these responses (to questions such as welfare use and educational achievement) were validated with administrative data.

The NFP team recognizes the limitations of maternal reports: "We know, for example, that domestic violence is underreported, and reliance on maternal reports is particularly

susceptible to reporting artifacts."[10] They point out, however, that "the strongest program effects for the nurse-visited group were on outcomes based on objective measures (e.g. tests of child executive and language functioning and examiner ratings of the child's behavior adaptation during tests)."[11]

Generalizability. The positive impacts of the Denver trial, especially those relating to child development, were concentrated among women with low psychological resources and their children, which limits their generalizability. As the NFP team also notes, "Given the higher rate of refusal to participate in the study among women who smoked cigarettes, this trial has limited generalizability to the entire population of smokers and probably user of other substances."[12] Additionally, longer-term follow-up is needed to determine whether the positive effects are lasting and whether the program yields other benefits, such as reduced delinquency, when the study children become adolescents.

Replication. The Denver home visiting program is a replication of the nurse home visiting programs conducted by the NFP team in Elmira and Memphis. The paraprofessional component, however, was not present in these two earlier studies. Further replication and evaluation by an independent evaluator following the identical intervention protocol would be desirable.

Home visiting using paraprofessionals or other protocols has been widely tested. One comprehensive review of home visiting programs found that such programs have been less effective than the nurse home visiting model applied in Elmira.[13] Thus, it is important to bear in mind that the program model and program content are very important. As Richard Berk, professor of Criminology and Statistics at the University of Pennsylvania, and Peter Rossi, former professor at the University of Massachusetts (Amherst), note, "Replications of a given evaluation may be used to incrementally define the boundaries within which generalization is possible."[14]

Evaluator's description of findings. Some of the effects produced in the Elmira and Memphis trials were noticeably absent in the Denver evaluation, including the effect on subsequent pregnancies or live births (although there was an effect on spacing) and on welfare use. Hypothesizing as to why there was no effect on women's use of welfare, the NFP team

[10]Olds, et al., 2004, 1567.

[11]Olds, et al., 2004, 1567.

[12]Olds, et al., 2002, 494.

[13]*See* David L. Olds and Harriet Kitzman, "Review of Research on Home Visiting for Pregnant Women and Parents of Young Children," *The Future of Children* 3, no. 3 (Winter 1993): 53–92.

[14]Richard A. Berk and Peter H. Rossi, *Thinking About Program Evaluation 2* (Thousand Oaks, CA: Sage Publications, 1999), 25.

notes, "This is likely attributable to welfare reform, which limits lifetime use. Findings may also might have been affected by the highly favorable economic conditions in the late 1990s (when this follow-up study was conducted), which increased the availability of jobs."[15]

The effects of the Denver trial were concentrated among women with low psychological resources and their children. The NFP team describes this finding:

> In all trials, the effects of this program on children's health and development have been concentrated among families at greater risk because of sociodemographic factors and the mothers' having limited psychologic resources. . . . Moreover, the greater program impact on low-resource mothers in Denver is consistent with recent evidence that environmental factors play a larger role in explaining children's cognitive functioning among children from impoverished environments than they do among children from more advantaged environments.[16]

Evaluator's independence. The NFP team both developed and evaluated the nurse visiting model. They, however, support independent evaluations of the model assuming it is implemented with fidelity. Moreover, the evaluation findings have been published in high-quality peer-reviewed journals.

Statistical significance/confidence intervals. Statistical significance was measured and reported at the 5 percent level.

Effect sizes. Effect sizes were calculated as the least-squares mean difference divided by the pooled standard deviation (SD) of the outcome. For statistically significant effects, most effect sizes ranged from about 0.3 SD to 0.6 SD. Under traditional demarcations, these effects would be considered "small," with a few effects (above 0.6 SD) falling in the "moderate" range. (See Appendix 1 for a further discussion of effect sizes and their interpretation.)

Sustained effects. A follow-up was conducted when the children were four years old, and the results are reported here.

Benefit-cost analysis. Apparently not performed.

Cost-effectiveness analysis. Apparently not performed.

[15]Olds, et al., 2004, 1566.

[16]Olds, et al., 2004, 1566.

Commentary

Editor's Note: David Olds comments on the Nurse Family Partnership trials and the role of evaluation in the field of early intervention in the "Commentary" section of Chapter 19.

Note: This report is open to public comments, subject to review by the forum moderator. To leave a comment, please send an email to welfareacademy@umd.edu or fill out the comment form at http://www.welfareacademy.org/pubs/early_education/chapter23.html.