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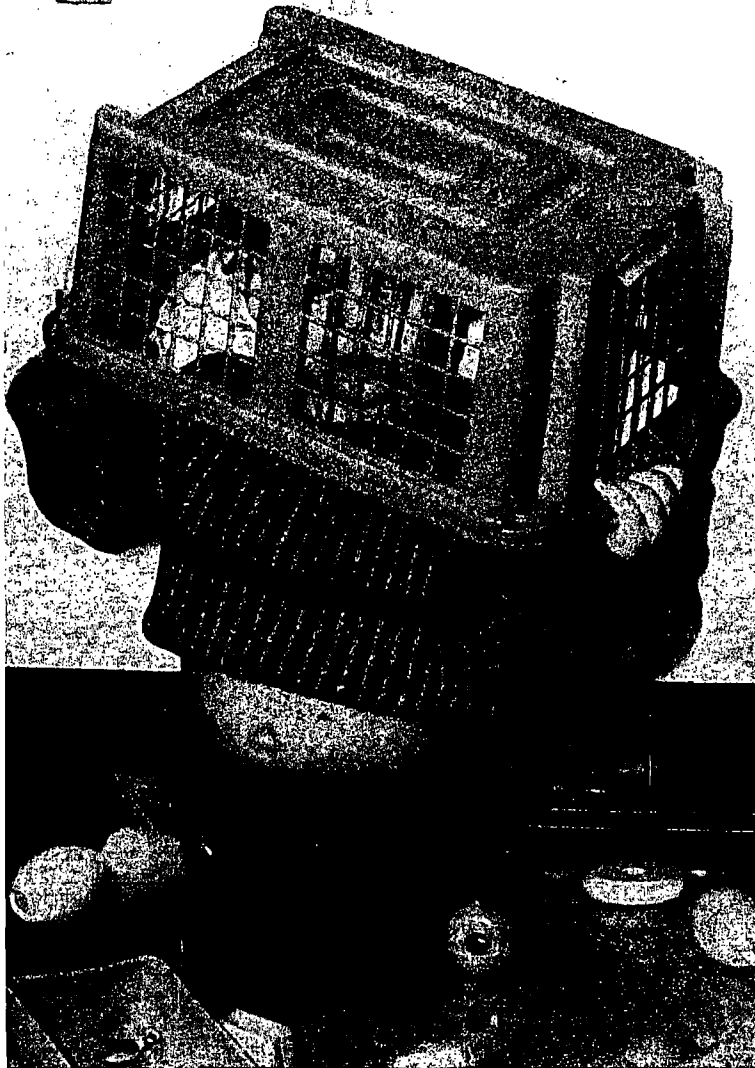
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# ZERO TO THREE

Bulletin of ZERO TO THREE: National Center for Infants, Toddlers, and Families

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set Brown McCracken

## Opening the Black Box:

*What Makes Early Child  
and Family Development  
Programs Work?*

**Lisa J. Berlin, Ph. D.**  
*Invited Guest Editor*

How do early child and family development programs work? What makes the difference between a program that succeeds in helping participants achieve meaningful goals and a program that's just a nice try?

The tradition of early intervention\* began in earnest in the mid-1960's as part of the Johnson administration's "War on Poverty." The past three decades have

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\* "early intervention" will be used synonymously with "early child and family development programs" throughout this issue.

**EXCERPT FROM**  
**The Comprehensive Child Development Program:**  
**When a Demonstration Fails**  
**Walter S. Gilliam, Carol H. Ripple, and Edward F. Zigler**  
**Yale University**  
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**July 6, 1998**

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Randomly assigning people to a 'treatment' or 'no-treatment group does not ensure that they will comply with their placement. However, if one compares those who actively pursue treatment to those who do not, the desirable condition of random selection is lost and the experimental variable is biased by motivational and other issues. At first, it may appear that randomization and treatment integrity are opposing conditions: when one is ensured, the other is lost. Clearly, the issue is most problematic during a program's start-up cohort, when treatment duration, intensity, and quality have not yet been maximized.

One solution to the randomization versus treatment-integrity dilemma inherent in all social program evaluation is to pursue process and impact evaluations sequentially, rather than concurrently. Randomized experiments should not be attempted until well after program quality and treatment participation have been maximized. Although an impact evaluation can determine the effectiveness of a program, it is the process evaluation that determines whether a program exists in the first place. Clearly, when a process evaluation determines that attrition rates are high and that important services, such as mental health, are being under-utilized, the program is not yet ready for an expensive impact evaluation that is likely to yield null findings. Rather, the process evaluation finding should be used to help improve the program and move it closer to a point when an impact evaluation is appropriate. The desirable serial sequence of program evaluation remains small-scale efficacy studies, process evaluation of large-scale implementation, impact evaluation, and cost-benefit evaluation. Failure at any one level could preclude continuing to more advanced levels of program evaluation.

## Original Contributions

# Long-term Effects of Home Visitation on Maternal Life Course and Child Abuse and Neglect

## Fifteen-Year Follow-up of a Randomized Trial

David L. Olds, PhD; John Eckenrode, PhD; Charles R. Henderson, Jr, RN, PhD; Jane Powers, PhD; Robert Cole, PhD; Kimberly Sidora, MPH; Pamela Morris; Lisa M. Pettitt; Dennis Luckey, PhD

**Context.**—Home-visitation services have been promoted as a means of improving maternal and child health and functioning. However, long-term effects have not been examined.

**Objective.**—To examine the long-term effects of a program of prenatal and early childhood home visitation by nurses on women's life course and child abuse and neglect.

**Design.**—Randomized trial.

**Setting.**—Semirural community in New York.

**Participants.**—Of 400 consecutive pregnant women with no previous live births enrolled, 324 participated in a follow-up study when their children were 15 years old.

**Intervention.**—Families received a mean of 9 home visits during pregnancy and 23 home visits from the child's birth through the second birthday.

**Data Sources and Measures.**—Women's use of welfare and number of subsequent children were based on self-report; their arrests and convictions were based on self-report and archived data from New York State. Verified reports of child abuse and neglect were abstracted from state records.

**Main Results.**—During the 15-year period after the birth of their first child, in contrast to women in the comparison group, women who were visited by nurses during pregnancy and infancy were identified as perpetrators of child abuse and neglect in 0.29 vs 0.54 verified reports ( $P < .001$ ). Among women who were unmarried and from households of low socioeconomic status at initial enrollment, in contrast to those in the comparison group, nurse-visited women had 1.3 vs 1.6 subsequent births ( $P = .02$ ), 65 vs 37 months between the birth of the first and a second child ( $P = .001$ ), 60 vs 90 months' receiving Aid to Families With Dependent Children ( $P = .005$ ), 0.41 vs 0.73 behavioral impairments due to use of alcohol and other drugs ( $P = .03$ ), 0.18 vs 0.58 arrests by self-report ( $P < .001$ ), and 0.16 vs 0.90 arrests disclosed by New York State records ( $P < .001$ ).

**Conclusions.**—This program of prenatal and early childhood home visitation by nurses can reduce the number of subsequent pregnancies, the use of welfare, child abuse and neglect, and criminal behavior on the part of low-income, unmarried mothers for up to 15 years after the birth of the first child.

IN RECENT YEARS, home-visitation services have been promoted widely as a means of preventing a range of health and developmental problems in children from vulnerable families. The US Advisory Board on Child Abuse and Neglect, for example, has recommended that home-visitation services be made available to all parents of newborns as a means of preventing child abuse and neglect.<sup>1</sup>

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See also pp 644 and 680.

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Many of these recommendations have been based on the results of a randomized trial of a comprehensive program of prenatal and early childhood home visitation by nurses that was conducted in Elmira, NY.<sup>2-5</sup> Findings from this trial indicated that the program reduced the rates of subsequent pregnancy, increased labor force participation, and reduced government spending for low-income unmarried women from the birth

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of the first child through the child's fourth birthday, ie, through 2 years after the program ended.<sup>10</sup> Although the rates of state-verified cases of child maltreatment among high-risk families were reduced while the program was in operation through age 2 years,<sup>10</sup> the effects were attenuated during a 2-year period after the program ended,<sup>10</sup> most likely because of increased surveillance for child abuse and neglect set in motion among the nurse-visited families.<sup>10</sup> Children's health care encounters in which injuries were detected also were reduced from ages 1 through 4 years.<sup>10</sup>

Although this program produced positive effects on maternal and child health from pregnancy through the child's fourth year of life,<sup>10</sup> its long-term effects remain unexamined. The present study was conducted to determine the extent to which the beneficial effects of the program instituted early in the life cycle altered the life-course trajectories of the mothers through the child's 15th birthday. We examined the long-term effects of the program on 2 domains of maternal functioning: (1) maternal life course (subsequent number of children, use of Aid to Families With Dependent Children [AFDC], employment, substance abuse, and encounters with the criminal justice system) and (2) perpetration of child abuse and neglect. We hypothesized that the program effects, as in earlier phases of the study, would be greater for families in which the mothers experienced a larger number of chronic stressors and had fewer resources to manage the challenges of living in poverty and being a parent.

## DESIGN AND METHODS

### Setting

The study was originally conducted in and around Elmira, NY, a small city with a population of 40 000 in a semirural area of central New York State (NYS). Patients were recruited from a clinic offering free antepartum services sponsored by the county health department and the offices of private obstetricians.

### Participants

From April 1978 through September 1980, 500 consecutive eligible women were invited to participate. Pregnant women were actively recruited for the study if they had no previous live births, could register in the study prior to the 25th week of gestation, and had at least one of the following sociodemographic risk characteristics: young age (<19 years at registration), unmarried, or low socioeconomic status (SES) (Medicaid status or no private insurance). To avoid creating a program stigmatized as being exclusively for

the poor, any woman who asked to participate and had no previous live birth was accepted into the study. Approximately 10% of the target population (low income, unmarried, or teenaged) was not recruited because of late registration for prenatal care, and another 10% was not recruited because they were not referred from the offices of private obstetricians.

Four hundred of the 500 women enrolled in the study. All enrollees completed approved informed consent procedures. There were no differences in the age, education, or marital status of women who chose to enroll and those who declined; there was a difference by race, with 80% of white women vs 96% of the African-American women agreeing to participate.

Eighty-five percent of the sample originally recruited had at least 1 of the 3 risk characteristics used for recruitment. Forty-eight percent were younger than 19 years, 62% were unmarried, and 59% were from households classified as low SES<sup>12</sup> at registration during pregnancy. Eleven percent of the sample was African American.

### Treatment Conditions

The research design included 4 treatment conditions. Families randomized to treatment 1 (n=94) were provided sensory and developmental screening for the children at 12 and 24 months of age. Based on these screenings, the children were referred for further clinical evaluation and treatment when needed. Families randomized to treatment 2 (n=90) were provided the screening services offered those in treatment 1, plus free transportation (using a taxicab voucher system) for prenatal and well-child care through the child's second birthday. There were no differences between participants in treatments 1 and 2 in their use of prenatal and well-child care (both groups had high rates of completed appointments). Therefore, these 2 groups were combined to form a single comparison group as in earlier reports. Families randomized to treatment 3 (n=100) were provided the screening and transportation services offered those in treatment 2 in addition to being provided a nurse who visited them at home during pregnancy. Families randomized to treatment 4 (n=116) were provided the same services as those in treatment 3, except that the nurse continued to visit through the child's second birthday.

### Randomization

Women were stratified by marital status, race, and 7 geographic regions within the county (based on census tract boundaries). At the end of the intake interview, women drew their treatment assignments from a deck of cards and placed them in a sealed envelope. The cards were transferred to a research as-

sociate who managed the randomization. The stratification was executed by using separate decks of cards for the groups defined by the women's race, marital status at intake, and, for white women, the geographic region in which they resided. To ensure reasonably balanced subclasses, the decks were reconstituted periodically to overrepresent those treatment groups with smaller numbers of subjects, a procedure similar to the Efron biased coin designs.<sup>13</sup> Women in treatments 3 and 4 subsequently were assigned on a rotating basis, within their stratification blocks, to 1 of 5 nurse home visitors.

There were 2 deviations from this randomization procedure. First, 6 women who were enrolled were living in the same household as were other women who were already participating in the study. To avoid potential horizontal diffusion of the treatment in case of different assignments within households, the 6 new enrollees were assigned to the same treatment as their housemates. Second, during the last 6 months of the 30-month enrollment period, the number of cards representing treatment 4 was increased in each of the decks to enlarge the size of that group and to enhance the statistical power of the design to compare the infancy home-visitation program with treatments 1 and 2 on infant health and developmental outcomes. A thorough analysis conducted at earlier phases of the trial indicated that this slight confounding of treatments with time did not affect the treatment effects.

### Program Plan and Implementation

The experimental home-visitation program was administered by Comprehensive Interdisciplinary Developmental Services, Inc, of Elmira. In the home visits, the nurses promoted 3 aspects of maternal functioning: (1) health-related behaviors during pregnancy and the early years of the child's life; (2) the care parents provided to their children; and (3) maternal personal life-course development (family planning, educational achievement, and participation in the workforce). In the service of these 3 goals, the nurses linked families with needed health and human services and attempted to involve other family members and friends in the pregnancy, birth, and early care of the child. The program was based on theories of self-efficacy, human ecology, and human attachment.<sup>14</sup> The nurses used detailed assessments, record-keeping forms, and protocols to guide their work with families, but adapted the content of their home visits to the individual needs of each family. They provided a comprehensive educational program designed to promote parents' and other family mem-

bers' effective physical and emotional care of their children. The nurses also helped women clarify their goals and develop problem-solving skills to enable them to cope with the challenges of completing their education, finding work, and planning future pregnancies. Developing a close working relationship with the mother and her family, the nurses helped mothers identify small achievable objectives that could be accomplished between visits that, if met, would build mothers' confidence and motivation to manage the demands of caregiving and become economically self-sufficient. The nurses completed an average of 9 (range, 0-16) visits during the pregnancy and 23 (range, 0-59) visits from the child's birth to second birthday. Details of the program can be found elsewhere.<sup>14,15</sup>

### Overview of Follow-up Study

The present phase of the study consists of a longitudinal follow-up of those 400 families who were randomized to treatment and comparison conditions and in which the mother and child were still alive and the family had not refused participation in earlier phases. The flow of patients from recruitment through the 15-year follow-up is presented in Table 1. As this table indicates, we completed assessments at 15 years on 81% of participants originally randomized and on 90% of women for whom there was no miscarriage, stillbirth, death (infant, child, or maternal), or child adoption. There were no treatment differences in the rates of completed assessments at the 15-year follow-up. Table 1 also shows that reviews of children's Child Protective Service (CPS) records were completed for an average of 13.4 years for those cases on which 15-year interviews were conducted with the mother. There were no treatment differences in the number of years for which we had CPS data.

### Statistical Power

Sample size and power were determined by the original design and subsequent attrition of subjects. Power calculations are given here for 3 key outcomes (number of months receiving AFDC, subsequent births, and verified reports of child abuse or neglect) with the assumption of  $\alpha = .05$  and  $\beta = .20$  (2-tailed tests); sample sizes as realized in the present study; and means and SDs obtained from the comparison subjects in the present study. The calculations were performed for the contrast of women in the comparison condition (treatment 1 + treatment 2) vs those in the nurse-visited-during-pregnancy-and-infancy condition (treatment 4)—for both the total sample and for the unmarried, low-SES subsample.

Table 1.—Profile of the Trial: Flow of Patients From Recruitment During Pregnancy Until 15 Years After Birth of First Child

|                                                  | Treatments 1 and 2<br>(n=184) | Treatment 3<br>(n=100) | Treatment 4<br>(n=116) |
|--------------------------------------------------|-------------------------------|------------------------|------------------------|
| Program implementation                           |                               |                        |                        |
| Completed prenatal home visits,<br>mean (range)  |                               | 8.6 (0-16)             | 8.6 (0-16)             |
| Completed postnatal home visits,<br>mean (range) |                               |                        | 22.8 (0-59)            |
| Intervening years                                |                               |                        |                        |
| Fetal, infant, or child death                    | 10                            | 7                      | 9                      |
| Child adopter†                                   | 7                             | 5                      | 2                      |
| Maternal death‡                                  | 1                             | 1                      | 0                      |
| 15-y follow-up study                             |                               |                        |                        |
| Missing (mothers)                                | 12                            | 1                      | 4                      |
| Refused to participate§                          |                               |                        |                        |
| Mothers                                          | 6                             | 5                      | 4                      |
| Adolescents                                      | 10                            | 8                      | 7                      |
| Completed assessments                            |                               |                        |                        |
| Mothers                                          | 148                           | 75                     | 97                     |
| Adolescents                                      | 144                           | 77                     | 94                     |
| Cases with CPS data                              | 142                           | 77                     | 95                     |
| Years of complete CPS data,<br>mean (SD) [range] | 13.4 (3.2) [2.6-15.0]         | 13.3 (3.1) [2.9-15.0]  | 13.4 (3.1) [0.7-15.0]  |

†Of 500 eligible patients, 100 refused participation. The 400 participants were randomized to treatment conditions: treatments 1 and 2 were combined to form a comparison group; treatment 3, nurse visitation during pregnancy; and treatment 4, nurse visitation during pregnancy and infancy. Data are given as number, unless otherwise indicated.

‡There were 2 adoptions in which interviews were conducted with the child but not the mother. They are not shown in this table.

§For both cases in which the mother died, the adolescents were interviewed.

§Refusals include 8 mothers who refused to participate during earlier phases and were not approached for the 15-year follow-up.

¶Child Protective Service (CPS) data were used to determine the number of state-verified reports of child abuse and neglect.

For the number of months receiving AFDC, a normal variable, we can detect a mean difference of 19 months in the total sample and 30 months in the higher-risk sample. For the number of subsequent births, also a normal variable, we can detect differences of 0.36 and 0.57 in the total and high-risk samples, respectively.

For the count of number of verified reports of abuse and neglect, the smallest detectable differences are 0.21 and 0.33, respectively. The actual analyses in this report use more fully specified models than those used for the power calculations, and thus have greater power.

### Masking

The mothers were informed that they were being interviewed as part of a follow-up to their participation in a study in which they originally enrolled when they were pregnant with their first child. All data were gathered by staff members who had no access to the families' treatment assignments, except in a few cases in which the mothers inadvertently revealed that they were visited by a nurse. Staff members who gathered data were told that the 15-year follow-up study was designed to assess the long-range effects of prenatal and early childhood services, including home visitation by nurses. The principal investigators and statisticians had access to the families' treatment assignments, although the operationalization of vari-

ables was made explicitly without reference to this information.

### Assessments and Definitions of Variables

Assessments conducted at earlier phases are specified in previous publications.<sup>16,17</sup> Intake interviews, which were conducted with women before randomization, included assessments of women's sociodemographic and personality characteristics (including a short-form measure of the locus of control scale of Rotter<sup>18</sup>), health-related behaviors, and health conditions. Women's household SES was estimated by using the Hollingshead 4-factor method<sup>19</sup>; families were classified into low SES (III and IV) and higher SES (I and II) levels.

At the 15th-year interview, mothers completed a life-history calendar that was designed to help them recall major life events (such as births of additional children, marriages, employment, household moves, and housing arrangements). Women were asked to estimate the number of months that they used AFDC, Medicaid, and food stamps, as well as the number of times that they were arrested or convicted from the time of the birth of their first child to the child's 15th birthday.

Women also were asked a series of questions adapted from the National Comorbidity Survey<sup>20</sup> regarding the impact of alcohol and other drug use on major aspects of their lives since the birth of their child. A variable was constructed

that summarized a count of 6 domains of women's lives that were affected by their use of alcohol (missing work, experiencing trouble at work, having a motor vehicle crash or traffic violation, having compromised care of their children, having received treatment). The same set of questions was repeated for their use of illegal and prescription drugs. The counts of domains affected by their use of alcohol and other drugs were summarized to create a "substance use behavioral impairment" scale with values ranging from 0 to 12.

Mothers provided consent for the research staff to review CPS records from states in which they resided during the interval from the birth of their first child (focal child) to that child's 15th birthday. All reports involving either the mother or the focal child were recorded.

Substantiated reports were abstracted to ascertain key features of the maltreatment incident. All NYS records were searched, as well as those of most other states in which families resided during the 15-year period. In some states, data were not available for the entire 15-year period because these states expunge their records on a periodic basis. A few other states prohibit the release of case-level information. Six cases had fewer than 4 years of CPS data, and although none was indicated for abuse or neglect, they are retained as valid cases for this analysis. As shown in Table 1, our search covered an average of more than 13 years of the 15-year period in each treatment group, and there were no treatment differences in the amount of time searched, either for the sample as a whole or for the low-SES, unmarried subgroups. The primary outcome variable reported herein is the total number of substantiated reports during the entire 15-year period involving the mother as perpetrator.

Mothers' records of arrests and criminal convictions were abstracted from the NYS Division of Criminal Justice Services, after the principal investigator (D.O.) signed a nondisclosure agreement. Cases were matched based on the women's names, birth dates, ethnicity, and Social Security numbers. Data on the number of arrests and convictions and types of offenses were abstracted from this database. Arrests were separated by whether they occurred before randomization or between the child's birth and 15th birthday. (No arrests occurred between randomization and the child's birth.)

### Statistical Models and Methods

The study was conducted with an intent-to-treat approach. After examination of a large number of classification factors and covariates, a core statistical model was derived that was consistent

with the one used in the earlier phases of this research. It consisted of a  $3 \times 2 \times 2$  factorial structure and 6 covariates. The classification factors were treatments (1 and 2 vs 3 vs 4), maternal marital status (married vs unmarried, at registration), and social class (Hollingshead I and II vs III and IV, at registration). All interactions among these factors were included. The basic conclusions reported herein were not modified by or limited to one race, and race was not included in final models.

The 6 covariates included in the final model were maternal age, education, locus of control, husband or boyfriend support, mother's employment status, and father's public-assistance status, all measured at registration. These covariates had consistently significant relationships with many of the outcomes examined in this report. All covariates were tested for homogeneity of regressions for the hypothesized contrasts.<sup>18</sup>

Dependent variables for which a normal distribution was assumed were analyzed in the general linear model and low-frequency count data (eg, number of substantiated reports of child maltreatment) in the log-linear model (assuming a Poisson distribution). In the log-linear model, the analysis was performed and estimates obtained in terms of the logs of the incidence. We use the term *incidence* in referring to the actual count or mean of counts over specific periods of measurement.

The distributions of each of the dependent variables were carefully examined, and cases with outlying values (above 20) were truncated to 20 to reduce the likelihood that the differences observed were the result of a few extreme values. This was done for 1 outcome variable, number of days jailed.

All treatment contrasts focused on the comparison of the combination of treatments 1 and 2 (the comparison group) with treatment 4 (the pregnancy and infancy nurse-visited group), because we hypothesized that the greatest treatment effect would be exerted by the combination of prenatal and postnatal home visitation, as found in earlier evaluations.<sup>9,9</sup> We also show treatment effects for the group defined by women's being unmarried and from low-SES households at registration during pregnancy; this constitutes our operationalization of women's experiencing higher levels of chronic stress (being from a low-SES household) and having few personal resources to manage stress (being unmarried).

### RESULTS

We conducted detailed examinations of 17 background variables to determine the extent to which the treatment

groups were equivalent for families on which 15-year assessments were completed. As indicated in Table 2, the treatment groups were equivalent both for the sample as a whole and for women who were unmarried and from low-SES households at registration.

### Rates of Subsequent Births and Use of Welfare

As indicated in Table 3, in contrast to their counterparts in the comparison group, nurse-visited unmarried women from low-SES households had fewer subsequent pregnancies ( $P=.03$ ) and live births ( $P=.02$ ) and greater spacing between first and second births ( $P=.001$ ). In addition, they reported using AFDC and food stamps fewer months than did unmarried, low-SES women in the comparison group ( $P=.005$  and  $P=.001$ , respectively).

### Substance Abuse, Criminal Justice Encounters, and Child Abuse and Neglect

Table 4 shows that nurse-visited, low-SES, unmarried women reported being impaired in fewer domains by alcohol or other drug use, having been arrested fewer times, having been convicted fewer times, and having spent fewer days in jail ( $P=.005$ ,  $P<.001$ ,  $P=.008$ , and  $P<.001$ , respectively) since the birth of their first child than did low-SES unmarried women in the comparison group. Data from NYS showed that nurse-visited, low-SES, unmarried women had fewer actual arrests ( $P<.001$ ) and fewer convictions ( $P<.001$ ).

New York State arrests were classified into 3 categories: property crimes (eg, theft), person crimes (assault, robbery), and other (eg, vice, major traffic offenses). Overall, 67% of the crimes were for property offenses, 14% were for person crimes, and 19% were for other offenses. The treatment differences for low-SES, unmarried women were present for arrests for property offenses (0.12 vs 0.60;  $P<.001$ ), but not at conventional levels of statistical significance for person offenses (0.02 vs 0.13;  $P=.10$ ), and other offenses (0.02 vs 0.17;  $P=.12$ ) (data not shown).

Table 4 also shows that in contrast to women in the comparison group, those visited during pregnancy and the first 2 years of the child's life were identified as perpetrators of child abuse and neglect in fewer verified reports during the 15-year interval ( $P<.001$ ). This effect was greater for women who were unmarried and from low-SES households at registration ( $P<.001$ ). The effect of the program on number of verified reports was especially strong for the 4- to 15-year period after the birth of the child—ie,

Table 2—Equivalence of Treatment Conditions on Background Characteristics Measured at Registration for Women Assessed at 15-Year Follow-up\*

| Dependent Variables                                                     | Whole Sample               |                    |                    | Low-SES Unmarried Sample  |                    |                    |
|-------------------------------------------------------------------------|----------------------------|--------------------|--------------------|---------------------------|--------------------|--------------------|
|                                                                         | Treatments 1 and 2 (n=148) | Treatment 3 (n=79) | Treatment 4 (n=97) | Treatments 1 and 2 (n=62) | Treatment 3 (n=30) | Treatment 4 (n=38) |
| Unmarried, %                                                            | 52                         | 59                 | 64                 |                           |                    |                    |
| Low-SES household, %                                                    | 54                         | 70                 | 61                 |                           |                    |                    |
| White, %                                                                | 90                         | 91                 | 86                 | 87                        | 87                 | 77                 |
| Smoker ( $\geq 4$ cigarettes/d), %                                      | 47                         | 46                 | 58                 | 51                        | 60                 | 59                 |
| Male child, %                                                           | 55                         | 44                 | 55                 | 44                        | 53                 | 49                 |
| Mother working, %                                                       | 39                         | 36                 | 31                 | 24                        | 20                 | 20                 |
| Mother receiving public assistance, %                                   | 9                          | 10                 | 13                 | 23                        | 29                 | 20                 |
| Father working, %                                                       | 70                         | 70                 | 67                 | 42                        | 50                 | 52                 |
| Father receiving public assistance, %                                   | 4                          | 3                  | 3                  | 10                        | 6                  | 2                  |
| Husband or boyfriend in house, %                                        | 58                         | 76                 | 60                 | 21                        | 47                 | 22                 |
| Maternal age, mean (SD), y                                              | 19.3 (2.9)                 | 19.5 (3.1)         | 19.4 (3.7)         | 18.6 (2.5)                | 19.0 (2.8)         | 18.2 (3.3)         |
| Maternal education, mean (SD), y                                        | 11.2 (1.5)                 | 11.6 (1.5)         | 11.1 (1.6)         | 10.7 (1.4)                | 10.9 (1.4)         | 10.3 (1.5)         |
| Husband or boyfriend education, mean (SD), y                            | 11.4 (1.4)                 | 11.7 (1.7)         | 11.5 (1.6)         | 11.1 (1.4)                | 11.0 (1.8)         | 10.8 (1.5)         |
| Grandmother support†‡                                                   | 100.4 (10.1)               | 97.7 (9.2)         | 101.3 (10.3)       | 101.6 (10.9)              | 98.1 (10.3)        | 104.1 (11.2)       |
| Husband or boyfriend support†‡                                          | 99.6 (10.5)                | 102.0 (9.0)        | 99.0 (9.9)         | 94.2 (10.6)               | 98.5 (9.4)         | 96.8 (9.3)         |
| Locus of control†                                                       | 99.3 (10.1)                | 100.6 (9.5)        | 100.6 (10.2)       | 97.5 (10.2)               | 99.2 (10.3)        | 99.1 (9.9)         |
| Incidence of maternal arrests in New York State prior to randomization§ | 0.09 (−2.50)               | 0.13 (−5.41)       | 0.06 (−8.98)       | 0.13 (−2.03)              | 0.13 (−2.02)       | 0.18 (−1.71)       |

\*See first footnote to Table 1 for explanation of treatment groups. SES indicates socioeconomic status.

†Standardized to mean=100 and (SD)=10.

‡Locally developed scale that assesses degree to which individual provides emotional and material support to mother.

§Incidence (log incidence) represents the mean number of infrequently occurring events within stated period. Individual cases may have values greater than 1, although the range is small.

Table 3—Adjusted Maternal Life-Course Outcomes From Birth of First Child to 15 Years\*

| Dependent Variables                            | Whole Sample       |             |             |                                                             | Low-SES Unmarried Sample |             |             |                                                             |
|------------------------------------------------|--------------------|-------------|-------------|-------------------------------------------------------------|--------------------------|-------------|-------------|-------------------------------------------------------------|
|                                                | Mean No.           |             |             | Estimate† (95% CI),<br>Treatments 1 and 2<br>vs Treatment 4 | Mean No.                 |             |             | Estimate† (95% CI),<br>Treatments 1 and 2<br>vs Treatment 4 |
|                                                | Treatments 1 and 2 | Treatment 3 | Treatment 4 |                                                             | Treatments 1 and 2       | Treatment 3 | Treatment 4 |                                                             |
| Subsequent pregnancies                         | 2.1                | 1.9         | 1.7         | 0.4 (−0.1 to 0.8)                                           | 2.2                      | 2.0         | 1.5         | 0.7‡ (0.1 to 1.3)                                           |
| Subsequent births                              | 1.6                | 1.4         | 1.3         | 0.3 (−0.0 to 0.6)                                           | 1.6                      | 1.4         | 1.1         | 0.5‡ (0.1 to 1.0)                                           |
| Months between birth of first and second child | 37.3               | 39.8        | 41.7        | −4.4 (−14.9 to 6.1)                                         | 37.3                     | 46.6        | 64.8        | −27.5§ (−44.1 to −10.9)                                     |
| Months receiving AFDC                          | 65.9               | 70.2        | 52.8        | 13.1 (−0.9 to 27.0)                                         | 90.3                     | 81.8        | 60.4        | 29.9§ (9.0 to 50.7)                                         |
| Months employed                                | 89.7               | 87.5        | 96.4        | −6.7 (−20.4 to 7.0)                                         | 80.0                     | 74.9        | 95.9        | −15.9 (−36.6 to 4.6)                                        |
| Months receiving food stamps                   | 56.4               | 62.0        | 47.9        | 8.5 (−6.3 to 23.3)                                          | 83.5                     | 84.0        | 46.7        | 36.8§ (14.6 to 59.0)                                        |
| Months receiving Medicaid                      | 70.0               | 71.1        | 61.8        | 8.2 (−7.6 to 24.0)                                          | 95.4                     | 92.4        | 72.3        | 23.1 (−0.6 to 46.8)                                         |

\*Adjusted for socioeconomic status (SES), marital status, maternal age, education, locus of control, support from husband or boyfriend, working status, and husband or boyfriend use of public assistance at registration. See first footnote to Table 1 for explanation of treatment groups. AFDC indicates Aid to Families With Dependent Children; CI, confidence interval.

†Estimate = (treatments 1 and 2 mean) − (treatment 4 mean).

‡ $P < .05$ .§ $P < .01$ .

the period not assessed in previous reports (data not shown).

## COMMENT

In contrast to women in the comparison group, those visited by nurses during pregnancy and the first 2 years after the birth of their first child were identified as perpetrators of child abuse and neglect in fewer verified reports. Among women who were unmarried and from low-SES households at registration, those who were visited by nurses during pregnancy and infancy had fewer subsequent children, months receiving AFDC and food stamps, behavioral impairments from use

of alcohol and other drugs, arrests, convictions, and number of days jailed during the 15-year period after birth of their first child. For most outcomes, the group that was visited only during pregnancy exhibited levels of functioning that fell in between the comparison group and the group that was visited during pregnancy and infancy, indicating a dose-response relationship for level of home visitation.

These findings have some limitations. First, most of the positive results were concentrated among mothers who were unmarried and from low-SES households at registration during pregnancy. While we hypothesized originally that the effects

would be greater for women who experienced higher levels of stress and who had fewer personal resources, we did not fully operationalize the stress and resource variables prior to the beginning of the trial. We chose to employ characteristics used for sample recruitment as indicators of chronic stress (coming from a low-SES household) and having few personal resources (being unmarried). The marital status and poverty variables chosen to reflect the personal resource and stress constructs, however, are both well-established risk factors for several adverse outcomes. The concentration of program effects in women who are unmarried and

Table 4.—Adjusted Rates of Maternal Substance Abuse, Arrests, Convictions, and Child Abuse and Neglect Reports From Birth of First Child to 15 Years\*

| Dependent Variables                                    | Whole Sample               |              |               |                                                             | Low-SES Unmarried Sample   |              |              |                                                             |
|--------------------------------------------------------|----------------------------|--------------|---------------|-------------------------------------------------------------|----------------------------|--------------|--------------|-------------------------------------------------------------|
|                                                        | Incidence (Log Incidence)† |              |               | Estimate‡ (95% CI),<br>Treatments 1 and 2<br>vs Treatment 4 | Incidence (Log Incidence)† |              |              | Estimate‡ (95% CI),<br>Treatments 1 and 2<br>vs Treatment 4 |
|                                                        | Treatments<br>1 and 2      | Treatment 3  | Treatment 4   |                                                             | Treatments<br>1 and 2      | Treatment 3  | Treatment 4  |                                                             |
| Substance use<br>impairments§                          | 0.43 (-1.09)               | 0.45 (-0.82) | 0.34 (-1.33)  | 0.24 (-0.39 to 0.87)                                        | 0.73 (-0.31)               | 0.61 (-0.49) | 0.41 (-0.89) | 0.58 (0.04 to 1.11)                                         |
| Arrests                                                | 0.22 (-2.02)               | 0.16 (-2.17) | 0.09 (-5.21)  | 3.19 (-99.66 to 106.04)                                     | 0.58 (-0.55)               | 0.36 (-1.01) | 0.18 (-1.74) | 1.19 (-0.49 to 1.89)                                        |
| Convictions                                            | 0.13 (-2.29)               | 0.05 (-9.48) | 0.03 (-9.62)  | 7.33 (-408.24 to 422.91)                                    | 0.29 (-1.28)               | 0.11 (-2.22) | 0.06 (-2.74) | 1.46 (-0.38 to 2.54)                                        |
| Days in jail                                           | 0.65 (-4.36)               | 0.13 (-9.20) | 0.01 (-13.36) | 9.00 (-481.52 to 499.53)                                    | 1.11 (-0.10)               | 0.47 (-0.76) | 0.04 (-3.22) | 3.32 (-2.16 to 4.48)                                        |
| NYS arrests                                            | 0.38 (-1.57)               | 0.34 (-1.12) | 0.12 (-5.03)  | 3.46 (-105.59 to 112.50)                                    | 0.90 (-0.11)               | 0.39 (-0.95) | 0.16 (-1.85) | 1.74 (-0.94 to 2.54)                                        |
| NYS convictions                                        | 0.27 (-4.92)               | 0.28 (-1.32) | 0.12 (-5.30)  | 0.38 (-226.81 to 227.57)                                    | 0.69 (-0.37)               | 0.29 (-1.25) | 0.13 (-2.02) | 1.65 (-0.79 to 2.52)                                        |
| Substantiated reports<br>of child abuse and<br>neglect | 0.54 (-0.63)               | 0.35 (-1.26) | 0.29 (-1.40)  | 0.77 (-0.34 to 1.19)                                        | 0.53 (-0.64)               | 0.63 (-0.47) | 0.11 (-2.25) | 1.61 (-0.87 to 2.35)                                        |

\*Adjusted for socioeconomic status (SES), marital status, maternal age, education, locus of control, support from husband or boyfriend, working status, and husband or boyfriend use of public assistance at registration. See first footnote to Table 1 for explanation of treatment groups. NYS indicates New York State; CI, confidence interval.

†Incidence represents the mean number of infrequently occurring events within stated period. Individual cases may have values greater than 1, although the range is small.

‡Estimate = (treatment 1 and 2 log incidence) - (treatment 4 log incidence).

§Scale summarizes the counts of behavioral impairments (eg, missing work, motor vehicle crash) reported by women resulting from their use of alcohol and illegal drugs. P < .01.

of lower SES suggests that they need these services and benefit from them to a greater extent than do those who are married and of higher SES. Consequently, such services should be made available to communities with high concentrations of low-income, unmarried women.

The second limitation is that several of the outcomes were based on self-report, which may be subject to treatment-related reporting bias. The data on maternal use of AFDC and food stamps, for example, were based on self-reports and covered up to 15-year time periods. We attempted to validate maternal report of welfare use by reviewing state and county records but found that they often were incomplete. Fortunately, we were able to obtain archived data from independent sources on other critical outcomes.

The child abuse and neglect findings, for example, were based on state archived data, which makes them less susceptible to reporting bias. Although we were unable to achieve complete reviews of these archived records for all families, they are substantially complete, and there is no indication that missing data resulted in any bias in favor of the nurse-visited groups. It should be noted, moreover, that the effects of the program overrode a tendency for nurse-visited families to be identified for maltreatment at lower thresholds of caregiving dysfunction than were families in the comparison group during the first 4 years of the child's life—a form of detection bias that worked against the hypothesis of program efficacy.<sup>7</sup>

Although it would have been preferable to have criminal records to corroborate the mothers' reports of all arrests and convictions, the analysis of their arrests and convictions archived in NYS produced a pattern of treatment effects that was even stronger than was found with maternal report. Thus, in spite of the knowledge nurse-visited women had of the purpose of

this study, they were at least as accurate in reporting this undesirable behavior as were women in the comparison group.

Finally, one may reasonably question the extent to which the findings of this study may be generalized to a wider range of low-SES, unmarried women today. This question led to a recently completed replication of this trial in Memphis, Tenn, with a sample of predominantly low-income, unmarried African-American mothers and their families.<sup>16</sup> The findings of the replication are congruent with the Elmira trial for the 2-year period after birth of the first child and indicate that the benefits of the program, at least through the first child's second birthday, are not limited by time, geography, or the sociodemographic characteristics of the families served. We believe that the results of these 2 trials now provide sufficient evidence to form a rationale for preliminary stages of program dissemination.

One of the most fundamental considerations in planning program dissemination is cost. As indicated in a forthcoming report, the reduction in family size, use of welfare, incidence of child abuse and neglect, and maternal criminality 15 years after the birth of the first child found for this program will lead to substantial savings to government in several domains of spending.<sup>20</sup> In considering the cost of the program (estimated to be \$3300 in 1980 dollars and \$6700 in 1997 dollars for 2½ years of service), it is important to note that the investment in the service, from the standpoint of government spending, was recovered for low-SES families before the child reached 4 years of age.<sup>4</sup> It would take longer for the investment to be recovered today because costs for such a program have increased more rapidly than costs of welfare benefits.

It is also important to note that the effects reported herein were produced

in the context of a controlled experiment, in which the program was conducted with high levels of fidelity to the underlying theoretical and clinical model.<sup>14</sup> The next challenge is to determine the extent to which this program can be replicated.<sup>21</sup> A modest dissemination effort is currently being conducted under the auspices of the US Departments of Justice and Health and Human Services that will shed light on community and organizational factors that contribute to or undermine fidelity of program implementation in new program sites.

Finally, it should be emphasized that although many different kinds of home-visitation programs have been promoted, it is incorrect to assume that our results can be applied to home-visitation programs that are not based on this model. While some other types of home-visitation programs have shown some promise,<sup>22-25</sup> most have failed.<sup>26</sup> At least 2 well-designed trials of other home-visitation programs are under way that should give us a better understanding of the range of program characteristics that can affect important aspects of maternal, child, and family functioning.<sup>27-29</sup> In the meantime, as health and social welfare policy is redesigned in the near future, we believe that it makes sense to begin with programs that have been tested, replicated, and found to work.

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# Long-term Effects of Nurse Home Visitation on Children's Criminal and Antisocial Behavior

## 15-Year Follow-up of a Randomized Controlled Trial

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**Context.**—A program of home visitation by nurses has been shown to affect the rates of maternal welfare dependence, criminality, problems due to use of substances, and child abuse and neglect. However, the long-term effects of this program on children's antisocial behavior have not been examined.

**Objective.**—To examine the long-term effects of a program of prenatal and early childhood home visitation by nurses on children's antisocial behavior.

**Design.**—Fifteen-year follow-up of a randomized trial. Interviews were conducted with the adolescents and their biological mothers or custodial parents.

**Setting.**—Semirural community in New York.

**Participants.**—Between April 1978 and September 1980, 500 consecutive pregnant women with no previous live births were recruited, and 400 were enrolled. A total of 315 adolescent offspring participated in a follow-up study when they were 15 years old; 280 (89%) were born to white mothers, 195 (62%) to unmarried mothers, 151 (48%) to mothers younger than 19 years, and 186 (59%) to mothers from households of low socioeconomic status at the time of registration during pregnancy.

**Intervention.**—Families in the groups that received home visits had an average of 9 (range, 0-16) home visits during pregnancy and 23 (range, 0-59) home visits from birth through the child's second birthday. The control groups received standard prenatal and well-child care in a clinic.

**Main Outcome Measures.**—Children's self-reports of running away, arrests, convictions, being sentenced to youth corrections, initiation of sexual intercourse, number of sex partners, and use of illegal substances; school records of suspensions; teachers' reports of children's disruptive behavior in school; and parents' reports of the children's arrests and behavioral problems related to the children's use of alcohol and other drugs.

**Results.**—Adolescents born to women who received nurse visits during pregnancy and postnatally and who were unmarried and from households of low socioeconomic status (risk factors for antisocial behavior), in contrast with those in the comparison groups, reported fewer instances (incidence) of running away (0.24 vs 0.60;  $P = .003$ ), fewer arrests (0.20 vs 0.45;  $P = .03$ ), fewer convictions and violations of probation (0.09 vs 0.47;  $P < .001$ ), fewer lifetime sex partners (0.92 vs 2.48;  $P = .003$ ), fewer cigarettes smoked per day (1.50 vs 2.50;  $P = .10$ ), and fewer days having consumed alcohol in the last 6 months (1.09 vs 2.49;  $P = .03$ ). Parents of nurse-visited children reported that their children had fewer behavioral problems related to use of alcohol and other drugs (0.15 vs 0.34;  $P = .08$ ). There were no program effects on other behavioral problems.

**Conclusions.**—This program of prenatal and early childhood home visitation by nurses can reduce reported serious antisocial behavior and emergent use of substances on the part of adolescents born into high-risk families.

JUVENILE CRIME is a significant problem in the United States. In 1996, law enforcement agencies made 2.9 million arrests of juveniles (children <18 years). Moreover, 19% of all arrests and 19% of all violent crime arrests were accounted for by juveniles. Although the number of juvenile Violent Crime Index arrests (ie, for murder, forcible rape, robbery, and aggravated assault) declined in both 1995 and 1996, the rate in 1996 was still 60% higher than the 1987 level.<sup>1</sup>

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For editorial comment see p 1271.

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Antisocial behavior can be classified according to its time of onset: prior to puberty (childhood onset) vs after puberty (adolescent onset).<sup>2,3</sup> Childhood onset is characterized by more serious behavioral disruption, such as violent behavior toward classmates and cruelty toward animals beginning as early as age 3 years, but occurs less frequently. The adolescent-onset variety, although sometimes expressed as aggression toward peers, is generally less serious (eg, shoplifting, lying to teachers and parents) and occurs so frequently that some consider it normative.<sup>3</sup> Childhood-onset antisocial behavior is associated with neuropsychological deficits (eg, impaired language and intellectual functioning, attention-deficit/hyperactivity disorder) and harsh, rejecting parenting early in the child's life.<sup>4,5</sup> The

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Table 1.—Flow of Patients From Recruitment During Pregnancy Until 15 Years After Delivery of First Child

|                                                         | Treatment Groups*    |                |                |
|---------------------------------------------------------|----------------------|----------------|----------------|
|                                                         | 1 and 2<br>(n = 184) | 3<br>(n = 100) | 4<br>(n = 116) |
| Program implementation                                  |                      |                |                |
| No. of completed prenatal home visits, average (range)  | ...†                 | 8.6 (0-16)     | 8.6 (0-16)     |
| No. of completed postnatal home visits, average (range) | ...                  | ...            | 22.8 (0-59)    |
| Intervening years                                       |                      |                |                |
| No. of fetal, infant, or child deaths                   | 10                   | 7              | 9              |
| No. of children adopted‡                                | 7                    | 6              | 2              |
| No. of maternal deaths§                                 | 1                    | 1              | 0              |
| 15-Year follow-up study                                 |                      |                |                |
| No. of missing biological mothers                       | 12                   | 1              | 4              |
| No. who refused to participate                          |                      |                |                |
| Mothers                                                 | 6                    | 5              | 4              |
| Adolescents                                             | 10                   | 8              | 7              |
| No. of completed interviews                             |                      |                |                |
| Parents (biological or custodial)                       | 152                  | 81             | 97             |
| Adolescents                                             | 144                  | 77             | 94             |
| No. of cases with school data (grades 7-9)              | 139                  | 68             | 84             |
| No. of cases with teacher report data¶                  | 117                  | 66             | 79             |
| No. of cases with probation or family court data#       | 60                   | 27             | 29             |

\*Treatment groups 1 and 2 are the comparison; treatment group 3 was nurse-visited during pregnancy; and treatment group 4 was nurse-visited during pregnancy and infancy. Of 500 eligible persons invited to participate, 100 refused and 400 were randomized to the various treatment groups.

†Ellipses indicate data not available.

‡There were 2 adoptions in which interviews were conducted with the child but not the mother. They are not shown.

§For both cases in which the mother died, the adolescents were interviewed.

||Refusals include 8 mothers who refused to participate during earlier phases and were not approached for the 15-year follow-up.

¶Data are for cases with at least 1 mathematics or English teacher report of classroom behavior.

#Data are for subsample of children who resided in original community for their entire lives.

adolescent-onset type has been hypothesized to be a reaction to the limited number of responsible roles for adolescents in Western societies.<sup>3</sup>

In earlier articles, we have shown that a program of prenatal and infancy home visitation by nurses improved women's prenatal health-related behavior<sup>6</sup> and reduced the rates of child abuse and neglect,<sup>7,8</sup> maternal welfare dependence, closely spaced successive pregnancies, maternal criminal behavior and behavioral problems due to use of alcohol and other drugs,<sup>8</sup> and children's intellectual impairment associated with prenatal exposure to tobacco.<sup>9,10</sup> These aspects of maternal and child functioning represent significant risks for early-onset antisocial behavior.<sup>11</sup>

This article examines the extent to which this program produced a reduction in children's criminal and antisocial behavior. We expected that the program would reduce antisocial behaviors indicative of the early-onset type but did not expect it to have as dramatic an effect on adolescent-onset antisocial behavior.<sup>11</sup> We expected that program effects would be concentrated on children born to women who were unmarried and from low-income families at registration during pregnancy. One of the treatment conditions used in this study consisted of prenatal home visitation with no postpartum follow-up. We expected that the group receiving only prenatal home visitation would function better than the

comparison group but not as well as the group that received prenatal and postnatal home visitation.

## METHODS

The details of this study's design can be found in an earlier article.<sup>8</sup> A summary of the design is given herein.

### Setting, Participants, and Randomization

Pregnant women were recruited from a free antepartum clinic sponsored by the Chemung County, New York, health department and the offices of private obstetricians in Elmira, NY. We actively recruited women with no previous live births who were less than 25 weeks pregnant and who were young (aged <19 years at registration), unmarried, or of low socioeconomic status (SES). Women without these sociodemographic risk characteristics were permitted to enroll if they had no previous live births. From April 1978 through September 1980, 500 women were invited to participate and 400 enrolled. Eighty-five percent were young, unmarried, or from low-SES households (August Hollingshead, PhD, unpublished manuscript, 1976). After completing informed consent and baseline interviews, women were stratified by sociodemographic characteristics and randomized to 1 of 4 treatment conditions. Persons involved in data gathering were blinded to the women's treatment conditions.

## Treatment Conditions

Families in treatment group 1 (n = 94) were provided sensory and developmental screening for the child at 12 and 24 months of age. Based on these screenings, the children were referred for further clinical evaluation and treatment when needed. Families in treatment group 2 (n = 90) were provided the screening services offered those in treatment group 1 in addition to free transportation (using a taxicab voucher system) for prenatal and well-child care through the child's second birthday. There were no differences between treatment groups 1 and 2 in their use of prenatal and well-child care (both groups had high rates of completed appointments). Therefore, these 2 groups were combined to form a single comparison group as in earlier articles. Families in treatment group 3 (n = 100) were provided the screening and transportation services offered to treatment group 2 and in addition were provided a nurse who visited them at home during pregnancy. Families in treatment group 4 (n = 116) were provided the same services as those in treatment group 3 except that the nurse continued to visit through the child's second birthday.

## Program Plan and Implementation

In the home visits, the nurses promoted 3 aspects of maternal functioning: (1) positive health-related behaviors during pregnancy and the early years of the child's life, (2) competent care of their children, and (3) maternal personal development (family planning, educational achievement, and participation in the workforce). In the service of these 3 goals, the nurses linked families with needed health care and human services and attempted to involve other family members and friends in the pregnancy, birth, and early care of the child. The nurses completed an average of 9 visits during pregnancy (range, 0-16) and 23 visits from birth to the child's second birthday (range, 0-59). Details of the program can be found elsewhere.<sup>12,13</sup>

## Overview of Follow-up Study

The current phase of the study consists of a longitudinal follow-up of the 400 families who were randomized to treatment and control conditions and in which the mother and child were still alive and the family had not refused participation at earlier phases. The flow of patients from recruitment through the 15-year follow-up is presented in Table 1. Interviews were conducted with the adolescents, their biological mothers, and their custodial parents if the biological mother no longer had custody. As-

assessments using parent reports used interview data from the parent who was judged to have had the greatest amount of recent experience with the child.

### Assessments and Definitions of Variables

Assessments conducted at earlier phases are specified in previous articles.<sup>7,8</sup> At the 15-year follow-up assessment, adolescents completed interviews that measured whether they had been adjudicated a person in need of supervision (PINS) resulting from incorrigible behavior such as recurrent truancy or destroying parents' property; their frequency of running away from home; and the number of times they had been stopped by the police, arrested, convicted of a crime or of probation violations, and sent to youth correctional facilities.<sup>14</sup> They also reported on their disruptive behavior in school; number of school suspensions; delinquent and aggressive behavior outside school; experience of sexual intercourse; rates of pregnancy; lifetime number of sexual partners; and frequency of using cigarettes, alcohol, and illegal drugs during the 6-month period prior to the 15-year interview.<sup>15</sup>

Variables were created to summarize the number of occurrences of being stopped by the police, arrested, convicted (adjudicated) of the original crime or of probation violations, and sent to a youth correctional facility. Although we asked the children to report their number of school suspensions and disruptive behaviors in school, we used archived school data and teacher reports to measure these outcomes because they are less subject to reporting bias than are self-report data.

A variable was constructed to characterize the total number of cigarettes currently smoked per day. Separate variables were constructed to count the number of days the children had consumed alcohol or used illegal drugs during the 6-month period prior to the interview. The adolescents were asked questions regarding the effect of alcohol on 5 domains of their lives (trouble with parents, trouble at school, problems with friends, problems with someone they were dating, trouble with police).<sup>16</sup> These data were summarized in an alcohol-use behavioral problem scale (range, 0-5). Corresponding questions regarding use of illegal drugs were omitted because of clerical error.

The self-reports of antisocial and delinquent acts were factor analyzed and found to produce 2 factors, major delinquent acts and minor antisocial acts, with Cronbach  $\alpha$  coefficients of .82 and .68, respectively. The adolescents also completed the Achenbach Youth Self-Report of Problem Behaviors, which produces 2 broadband scales: internalizing

(anxiety/depression, social withdrawal, and somatic complaints) and externalizing (delinquency and aggression) behavior problems.<sup>17</sup>

Parents were asked questions about their children's behavioral problems (the Achenbach scale); school suspensions; arrests; and use of cigarettes, alcohol, and illegal drugs, including the effect of alcohol and other drugs on their children's lives. Variables were constructed to coincide with those based on the child's self-report of behavior. Parents' reports of their children's behavioral problems caused by substance use included children's use of illegal drugs (range, 0-10).

The number of short-term and long-term suspensions were counted from an abstraction of the children's school records for grades 7 through 9. In New York State, long-term suspensions require a hearing and usually are for serious infractions such as assaulting a student or teacher. Records were analyzed when there were complete school data for 2 of the 3 years. The students' current teachers in English and mathematics completed an "acting out" scale that rated children's disruptive behavior in the classroom (eg, disruptive in class, defiant, obstinate, stubborn).<sup>18</sup>

Finally, the records of 116 children who lived in Chemung County for their entire lives were reviewed by the Chemung County Probation Department and the Chemung County Family Court. Identifying information on the adolescents (name, birth date, sex, Social Security number) was provided to these departments for purposes of matching their records with the participants in this study. The department staff summarized the counts of arrest and PINS records within treatment and risk-status groups. Individual identifiers were not returned in the abstraction of these data, although the children's treatment group, sex, and risk status (ie, whether they were born to an unmarried mother from low SES) were returned.

### Statistical Models and Methods

The study was conducted with an intention-to-treat approach. A core statistical model was derived that was consistent with the one used in the earlier phases of this research. It consisted of a  $3 \times 2 \times 2 \times 2$  factorial structure and 6 covariates. The classification factors were treatment groups (1 and 2 vs 3 vs 4), maternal marital status (married vs unmarried at registration), social class (Hollingshead I and II vs III and IV at registration), and sex of child. All interactions among the first 3 factors were included.

Interactions with sex of the child also were examined. Although sex was a sig-

nificant predictor of the antisocial behavior outcomes, it did not interact in a fully interpretable way with other terms in the model for some outcomes, so it was included without interactions. Where program effects were moderated by the child's sex in a coherent way, we have noted this in the presentation of the findings, in which case the model includes SES as a covariate rather than a classification factor and includes all interactions among treatment, marital status, and sex. This model was preferable to a 4-factor classification structure with all interactions because of the low incidence of some outcomes for certain subclasses, compromising the stability of the Poisson log-linear models used in the analysis. In addition, for 2 variables, the core log-linear model produced unstable variance estimates for the tests of treatment main effects. In these cases, SES and marital status were included without interactions for that test.

Race of the mother was among a number of additional classification factors examined in deriving the core model but was not included because it was not a significant predictor of outcomes once other terms were included.

The 6 covariates included in the final models were maternal age, maternal education, locus of control,<sup>19</sup> support from husband or boyfriend, maternal employment status, and paternal public assistance status. All covariates were measured at registration and tested for homogeneity of regressions for the hypothesized contrasts.<sup>20</sup>

Dependent variables with normal distributions were analyzed in the general linear model and low-frequency count data (eg, number of arrests) in the log-linear model (assuming a Poisson distribution). In the log-linear model, the analysis was carried out and estimates were obtained in terms of the logs of the incidence. We use the term *incidence* to refer to the actual count or mean of counts during specific periods of measurement. A careful examination of the distributions of each of the dependent variables was carried out. Low-incidence count variables with values higher than 20 were analyzed in a log-linear model, correcting for overdispersion.

For outcomes reported by more than 1 respondent (eg, child and parent or teachers), we carried out repeated-measures analyses, adding to the basic model fixed factors for respondent and a random factor for individuals. The focus of interpretation was on the average of the 2 sources of information.

All treatment contrasts focused on the comparison of the combination of treatment groups 1 and 2 (the comparison group) with treatment group 4 (the pregnancy and infancy nurse-visited group)

Table 2.—Equivalence of Treatment Conditions on Maternal Background Characteristics Measured at Registration for Children Assessed at 15-Year Follow-up\*

| Dependent Variables                                                     | Total Sample of Treatment Groups |               |               | Low SES, Unmarried Sample of Treatment Groups |               |               |
|-------------------------------------------------------------------------|----------------------------------|---------------|---------------|-----------------------------------------------|---------------|---------------|
|                                                                         | 1 and 2<br>(n = 148)             | 3<br>(n = 79) | 4<br>(n = 97) | 1 and 2<br>(n = 62)                           | 3<br>(n = 30) | 4<br>(n = 38) |
| Unmarried, %                                                            | 62                               | 59            | 64            | 100                                           | 100           | 100           |
| Low-SES household, %                                                    | 64                               | 70            | 61            | 100                                           | 100           | 100           |
| White, %                                                                | 90                               | 91            | 86            | 87                                            | 87            | 77            |
| Smoker (>4 cigarettes/day)                                              | 47                               | 46            | 58            | 51                                            | 60            | 59            |
| Male children, %                                                        | 55                               | 44            | 55            | 44                                            | 53            | 49            |
| Mother working, %                                                       | 39                               | 36            | 31            | 24                                            | 20            | 20            |
| Mother receiving public assistance, %                                   | 9                                | 10            | 13            | 23                                            | 29            | 20            |
| Father working, %                                                       | 70                               | 70            | 67            | 42                                            | 50            | 52            |
| Father receiving public assistance, %                                   | 4                                | 3             | 3             | 10                                            | 6             | 2             |
| Husband or boyfriend in house, %                                        | 58                               | 76            | 60            | 21                                            | 47            | 22            |
| Maternal age, mean (SD), y                                              | 19.3 (2.9)                       | 19.5 (3.1)    | 19.4 (3.7)    | 18.6 (2.5)                                    | 19.0 (2.8)    | 18.2 (3.3)    |
| Maternal education, mean (SD), y completed                              | 11.2 (1.5)                       | 11.6 (1.5)    | 11.1 (1.6)    | 10.7 (1.4)                                    | 10.9 (1.4)    | 10.3 (1.5)    |
| Husband or boyfriend education completed, mean (SD), y                  | 11.4 (1.4)                       | 11.7 (1.7)    | 11.5 (1.6)    | 11.1 (1.4)                                    | 11.0 (1.8)    | 10.8 (1.5)    |
| Grandmother support, mean (SD)†‡                                        | 100.4 (10.1)                     | 97.7 (9.2)    | 101.3 (10.3)  | 101.6 (10.9)                                  | 98.1 (10.3)   | 104.1 (11.2)  |
| Husband or boyfriend support†‡                                          | 99.6 (10.5)                      | 102.0 (9.0)   | 99.0 (9.9)    | 94.2 (10.6)                                   | 98.6 (9.4)    | 96.8 (9.3)    |
| Locus of control, mean (SD)†                                            | 99.3 (10.1)                      | 100.6 (9.5)   | 100.6 (10.2)  | 97.5 (10.2)                                   | 99.2 (10.3)   | 99.1 (9.9)    |
| Incidence of maternal arrests in New York State prior to randomization§ | 0.09                             | 0.13          | 0.06          | 0.13                                          | 0.13          | 0.18          |

\*Treatment groups 1 and 2 are the comparison; treatment group 3 was nurse-visited during pregnancy; and treatment group 4 was nurse-visited during pregnancy and infancy. SES indicates socioeconomic status.

†Standardized to mean (100) and SD (10).

‡Locally developed scale that assesses degree to which individual provides emotional and material support to mother.

§Incidence indicates the mean number of infrequently occurring events within the stated period. Individual cases may have values greater than 1.

because we hypothesized that the greatest treatment effect would be exerted by the combination of prenatal and postnatal home visitation, as found in earlier evaluations.<sup>7,8</sup> The results for the group that received prenatal home visitation only (treatment group 3) are included to report whether that group had intermediate levels of functioning. To address our primary hypotheses, treatment effects also are shown for adolescents whose mothers were unmarried and from low-SES households at registration during pregnancy. All estimates of treatment main effects and effects for the unmarried, low-SES group are derived from a common statistical model.

## RESULTS

### Equivalence of Treatment Groups on Background Characteristics

As indicated in Table 2, for those families for which 15-year assessments were completed, the treatment groups were essentially equivalent on background characteristics for both the sample as a whole and for women who were unmarried and from low-SES households. Small differences on some background variables (such as paternal receipt of public assistance) led us to include them as covariates.

### Encounters With the Criminal Justice System

Table 3 shows that adolescents born to nurse-visited women (treatment group 4) reported more frequent stops by police

( $P < .001$ ) but fewer arrests and convictions and violations of probation ( $P = .005$  and  $.001$ , respectively); the arrest and convictions and probation violation effects were concentrated among children born to women who were unmarried and from low-SES families ( $P = .03$  and  $< .001$ , respectively). For the subsample of children who lived in Chemung County for their entire lives, nurse-visited children (treatment group 4) had fewer official PINS records ( $P = .007$ ). Nurse-visited children whose mothers were unmarried and from low-SES families were reported by their parents to have been arrested less frequently than were their counterparts in the comparison group ( $P = .05$ ). In addition, among adolescents born to unmarried women from low-SES households, those in treatment group 4 reported fewer instances of running away ( $P = .003$ ). As indicated in Table 3, with the exception of parent report of child arrests, most of these effects were present for children whose mothers were visited only during pregnancy (treatment group 3).

The effect of the treatment group 4 program on the children's reports of running away was concentrated in girls, whereas the effect on parents' reports of the children's arrests and children's reports of convictions and probation violations was greater for boys (data not shown). The effect of the program on arrests was not limited to any specific type of crime, although property crimes were more frequent and, therefore, accounted for a larger portion of the program effect on arrests overall.

### School Suspensions, Behavior Problems, and Use of Substances

Table 4 shows that children born to nurse-visited (treatment group 4) women who were unmarried and from low-SES households reported having fewer sexual partners ( $P = .003$ ), smoking fewer cigarettes per day ( $P = .10$ ), and consuming alcohol fewer days during the 6-month period prior to the 15-year interview ( $P = .03$ ). Parents of children born to nurse-visited, unmarried women from low-SES families reported that their children had fewer behavioral problems related to their use of alcohol and other drugs ( $P = .08$ ). For these outcomes, there was some indication that the group visited by nurses only during pregnancy (treatment group 3) did not do as well. Although adolescents in the unmarried, low-SES group reported smoking fewer cigarettes, they also reported higher levels of illegal drug use and their parents reported more behavioral problems due to the use of alcohol and other drugs than did their counterparts in the comparison group. There were no treatment differences in teachers' reports of the adolescents' acting out in school; short-term or long-term suspensions; the adolescents' initiation of sexual intercourse; or the parents' or children's reports of major delinquent acts, minor antisocial acts, or other behavioral problems.

### COMMENT

Adolescents born to nurse-visited (treatment group 4) women who were un-

Table 3.—Adjusted Rates of Children's Encounters With Criminal Justice System From Birth to 15 Years of Age\*

| Dependent Variables                                  | Total Sample    |      |      |               |               | Low-SES, Unmarried Sample |      |      |               |               |
|------------------------------------------------------|-----------------|------|------|---------------|---------------|---------------------------|------|------|---------------|---------------|
|                                                      | Treatment Group |      |      | P Value†      |               | Treatment Group           |      |      | P Value†      |               |
|                                                      | 1 and 2         | 3    | 4    | T1 & T2 vs T3 | T1 & T2 vs T4 | 1 and 2                   | 3    | 4    | T1 & T2 vs T3 | T1 & T2 vs T4 |
| Ever PINS, %                                         | 13              | 11   | 8    | .75           | .33           | 14                        | 10   | 5    | .63           | .14           |
| Incidence of times ran away‡                         | 0.29            | 0.23 | 0.34 | .83           | .07           | 0.60                      | 0.14 | 0.24 | <.002         | .003          |
| Incidence of times stopped by police                 | 0.80            | 0.53 | 2.25 | .24           | <.001         | 1.16                      | 0.78 | 1.46 | .34           | .46           |
| Incidence of arrests                                 | 0.36            | 0.16 | 0.17 | .005§         | .005§         | 0.45                      | 0.15 | 0.20 | .02           | .03           |
| Incidence of convictions and probation violations    | 0.27            | 0.06 | 0.10 | <.001§        | <.001§        | 0.47                      | 0.07 | 0.09 | <.001         | <.001         |
| Incidence of times sent to youth corrections         | 0.05            | 0.05 | 0.04 | .98           | .98           | 0.06                      | 0.03 | 0.02 | .32           | .12           |
| Incidence of arrests (mother report)                 | 0.12            | 0.11 | 0.08 | .73           | .37           | 0.19                      | 0.16 | 0.04 | .79           | .05           |
| Incidence of PINS records (subsample, archived data) | 0.31            | 0.17 | 0.03 | .06           | .007          | 0.35                      | 0.33 | 0.00 | .94           | .07           |
| Incidence of arrests (subsample, archived data)      | 0.35            | 0.14 | 0.32 | .15           | .94           | 0.55                      | 0.22 | 0.44 | .24           | .74           |

\*Treatment group 1 and 2 (T1 and T2) are the comparison; treatment group 3 (T3) was nurse-visited during pregnancy; and treatment group 4 (T4) was nurse-visited during pregnancy and infancy. Data are adjusted for socioeconomic status (SES), maternal marital status, age, education, locus of control, support from husband or boyfriend, and working status; husband or boyfriend use of public assistance at registration; and sex of child. PINS indicates person in need of supervision.

†Test of treatment effect performed on odds ratios for percentage outcomes and difference of logs of incidence for incidence outcomes.

‡Incidence indicates the mean number of infrequently occurring events within the stated period. Individual cases may have values greater than 1.

§Test conducted without interactions for SES and marital status.

||No covariates were included in the analysis of this outcome.

Table 4.—Adjusted Reports of Problem Behavior, Sexual Activity, Pregnancy, and Use of Substances at 15-Year Follow-up\*

| Dependent Variables                          | Total Sample     |       |       |               |               | Low-SES, Unmarried Sample |       |       |               |               |
|----------------------------------------------|------------------|-------|-------|---------------|---------------|---------------------------|-------|-------|---------------|---------------|
|                                              | Treatment Groups |       |       | P Value†      |               | Treatment Groups          |       |       | P Value†      |               |
|                                              | 1 and 2          | 3     | 4     | T1 & T2 vs T3 | T1 & T2 vs T4 | 1 and 2                   | 3     | 4     | T1 & T2 vs T3 | T1 & T2 vs T4 |
| No. of minor antisocial acts, mean‡          | 2.99             | 2.54  | 2.88  | .50           | .86           | 4.06                      | 3.25  | 3.38  | .42           | .47           |
| No. of major delinquent acts, mean§          | 3.02             | 2.79  | 3.57  | .93           | .48           | 4.09                      | 3.45  | 3.99  | .60           | .77           |
| No. of externalizing problems, mean          | 13.73            | 13.65 | 13.88 | .95           | .89           | 14.18                     | 15.63 | 11.85 | .42           | .17           |
| No. of internalizing problems, mean          | 10.58            | 11.19 | 11.66 | .46           | .19           | 10.82                     | 11.15 | 9.85  | .80           | .44           |
| No. of acting out problems, mean¶            | 9.61             | 8.97  | 9.47  | .41           | .85           | 10.35                     | 9.79  | 10.58 | .62           | .85           |
| Ever had sexual intercourse, %               | 35               | 35    | 42    | 1.00          | .32           | 45                        | 55    | 46    | .44           | 1.00          |
| Ever pregnant or made someone pregnant, %    | 3                | 2     | 4     | .97           | 1.00          | 8                         | 9     | 7     | .90           | .74           |
| Incidence of sex partners#                   | 1.56             | 1.10  | 1.16  | .48           | .90           | 2.48                      | 2.23  | 0.92  | .73           | .003          |
| Incidence of short-term school suspensions   | 0.28             | 0.11  | 0.27  | .96           | .97           | 0.32                      | 0.16  | 0.38  | .11           | .63           |
| Incidence of long-term school suspensions    | 0.04             | 0.00  | 0.01  | 1.00          | 1.00          | 0.15                      | 0.01  | 0.04  | .97           | .25           |
| Incidence of cigarettes smoked per day       | 1.30             | 0.91  | 1.28  | .49           | .76           | 2.50                      | 1.32  | 1.50  | .07           | .10           |
| Incidence of days drank alcohol              | 1.57             | 1.81  | 1.87  | .97           | .96           | 2.49                      | 1.84  | 1.09  | .41           | .03           |
| Incidence of days used drugs                 | 2.28             | 3.55  | 2.04  | .49           | .54           | 4.04                      | 9.38  | 2.50  | .01           | .24           |
| Alcohol impairment, self-report              | 0.52             | 0.50  | 0.47  | .95           | .35           | 0.49                      | 0.38  | 0.55  | .36           | .60           |
| Alcohol and drug impairment, parent's report | 0.18             | 0.20  | 0.28  | .96           | .68           | 0.34                      | 0.62  | 0.15  | .05           | .08           |

\*Treatment groups 1 and 2 (T1 and T2) are the comparison; treatment group 3 (T3) was nurse-visited during pregnancy; and treatment group 4 (T4) was nurse-visited during pregnancy and infancy. Data are adjusted for maternal socioeconomic status, marital status, education, locus of control, support from husband/boyfriend, and working status; husband/boyfriend use of public assistance at registration; and sex of child.

†Test of treatment effect based on mean differences for means, odds ratios for percentages, and difference of logs of incidence for count data outcomes.

‡Minor antisocial acts included lied to parents, lied to teacher, took car without permission, stayed out all night without permission, been passenger in car where driven drunk, and used fake identification to enter bar.

§Major delinquent acts included hurt someone who needed bandages, stole something worth more than \$50, stole something worth less than \$50, trespassed, damaged property on purpose, hit someone because did not like what he or she said, carried weapon, set fire on purpose, and been in fight with gang members.

||Average of parent and child reports of behavioral problem (analyzed with repeated measures).

¶Average of mathematics and English teachers' reports of students' disruptive behavior in school (analyzed with repeated measures).

#Incidence indicates mean number of infrequently occurring events within the stated period. Individual cases may have values greater than 1.

married and from low-SES families had fewer episodes of running away from home, arrests, and convictions and violations of probation than did their counterparts in the comparison group. They also had fewer sexual partners and engaged in cigarette smoking and alcohol consumption less frequently. Their parents reported that they had fewer behavioral problems related to their use of drugs and alcohol. There were no program effects on less serious forms of antisocial behavior, initiation of sexual intercourse, or use of

illegal drugs. Children in treatment group 4, irrespective of risk, reported being stopped by police more frequently, but they reported fewer arrests and convictions and violations of probation, and the official PINS records corroborated this pattern. The higher rates of being stopped by police is an anomalous finding that has no coherence with any other effects and is likely to be either a sampling or reporting artifact.

The concentration of beneficial effects among children born to unmarried wom-

en of low SES is consistent with the results of other preventive interventions that have shown greater effects for children of families at greater social risk.<sup>20</sup> This suggests that these kinds of services ought to be focused on families in greater need by virtue of the mothers' being unmarried and poor.

In general, these findings are consistent with program effects on early-onset antisocial behavior rather than on the more common and less serious antisocial behavior that emerges with puberty.<sup>3</sup>

The mere presence of arrests, convictions, and probation violations by the time the children were 15 years old suggests that these children started offending early and that they may be on life-course trajectories that portend recurrent and more serious offenses in the future. Given that early-onset antisocial behavior is associated with (1) subtle neurological impairment, (2) harsh, punitive, and neglectful parenting, and (3) family contexts characterized by substance abuse and criminal behavior,<sup>2,6</sup> it is important to note that this program has affected these aspects of maternal, child, and family functioning at earlier phases in the child's development.<sup>6-11</sup> Moreover, genetic vulnerability to impulsivity and aggression is expressed much more frequently when vulnerable rhesus monkeys experience aberrant rearing<sup>21</sup> (also Allyson J. Bennett, PhD, K. Peter Lesch, Armin Heils, et al, unpublished data, 1998), adding to the plausibility of the findings reported here.

The prenatal phase of the program reduced fetal exposure to tobacco, improved the qualities of women's prenatal diets, reduced rates of pyelonephritis, improved levels of informal social support, and reduced intellectual impairment and irritable behavioral styles associated with fetal exposure to tobacco.<sup>6,10,11,22</sup> Prenatal exposure to tobacco is a risk factor for early behavioral dysregulation, problems with attention, and later crime and delinquency.<sup>22</sup> Moreover, the combination of birth complications (and, by implication, neurological impairment) and rejecting parenting substantially increases the likelihood of violent offenses by the time children are 18 years old.<sup>5</sup>

We did not expect prenatal home visitation (treatment group 3) by itself to be as effective as it was in preventing criminal behavior among children born to low-SES, unmarried women. This occurred even though these children's mothers showed almost none of the postnatal benefits observed for those visited during pregnancy and infancy (such as reduced welfare dependence, substance abuse, criminal behavior, and child abuse and neglect).<sup>8</sup> The mechanisms through which these beneficial effects occurred will be examined in future reports, with a focus on the alteration of maternal prenatal health and the children's corresponding neuropsychological functioning,<sup>22,23</sup> as well as prenatal stress, given that stress during pregnancy affects the social and neuromotor development of nonhuman primates.<sup>24,25</sup>

The impact of the full program (prenatal and infancy home visitation) on children's use of alcohol and number of sexual partners is important because re-

cent evidence indicates that alcohol use prior to age 15 years multiplies the risk of alcoholism in adulthood<sup>26</sup> and multiple partners increase the risk for sexually transmitted diseases, including human immunodeficiency virus infection.<sup>27,28</sup> The effect of the program on alcohol use is consistent with greater alcohol consumption observed among adult rhesus monkeys who experienced aberrant rearing.<sup>29</sup> These findings must be tempered, however, with an acknowledgment of their limitations.

The first limitation is that most of the positive results were concentrated among children born to women who were unmarried and from low-SES households. Although we hypothesized originally that the effects would be greater for women who experienced higher levels of stress and who had fewer personal resources, we did not fully operationalize the stress and resource variables prior to the beginning of the trial. We chose to use characteristics used for sample recruitment as indicators of long-term stress (eg, coming from a low-SES household) and having few personal resources (eg, being unmarried), 2 factors associated with a host of adverse outcomes. However, positive early results from a large urban replication of this study focusing almost exclusively on unmarried, low-income women support our interpretation that the effects observed in the current study are due to the program.<sup>30</sup>

The second limitation is that the arrest and conviction data were based primarily on the children's and parents' reports, which may be subject to treatment-related reporting bias. To validate the children's and parents' reports of undesirable behavior, we compared the rates of school suspensions derived from the school records with the parents' and children's reports of suspensions and found no treatment differences in accuracy. We also regressed the English and mathematics teachers' averaged reports of the adolescents' acting out in school on the adolescents' self-reports of their acting out in school separately for the nurse-visited and comparison group children and found no treatment differences in the slopes of these regressions.

Importantly, the pattern of mean differences for treatment groups 1 and 2 vs treatment group 4 for PINS records on the subsample of children who lived in Chemung County for their entire lives corroborated the pattern of the children's reported arrests. The PINS finding increases our confidence that the treatment differences in the adolescents' reported involvement with the criminal justice system are not the result of the nurse-visited children and their parents simply underreporting their actual lev-

els of involvement. The absence of program effect with the official arrest data may be explained by a significant, 9-fold higher rate of official arrest records prior to randomization (0.44 vs 0.05) found for treatment group 4 mothers who were unmarried and of low SES and whose children remained in Chemung County compared with their treatment group 1 and 2 counterparts.

Finally, we note that the adolescents' self-reports of delinquent and antisocial behavior are not completely consistent with the data on reports of arrests and convictions. A survey that used follow-up questions to the assault questions asked in the current study showed that the answers to the questions we used produced responses that frequently were trivial (eg, 33% of the serious violent responses and 64% of the self-reported minor assaults were too insignificant to lead to arrests).<sup>31</sup> This suggests that the particular questions used in this study regarding delinquent behavior did not adequately assess the severity of delinquency. Thus, the treatment differences found in reports of arrests and convictions are likely to be indications of underlying treatment differences in the severity of antisocial behavior that were not assessed adequately by the set of questions asked about particular antisocial behaviors.

This program prevented only the more serious forms of antisocial behavior leading to arrests and convictions. Other types of prevention programs may be necessary to reduce more normative types of disruptive behavior among young adolescents.<sup>32</sup> In light of the impact of this program on maternal and youth crime and corresponding government expenditures,<sup>8,33</sup> the US Department of Justice is now supporting an effort to make this program available to a larger number of high-crime communities.<sup>34</sup>

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# Effect of Prenatal and Infancy Home Visitation by Nurses on Pregnancy Outcomes, Childhood Injuries, and Repeated Childbearing

## A Randomized Controlled Trial

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**Context.**—Interest in home-visitation services as a way of improving maternal and child outcomes has grown out of the favorable results of a trial in semirural New York. The findings have not been replicated in other populations.

**Objective.**—To test the effect of prenatal and infancy home visits by nurses on pregnancy-induced hypertension, preterm delivery, and low birth weight; on children's injuries, immunizations, mental development, and behavioral problems; and on maternal life course.

**Design.**—Randomized controlled trial.

**Setting.**—Public system of obstetric care in Memphis, Tenn.

**Participants.**—A total of 1139 primarily African-American women at less than 29 weeks' gestation, with no previous live births, and with at least 2 sociodemographic risk characteristics (unmarried, <12 years of education, unemployed).

**Intervention.**—Nurses made an average of 7 (range, 0-18) home visits during pregnancy and 26 (range, 0-71) visits from birth to the children's second birthdays.

**Main Outcome Measures.**—Pregnancy-induced hypertension, preterm delivery, low birth weight, children's injuries, ingestions, and immunizations abstracted from medical records; mothers' reports of children's behavioral problems; tests of children's mental development; mothers' reports of subsequent pregnancy, educational achievement, and labor-force participation; and use of welfare derived from state records.

**Main Results.**—In contrast to counterparts assigned to the comparison condition, fewer women visited by nurses during pregnancy had pregnancy-induced hypertension (13% vs 20%;  $P=.009$ ). During the first 2 years after delivery, women visited by nurses during pregnancy and the first 2 years of the child's life had fewer health care encounters for children in which injuries or ingestions were detected (0.43 vs 0.55;  $P=.05$ ); days that children were hospitalized with injuries or ingestions (0.03 vs 0.16;  $P<.001$ ); and second pregnancies (36% vs 47%;  $P=.006$ ). There were no program effects on preterm delivery or low birth weight; children's immunization rates, mental development, or behavioral problems; or mothers' education and employment.

**Conclusion.**—This program of home visitation by nurses can reduce pregnancy-induced hypertension, childhood injuries, and subsequent pregnancies among low-income women with no previous live births.

WITHIN the past 8 years, home-visitation services have been promoted as a way to improve the outcomes of pregnancy,<sup>1</sup> to reduce the rates of child abuse and neglect,<sup>2</sup> and, now that welfare has been given to the states in the form of block grants, to help families become economically self-sufficient. While some home-visitation programs have produced some positive effects,<sup>3,4</sup> most have failed to affect important aspects of maternal and child health and family functioning.<sup>5,6</sup>

See also pp 637 and 680.

Some of this recent interest in home visitation has grown out of the results of a trial of nurse home visitation with white women who had no previous live births and who lived in a semirural area in and around Elmira, NY.<sup>7-10</sup> Women visited by nurses during pregnancy reduced the number of cigarettes smoked, improved the quality of their diets during the course of pregnancy, and exhibited lower rates of pyelonephritis. In contrast to a comparison group, nurse-visited women who smoked cigarettes at the beginning of pregnancy had 75% fewer preterm deliveries, and nurse-visited young adolescents delivered newborns with higher birth weights.<sup>7</sup> Three percent of the nurse-visited women exhibited pregnancy-induced hypertension (PIH) compared with 9% in the comparison group, a nonsignificant difference.<sup>7</sup>

Home visitation during pregnancy and the first 2 years of the child's life in the Elmira program reduced the rates of state-verified cases of child abuse and neglect among children born to unmarried adolescents from low socioeconomic-status households through age 2 years.<sup>8</sup> While the program's effect on child abuse and neglect was attenuated during the

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2-year period after the program ended,<sup>11</sup> this was probably because of increased surveillance for child abuse and neglect among the nurse-visited families.<sup>12</sup> Children's health care encounters in which injuries were detected were reduced from 1 through 4 years of age, ie, for up to 2 years after the program ended.<sup>11</sup> Moreover, during the first 4 years after delivery of their first child, the nurse-visited mothers who were unmarried and from low socioeconomic-status households at registration had fewer subsequent pregnancies and greater participation in the labor force than did their counterparts randomly assigned to comparison services.<sup>13</sup> This produced substantial savings to government.<sup>14</sup>

Despite limited similarity with the program tested, many different types of home-visitation programs for pregnant women and parents of young children have been promoted on the basis of results from the Elmira trial.<sup>15</sup> We have maintained, however, that the program model studied in Elmira should not be disseminated until its findings are replicated in a major urban area with a minority population.<sup>16</sup>

The current trial was undertaken to determine the extent to which findings from the Elmira study would be replicated with an African-American sample of primarily low-income, unmarried women living in a major urban area (Memphis, Tenn), and when the program was administered through a public health department.

We hypothesized that the program would produce outcomes similar to those in the original trial. Pilot work and preliminary analyses disclosed, however, that some outcomes from the original study occurred too infrequently to be viable outcomes or moderating variables in the Memphis trial, including pyelonephritis (1%), prenatal cigarette smoking (9%), and state-verified reports of child abuse and neglect (3%-4%). The beneficial effects of the Elmira program on child maltreatment and injuries in the original trial were concentrated on children born to mothers with little sense of control over their life circumstances.<sup>17</sup> We hypothesized in the current trial that effects of the program on maternal caregiving and childhood injuries would be greater for women with few psychological resources, where psychological resources were defined in terms of women's intellectual functioning and mental health, in addition to their sense of control.

## SUBJECTS AND METHODS

The numbers of eligible subjects invited to participate, randomized, and assessed at various stages of the research are summarized in Table 1. As this table indicates, we achieved high rates of participation and

Table 1.—Profile of the Trial: Sample Composition Over Time by Treatment\*

|                                                 | Treatment Group |                 |                 |                 | Total |
|-------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-------|
|                                                 | 1               | 2               | 3               | 4               |       |
| No. allocated to treatment                      | 166             | 515             | 230             | 228             | 1139  |
| No. of postrandomization drop†                  | 1               | 4               | 4               | 4               | 13    |
| No. of completed prenatal home visits (range)   |                 |                 | 7 (0-18)        | 7 (0-18)        |       |
| No. of completed postnatal home visits (range)  |                 |                 |                 | 25 (0-71)       |       |
| No. of miscarriages                             | 5               | 9               | 5               | 3               | 39    |
| No. of stillbirths                              | 0               | 5               | 3               | 2               | 10    |
| No. of infant deaths‡                           | 2               | 7               | 2               | 1               | 12    |
| No. of preterm deliveries < 28 wk               | 1               | 0               | 2               | 1               | 4     |
| No. of completed 28-wk interviews               | 157             | 485             | 210             | 211             | 1063  |
| No. of preterm deliveries < 36 wk               | 7               | 42              | 20              | 11              | 80    |
| No. of completed 36-wk interviews               | 137             | 411             | 179             | 189             | 916   |
| No. of obstetrical records abstracted           | 163             | 511             | 228             | 228             | 1130  |
| No. of labor and delivery records abstracted    | 162             | 509             | 228             | 227             | 1126  |
| No. of newborn records abstracted               | 157             | 486             | 220             | 219             | 1082  |
| No. of UT perinatal database records abstracted | 140             | 427             | 191             | 191             | 949   |
| No. of completed 6-mo assessments               | Not followed up | 469             | Not followed up | 203             | 672   |
| 12-mo assessments                               | Not followed up | Not followed up | Not followed up | Not followed up |       |
| No. of home assessments completed               |                 | 471             |                 | 211             | 682   |
| No. of office assessments completed             |                 | 470             |                 | 211             | 681   |
| 24-mo assessments                               | Not followed up | Not followed up | Not followed up | Not followed up |       |
| No. of home assessments completed               |                 | 467             |                 | 208             | 675   |
| No. of office assessments completed             |                 | 465             |                 | 206             | 671   |
| Pediatric records completed                     | Not followed up | Not followed up | Not followed up | Not followed up |       |
| No. of well-child and illness records           |                 | 467             |                 | 204             | 671   |
| No. of immunization records                     |                 | 470             |                 | 210             | 680   |
| No. of ED and hospitalization records           |                 | 481             |                 | 216             | 697   |
| No. of AFDC records reviewed                    | Not followed up | 455             | Not followed up | 201             | 656   |

\*A total of 1290 eligible subjects were invited to participate: 151 refused, and 1139 were randomized. Unless otherwise specified, the difference between the number of cases randomized and assessed is the result of missed assessments. UT indicates University of Tennessee; ED, emergency department; and AFDC, Aid to Families With Dependent Children.

†Ten of the 12 drops consisted of cases where the mother refused further participation after randomization. One woman (assigned to treatment 2) was dropped from the study when it was learned that she was registered and randomized a second time after an earlier registration and miscarriage. A second woman (assigned to treatment 1) was not followed up because of clerical error after a staff member identified her as not meeting the inclusion criteria.

‡One infant death occurred between 6 and 12 months of age.

retention. Office-based assessments were completed at 24 months post partum, for example, on 96% of the cases in which there was no fetal or child death.

## Participants

From June 1, 1990, through August 31, 1991, 1290 consecutive women from the obstetrical clinic at the Regional Medical Center in Memphis were invited to participate in the study. Women less than 29 weeks pregnant were recruited if they had no previous live births, no specific chronic illnesses thought to contribute to fetal growth retardation or preterm delivery (eg, chronic hypertensive disorders requiring medical treatment, severe cardiac disease, large uterine fibroids), and at least 2 of the following sociodemographic risk conditions: unmarried, less than 12 years of education, and unemployed. Eighty-eight percent (1139/1290) of the women completed informed consent and were randomized to 1 of 4 treatment conditions described below. Ninety-two percent of the women enrolled were African American, 98% were unmarried, 64% were aged 18 years or younger at registration, and 85% came from households with incomes at or below the federal pov-

erty guidelines. Compared with women who refused, those who agreed to participate were more likely to be African American than non-African American (89% vs 74%;  $P < .001$ ); younger (average age, 18 vs 19 years;  $P = .001$ ); and non-high school graduates (89% vs 84%;  $P = .01$ ).

## Statistical Power and Assignment Ratios

Sample size was established from a series of power calculations. For all calculations, we set  $\alpha = .05$  and  $\beta = .20$  and specified 2-tailed tests. We established sample size so that it would be sufficiently large (after attrition) to detect program effects that were limited to one half of the total sample defined as being at higher risk according to characteristics such as mothers' having few psychological resources. These calculations led to a sample of 1468 for the prenatal phase and 734 for the postnatal phase of the study. It was possible to enroll fewer women in the postnatal phase because, in the Elmira study, treatment effects (in SD units) were larger for postnatal outcomes than for prenatal outcomes. These analyses also indicated that we could assign women disproportionately

to the relatively expensive nurse-visited condition, with fewer in the comparison condition, with minimal loss of statistical power. Competition for subjects with other studies limited the final sample size for the prenatal phase of the study.

Given the sample actually enrolled, we show herein the estimate of smallest detectable treatment main effect for key outcomes: (1) mean increase in birth weight, 96 g, where  $SD=596$  g; (2) mean reduction in children's health care encounters in which injuries were detected, 0.58 to 0.36, where  $SD=1.06$ ; and (3) reduction in proportion of second pregnancies, 45% to 32%.

Slightly different assignment ratios and treatment allocation schemes were used during 3 time frames during the 15-month period of sample recruitment. This procedure was used to accommodate shifting expectations about completed sample size (because of the competition with other studies that sampled the same population), and to manage a relatively large number of women enrolled during the first 2 months of the study when only 10 of the 12 project nurses had been hired. Consequently, treatment 1 was added to the design during the second and third allocation periods to reduce the number of families assigned to the nurse-visited conditions (treatments 3 and 4) and to reduce workload stress among the nurses.

### Randomization

After completion of baseline interviews, identifying information on the participants was sent to the University of Rochester, Rochester, NY, where it was entered into a computer program that randomized individual women to treatment conditions by methods that are extensions of ones given by Soares and Wu.<sup>14</sup> This procedure concealed the randomization from individuals directly involved with the participants in Memphis. The randomization was conducted within strata from a model with 5 classification factors: maternal race (African American vs non-African American), maternal age ( $<17$ , 17-18, and  $\geq 19$  years), gestational age at enrollment ( $<20$  vs  $\geq 20$  weeks), employment status of head of household (employed vs unemployed), and geographic region of residence (4 regions). Women assigned to the home-visitation groups subsequently were assigned at random to a nurse home visitor.

### Treatment Conditions

Women in treatment 1 ( $n=166$ ) were provided free round-trip taxicab transportation for scheduled prenatal care appointments; they did not receive any postpartum services or assessments. Women in treatment 2 ( $n=515$ ) were provided the free transportation for sched-

uled prenatal care plus developmental screening and referral services for the child at 6, 12, and 24 months of age. Those in treatment 3 ( $n=230$ ) were provided the free transportation and screening offered in treatment 2 plus intensive nurse home-visitation services during pregnancy, 1 postpartum visit in the hospital before discharge, and 1 postpartum visit in the home. Women in treatment 4 ( $n=228$ ) were provided the same services as those in treatment 3; in addition, they continued to be visited by nurses through the child's second birthday.

For the evaluation of the prenatal phase of the program, treatments 1 and 2 were combined to form a single comparison group and then contrasted with treatments 3 and 4, a group that was visited by nurses during pregnancy. For the postnatal phase of the study, treatment 2 was contrasted with treatment 4.

### Program Plan and Implementation

The experimental home-visitation program was carried out by the Memphis/Shelby County Health Department. The nurses completed an average of 7 home visits (range, 0-18) during pregnancy and 26 home visits (range, 0-71) during the first 2 years post partum. They followed a detailed visit-by-visit protocol to guide their efforts to help women improve their health-related behaviors; care of their children; and life-course development (pregnancy planning, educational achievement, and participation in the workforce).

To improve the outcomes of pregnancy, the nurses helped women complete 24-hour diet histories on a regular basis and plot weight gains at every visit; they assessed the women's cigarette smoking and use of alcohol and illegal drugs and facilitated a reduction in the use of these substances through behavioral analysis.<sup>15</sup> They also taught women to identify the signs and symptoms of pregnancy complications, encouraged women to inform the office-based staff about those conditions, and facilitated compliance with treatment. They gave particular attention to urinary tract infections, sexually transmitted diseases, and hypertensive disorders. They coordinated care with office-based staff and measured blood pressure when needed.

After delivery, the nurses helped mothers and other caregivers improve the physical and emotional care of their children. The nurses taught parents to observe the signs of illness, to take temperatures, and to communicate with office staff about their children's illnesses before seeking care for an illness or injury. Specific curricula were integrated into the program to promote parent-child interaction by facilitating parents' understanding of their infants' and toddlers'

communicative signals,<sup>16,17</sup> enhancing interest in playing with their children in ways that promote emotional and cognitive development,<sup>18</sup> and creating households that are safer for children.<sup>19</sup>

The nurses also helped women clarify their goals and solve problems that may have interfered with completing their educations, finding work, and planning future pregnancies. The program promoted work, education, and family planning, but it did so in the context of helping women set goals for themselves at a crucial stage in their own personal development.

The program protocols were based on theories of human ecology, human attachment, and self-efficacy.<sup>20</sup> The nurses helped families make use of needed health and human services and attempted to involve other family members and friends in the pregnancy, birth, and early care of the child. They established trusting relationships with parents and helped mothers set small, achievable behavioral objectives between visits that, when met, would increase mothers' confidence in their ability to manage greater challenges.

### Masking

Interviews and abstractions of medical and social service records were conducted by staff members who were unaware of the women's treatment assignment, except for a few cases in which the participants inadvertently revealed their treatment status to the interviewers. Clinical assessments recorded in the medical records were made by health care providers who had access to the women's treatment assignment. Although the principal investigators and statisticians also had access to the subjects' treatment assignments, all decisions about the coding of interview responses and conditions in the medical record and about the construction of variables were made explicitly without this information.

### Assessments and Definitions of Variables

Participating women were interviewed by research staff members at the time of registration (before their assignment to treatments), at the 28th and 36th weeks of pregnancy, and at the sixth, 12th, and 24th months of the child's life. Medical and social service records were abstracted.

At registration, women were interviewed to determine standard socioeconomic conditions, their mental health,<sup>21</sup> personality characteristics,<sup>22</sup> obstetrical histories, health-related behaviors (cigarette smoking, alcohol and illegal drug use), and social support. Women also completed brief tests to estimate their levels of intellectual functioning.<sup>23</sup> Women's prepregnancy weights and heights were also determined by self-report. The

last weights recorded in the prenatal record before delivery were used to calculate pregnancy weight gains.

Household per annum discretionary income was calculated by means of subsistence standards for determining Medicaid eligibility in Tennessee, the number of individuals in the household, and reported household income. In addition, each participant was assigned a value that represented the percentage of poverty households in the census tract in which she resided.<sup>21</sup>

A variable was created to index women's psychological resources measured at registration. It was based on the summed *z* scores of their intelligence,<sup>22</sup> mental health,<sup>23</sup> and sense of mastery/self-efficacy.<sup>24,25</sup> Self-efficacy was assessed with a measure developed for the current study to determine mothers' confidence in their ability to behave in accordance with the major behavioral objectives of the program. Each of the 3 dimensions was standardized to a mean of 100 and SD of 10, summed, and then restandardized to a mean of 100 and SD of 10. The psychological resource variable was dichotomized at values less than 100 vs 100 or more.

Women were interviewed at 28 weeks' gestation by telephone to assess their health-related behaviors, social support, use of community services, and participation in school and work. Identical interviews were conducted again at 36 weeks. At 36 weeks' gestation, women also were assessed to ascertain their mental health symptoms (with a focus on anxiety and depression)<sup>26</sup> and their sense of mastery.<sup>22</sup>

Obstetrical and newborn records were abstracted directly and verified against an on-line perinatal database from the University of Tennessee. Discrepancies between the perinatal database and our independent abstraction were resolved on a case-by-case basis. In addition, a subset of 41 records (every 25th record) was abstracted by 2 different coders. The reliability of abstraction was good, with correlations of 1.00 for birth weight and 5-minute Apgar score and 0.98 for gestational age.

Urine screens for marijuana and cocaine were performed on 511 women who registered for prenatal care at the Regional Medical Center as part of their clinical assessment during the time that this trial was conducted. The results of these screens (conducted before randomization) were abstracted from the perinatal database.

Urinary tract infections were recorded if a culture produced a colony count of more than 100 000/mL of clean-catch voided urine for a single uropathogen. Diagnoses of pyelonephritis were recorded from the medical record. (Urinary tract infections and pyelonephritis occurred too infre-

quently [5% and 1%, respectively] to serve as viable outcomes and so are not reported herein.) Cultures for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* were obtained at the first prenatal visit and were coded from the prenatal record; *Trichomonas vaginalis* was ascertained by diagnoses from the record. A sexually transmitted disease variable was created that consisted of the number of any 1 of these 3 types of infections. Syphilis was coded separately because of the severity of its effects on the fetus. Diagnoses of *Gardnerella vaginalis* and yeast infections were abstracted from the prenatal record. Infections separated by more than 21 days were treated as separate infections. Diagnoses were separated according to whether they occurred before or after randomization. Pregnancy-induced hypertension was coded when preeclampsia, eclampsia, toxemia, or PIH was coded in the intrapartum or postpartum record.<sup>27</sup>

Birth weight (in grams) was recorded from the hospital record. Intrauterine growth restriction was defined as birth weight less than the 10th percentile for gestational age.<sup>28</sup> Gestational age (in days) was estimated from reported last menstrual period (LMP) and ultrasound scans obtained before 26 weeks' gestation. (Ultrasound was performed on all subjects at registration for prenatal care.) If LMP and ultrasound converged within 14 days, then LMP was used for estimating gestational age. When LMP and ultrasound differed by more than 14 days, ultrasound was used as the estimate. When ultrasound was not done before 26 weeks' gestation, or LMP was unknown, the record was reviewed by 2 clinicians, independently and unaware of treatment condition, to determine the most reliable estimate of gestational age. Preterm birth was divided into 2 categories: (1) spontaneous preterm birth after preterm labor, with or without premature rupture of the membranes, or (2) indicated preterm birth performed for maternal or fetal complications.

At 6 months post partum, mothers and children were assessed in the study offices. Mothers completed interviews that assessed whether or not they attempted to breast-feed, their duration of breast-feeding, and their beliefs about children associated with child abuse and neglect (belief in physical punishment, unrealistic expectations, lack of empathy, and role reversal).<sup>27</sup> Mothers and children were observed while the mothers taught their children a developmentally challenging task by means of the Nursing Child Assessment Satellite Training procedure.<sup>29</sup> The mothers' behaviors were coded and summarized to characterize their sensitivity, responsiveness, and quality of teaching. The infants' behaviors were coded and aggregated to characterize

their responsiveness and clarity of communication toward their mothers.

At 12 and 24 months post partum, in their homes and in the office, the mothers completed the standardized interviews given at 6 months. The interviews included information on the number and outcomes of subsequent pregnancies, mothers' educational achievements, and number of months mothers participated in the workforce. They and their children were observed again by means of the teaching-interaction procedure. During the home visits, the educational and socioemotional properties of the home environment were assessed, by means of the Home Observation for Measurement of the Environment.<sup>29</sup> At the 24-month office visit, the children were tested with the Bayley scales of infant development, and their mothers completed the Achenbach Child Behavior Checklist.<sup>30</sup>

The children's medical records were reviewed with a focus on hospitalizations, emergency department visits, and outpatient encounters in which injuries and ingestions were detected. A summary variable was created to count the total number of health care encounters of all types (outpatient, emergency, and hospital admissions) in which injuries or ingestions were detected. We calculated the number of days that children were hospitalized and in which injuries or ingestions were noted.

The dates and types of children's immunizations were recorded. Whether children were completely immunized by their 24th month of life was determined. Children needed to have 4 or more diphtheria, pertussis, and tetanus vaccines, 3 or more oral poliovirus vaccines, and 1 or more *Haemophilus influenzae* type b and measles, mumps, and rubella vaccines to be considered completely immunized.

Data also were abstracted from Tennessee Department of Human Services records to ascertain women's and their firstborn children's use of Aid to Families With Dependent Children (AFDC) during the period from the child's birth through second birthday. Cases were matched on mother's name, Social Security number, and birthday. A variable was constructed to reflect whether mother and/or child received AFDC for each month of the child's life from birth through 24 months. Summary variables were constructed to indicate the total number of months that either mother or child used welfare (AFDC) for the 1- to 12-month and 13- to 24-month periods.

#### Statistical Models and Methods of Analysis

Data analyses were conducted and reported on all cases with an "intention-to-treat" approach.

Table 2.—Background Characteristics of Sample at Randomization by Treatment Condition

| Dependent Variables                        | Treatment Group |               |               |             |
|--------------------------------------------|-----------------|---------------|---------------|-------------|
|                                            | 1               | 2             | 3             | 4           |
|                                            | %               | %             | %             | %           |
| White                                      | 4               | 8             | 7             | 11          |
| Married                                    | 1               | 2             | 3             | 1           |
| Head of household employed                 | 58              | 57            | 57            | 50          |
| Consumed alcohol (last 2 wk)               | 4               | 4             | 4             | 5           |
| Smoked cigarettes (last 3 d)               | 10              | 10            | 7             | 11          |
| Used marijuana (last 2 wk)                 | 1               | 1             | 2             | 1           |
| Used cocaine (last 2 wk)                   | 1               | 0             | 0             | 0           |
| Positive drug screen                       | 3               | 5             | 2             | 4           |
| Sexually transmitted diseases <sup>†</sup> | 36              | 32            | 31            | 37          |
| Syphilis (prerandomization)                | 7               | 4             | 7             | 6           |
| <i>Gardnerella</i> infection               | 7               | 8             | 11            | 11          |
| Urinary tract infection                    | 7               | 10            | 14            | 11          |
| Yeast infection                            | 6               | 9             | 8             | 6           |
| Previous abortion                          | 17              | 18            | 17            | 18          |
| Low body mass index                        | 28              | 30            | 32            | 22          |
|                                            | Mean±SD         | Mean±SD       | Mean±SD       | Mean±SD     |
| Age, y                                     | 18.0±3.3†       | 18.1±3.2      | 17.9±2.8      | 18.1±3.3    |
| Education, y                               | 10.1±2.0        | 10.3±1.9      | 10.3±2.0      | 10.1±2.0    |
| Income, \$†                                | 1089.6±6677.0   | 1671.1±6890.5 | 2324.6±7340.7 | 98.8±6611.4 |
| % Census tract below poverty               | 39.2±20.6       | 34.5±21.3     | 36.1±21.3     | 35.8±20.5   |
| Housing density                            | 0.9±0.5         | 0.9±0.5       | 1.0±0.5       | 1.0±0.6     |
| IQ                                         | 97.3±10.0       | 96.3±10.1     | 95.7±10.8     | 96.5±10.5   |
| Mental health§                             | 100.3±9.4       | 100.2±10.1    | 100.2±9.6     | 99.2±10.5   |
| Maternal self-efficacy§                    | 99.5±10.0       | 100.1±9.9     | 100.4±10.0    | 99.7±10.2   |
| Mastery§                                   | 100.6±9.6       | 100.1±10.3    | 99.9±9.7      | 99.4±9.9    |
| Maternal psychological resources§          | 100.6±9.6       | 100.1±10.0    | 100.0±9.6     | 99.3±10.7   |
| Grandmother support§                       | 99.9±10.1       | 99.9±9.8      | 99.3±10.9     | 101.0±9.3   |
| Husband/boyfriend support§                 | 99.2±9.8        | 100.2±10.0    | 99.8±10.0     | 100.3±10.1  |
| Child abuse beliefs§                       | 99.5±10.1       | 99.7±9.6      | 100.2±10.0    | 100.9±10.7  |
| Height, cm                                 | 164.2±6.7       | 164.7±7.3     | 164.1±7.0     | 164.0±6.5   |
| Prepregnant weight, kg                     | 62.3±15.1       | 62.1±14.7     | 61.0±12.9     | 62.7±13.9   |
| Gestational age, wk                        | 16.4±6.0        | 16.4±5.8      | 16.3±5.5      | 16.5±5.6    |

<sup>†</sup>Diagnosis of *Chlamydia trachomatis*, *Trichomonas vaginalis*, or *Neisseria gonorrhoeae* in current pregnancy before randomization.

†Mean±SD.

‡Annual household discretionary income based on income subsistence standards for Medicaid eligibility, reported household income, and number of individuals in household at registration.

§Standardized to sample mean=100, SD=10.

¶Locally developed scale that assesses degree to which individual provides emotional and material support to mother.

Dependent variables for which a normal distribution was assumed were analyzed in the general linear model; dichotomous outcomes, such as PIH, in the logistic-linear model (assuming a binomial distribution); and low-frequency count data, such as the number of health care encounters in which injuries were detected, in the log-linear model (assuming a Poisson distribution). Estimates and tests were adjusted for all covariates, classification factors, and interactions. Homogeneity of regressions was tested for all covariates on the contrasts of interest.<sup>30</sup> In the generalized case, the analysis was carried out and estimates obtained in terms of the linearized form of the model—the logits (or log of the odds) in the logistic models, and logs of the incidence in the log-linear models. We use the term *incidence* in referring to the actual count or mean of counts over specific periods of measurement.

For both prenatal and postnatal outcomes, to rule out the potential interaction of treatments with the 3 periods that had different treatment allocation schemes, analyses also were carried out in models that included a 3-level factor for allocation period and its interaction with other effects in the model. No significant differences for time or its interaction with treatments were found, so it was possible to drop this variable from further consideration.

The final models derived for the reported results differed, depending on whether the outcomes were from the prenatal or the postnatal phase of the study because outcomes in each phase had different sets of predictors and different hypothesized moderators of treatment effects. In both phases, we tested hypotheses regarding the moderating influence of specific variables found to condition program effects in the Elmira trial.

**Pregnancy Models.**—The models analyzed in the evaluation of program effects for birth weight and gestational age outcomes focused on the classification effect for treatments (groups 1 and 2 vs 3 and 4), maternal age (<17 vs ≥17 years at registration), and sex of the child. Covariates included women's prepregnancy weight, height, and number of cigarettes smoked at registration. The models for social and behavioral intervening outcomes (such as social support, psychological distress, and use of services) included treatments, a classification factor specifying whether the woman was in school at registration, and covariates for the intake measurement of the behavior or condition under examination (when these intake variables were available). The model for PIH and end-of-pregnancy blood pressures included treatments and a covariate for mean arterial blood pressure derived from the mothers' initial prenatal visit. The model for rates of genitourinary tract infections included treatments and a covariate for the number of corresponding types of infections diagnosed before randomization. A repeated-measures model was used for the analysis of maternal weight gain; the focus of the analysis was on testing the treatment difference in change between the prepregnancy and end-of-pregnancy time points.

**Models for Postnatal Outcomes.**—The primary statistical model for postnatal outcomes focused on classification effects for treatments (2 vs 4) and maternal psychological resources (high vs low), plus 2 covariates (household income and census-tract poverty level). For outcomes measured at more than 1 point in time or under more than 1 situation (eg, home and office), we carried out repeated-measures analyses, adding to the basic model fixed factors for time and measurement location and a random factor for individuals. The focus of interpretation was on those levels of functioning assessed at the end of the program, 24 months post partum.

## RESULTS

### Preintervention Equivalence of Treatment Conditions

As shown in Table 2, the treatment groups were equivalent on background characteristics, with a few exceptions: Women in treatment 4 lived in households in which the head of the household was more likely to be unemployed, and in which there was less discretionary income than did women in treatment 2. There were no additional intervention-comparison differences for subgroups defined on the basis of the women's age, psychological resources, gestational age at enrollment, or randomization period. Similarly, there were no additional

treatment differences on prerandomization background characteristics after removing those cases for which follow-up data were not available.

## Birth Outcomes

Table 3 shows that there were no treatment main effects for birth weight, length of gestation, low birth weight, spontaneous preterm delivery, indicated preterm delivery, or Apgar scores.

## Prenatal Intervening Variables

Table 4 shows that by the 36th week of pregnancy, nurse-visited women were more likely to use other community services than were women in the control group ( $P=.01$ ). They also were more likely to be working ( $P=.06$ ), an effect that was particularly strong among women who were not in school when they were randomized (14% vs 8% [ $P=.05$ ] and 8% vs 2% [ $P=.01$ ] for the 28th and 36th weeks, respectively; data not shown).

There were no program effects on women's use of standard prenatal care or obstetrical emergency services after registration in the study, but nurse-visited women who were in school at registration had twice as many predelivery hospitalizations as did their counterparts in the comparison condition (0.18 vs 0.09;  $P=.003$ ; data not shown). These differences were not explained by any coherent pattern of diagnoses associated with those hospitalizations.

Table 4 also shows that, in contrast to women in the comparison group, nurse-visited women had fewer yeast infections after randomization and fewer instances of PIH ( $P=.05$  and  $P=.009$ , respectively). Among women with PIH, in contrast to those in the comparison group, those who received a nurse home visitor had mean arterial blood pressures during labor that were 4.6 points lower ( $P=.006$ ), although there were no treatment differences in birth weight, length of gestation, or Apgar scores for those with PIH (data not shown).

## Childhood Injuries and Ingestions

During the first 2 years of their lives, nurse-visited children had fewer health care encounters in which injuries and ingestions were detected than did children in the comparison condition ( $P=.05$ ), an effect that was accounted for primarily by a reduction in outpatient encounters ( $P=.02$ ) (Table 5). Nurse-visited children also were hospitalized for fewer days with injuries and/or ingestions than were children in the comparison condition ( $P<.001$ ). These program effects on both total health care encounters and number of days hospitalized with injuries and ingestions were greater for children born to women with few psycho-

Table 3.—Adjusted Birth Weight, Length of Gestation, and Apgar Outcomes by Treatment Condition\*

| Dependent Variables | Comparison Groups, Mean | Nurse-Visited Groups, Mean | Mean Difference† | 95% Confidence Interval |
|---------------------|-------------------------|----------------------------|------------------|-------------------------|
| Birth weight, g     | 3050.4                  | 3032.2                     | 18.2             | -62.4 to 98.7           |
| Gestational age, wk | 39.0                    | 39.0                       | 0.0              | 0.4 to 0.4              |
| 5-min Apgar         | 8.7                     | 8.6                        | 0.1              | 0.1 to 0.3              |

| Dependent Variables             | Comparison Groups, Mean | Nurse-Visited Groups, Mean | Odds Ratio‡ | 95% Confidence Interval |
|---------------------------------|-------------------------|----------------------------|-------------|-------------------------|
| Low birth weight (<2500 g), %   | 14                      | 15                         | 1.1         | 0.8 to 1.6              |
| UGR §, %                        | 9                       | 9                          | 1.0         | 0.6 to 1.5              |
| Preterm (<37 wk), %             | 13                      | 11                         | 0.8         | 0.6 to 1.2              |
| Indicated preterm delivery, %   | 3                       | 3                          | 1.0         | 0.5 to 2.4              |
| Spontaneous preterm delivery, % | 9                       | 8                          | 0.8         | 0.5 to 1.3              |

\*Estimates adjusted for maternal age, number of cigarettes smoked, sex of child, maternal prepregnancy weight, and maternal height. Comparison groups were treatment groups 1 and 2; nurse-visited groups, treatment groups 3 and 4.

†Difference = (comparison mean) - (nurse-visited mean).

‡Odds =  $p/(1-p)$ ; odds ratio = nurse-visited odds/comparison odds.

§Intrauterine growth restriction; cases with birth weights less than 10th percentile for gestational age.

Table 4.—Adjusted Variables for Use of Health and Community Services, School, Work, and Obstetric Problems Identified After Randomization by Treatment Condition\*

| Dependent Variables                               | Comparison Groups, Mean | Nurse-Visited Groups, Mean | Mean Difference† | 95% Confidence Interval |
|---------------------------------------------------|-------------------------|----------------------------|------------------|-------------------------|
| Gestational weight gain, kg                       | 14.9                    | 14.6                       | 0.3              | -0.6 to 1.3             |
| Systolic blood pressure (labor admission), mm Hg  | 112.5                   | 111.7                      | 0.9              | -0.7 to 2.5             |
| Diastolic blood pressure (labor admission), mm Hg | 67.5                    | 66.8                       | 0.6              | -0.8 to 2.1             |
| No. of prenatal visits (total)                    | 5.5                     | 6.2                        | 0.3              | -0.1 to 0.7             |
| No. of visits for obstetrical evaluation (total)  | 2.3                     | 2.8                        | -0.1             | -0.3 to 0.2             |

| Dependent Variables                      | Incidence‡ (Log-Incidence) | Incidence‡ (Log-Incidence) | Log-Incidence Difference§ | 95% Confidence Interval |
|------------------------------------------|----------------------------|----------------------------|---------------------------|-------------------------|
| No. of hospitalizations during pregnancy | 0.13 (-2.11)               | 0.15 (-1.93)               | -0.19                     | -0.52 to 0.14           |
| No. of <i>Gardnerella</i> infections     | 0.07 (-2.53)               | 0.06 (-2.75)               | 0.12                      | -0.34 to 0.58           |
| No. of yeast infections                  | 0.19 (-1.65)               | 0.14 (-1.94)               | 0.29                      | -0.00 to 0.58           |
| No. of sexually transmitted diseases     | 0.21 (-1.58)               | 0.22 (-1.51)               | -0.07                     | -0.32 to 0.18           |

| Dependent Variables            | %  | %  | Odds Ratio¶ | 95% Confidence Interval |
|--------------------------------|----|----|-------------|-------------------------|
| Used other community services  | 20 | 29 | 1.8#        | 1.2 to 2.7              |
| In school                      | 41 | 44 | 1.2         | 0.8 to 1.8              |
| Employed                       | 3  | 6  | 2.0**       | 1.0 to 4.0              |
| Pregnancy-induced hypertension | 20 | 13 | 0.6#        | 0.5 to 0.9              |

\*Use of health and community services and school and work estimates adjusted for whether women were in school at registration; infections adjusted for number of prerandomization infections that correspond to those counted after randomization. Pregnancy-induced hypertension adjusted for mean arterial blood pressure measured at first antepartum visit. Comparison groups were treatment groups 1 and 2; nurse-visited groups, treatment groups 3 and 4.

†Difference = (comparison mean) - (nurse-visited mean).

‡Incidence = mean number of infrequently occurring events within stated time period. Individual cases may have values greater than 1, although the range is small.

§Difference = (comparison log-incidence) - (nurse-visited log-incidence).

¶ $P<.05$ .

#Odds =  $p/(1-p)$ ; odds ratio = nurse-visited odds/comparison odds.

\*\* $P<.01$ .

\*\*\* $P<.001$ .

logical resources (0.41 vs 0.67 [ $P=.003$ ] and 0.02 vs 0.26 [ $P<.001$ ], respectively).

Table 6 shows that the nurse-visited children were hospitalized at older ages and for substantially less serious reasons. The 3 nurse-visited children who were hospitalized with injuries and ingestions were admitted when they were more than 12 months of age (and thus mobile), while 6 (46%) of the 13 comparison children were hospitalized when they were less than 6 months of age (and thus immobile). Seven (54%) of the comparison-group children were hospitalized with either fractures and/or head trauma, while

none of the nurse-visited children were. Two of the 3 nurse-visited children were hospitalized with ingestions.

## Qualities of Caregiving, Immunization Rates, Mental Development, and Behavioral Problems

As indicated in Table 7, nurse-visited mothers reported that they attempted breast-feeding more frequently than did women in the comparison group ( $P=.006$ ), although there were no differences in duration of breast-feeding (duration data not shown). By the 24th

Table 5.—Adjusted Incidence of Child Health Care Encounters in Which Injuries and Ingestions Were Detected During Children's First 2 Years of Life by Treatment Condition\*

| Dependent Variables                                     | Comparison Group, Incidence† (Log-Incidence) | Nurse-Visited Group, Incidence† (Log-Incidence) | Log-Incidence Difference‡ | 95% Confidence Interval |
|---------------------------------------------------------|----------------------------------------------|-------------------------------------------------|---------------------------|-------------------------|
| Total No. of health care encounters—injuries/ingestions | 0.56 (-0.59)                                 | 0.43 (-0.34)                                    | 0.25§                     | -0.00 to 0.50           |
| No. of outpatient visits—injuries/ingestions            | 0.20 (-1.62)                                 | 0.11 (-2.19)                                    | 0.57§                     | 0.10 to 1.04            |
| No. of emergency department visits—injuries/ingestions  | 0.34 (-1.10)                                 | 0.33 (-1.12)                                    | 0.02                      | -0.27 to 0.31           |
| No. of hospitalizations—injuries/ingestions             | 0.03 (-3.63)                                 | 0.01 (-4.31)                                    | 0.68                      | -0.66 to 2.02           |
| No. of days hospitalized—injuries/ingestions            | 0.18 (-1.84)                                 | 0.04 (-3.47)                                    | 1.64                      | 0.78 to 2.50            |

\*Estimates adjusted for maternal psychological resources, discretionary household income, and poverty level of census tract. Comparison group was treatment group 2; nurse-visited group, treatment group 4.

†Incidence = mean number of infrequently occurring events within stated time period. Individual cases may have values greater than 1, although the range is small.

‡Difference = (comparison log-incidence) - (nurse-visited log-incidence).

§ $P \leq .05$ .

$P \leq .01$ .

Table 6.—Diagnoses for Hospitalizations in Which Injuries and Ingestions Were Detected, by Treatment Condition

| Diagnosis                                                                        | Age, mo | Sex | Length of Stay, d |
|----------------------------------------------------------------------------------|---------|-----|-------------------|
| <b>Nurse-Visited (Treatment Group 4)</b>                                         |         |     |                   |
| Burns (1st and 2nd degree to face)                                               | 12.0    | M   | 2                 |
| Coin ingestion                                                                   | 12.1    | M   | 1                 |
| Ingestion of iron medication                                                     | 20.4    | F   | 4                 |
| <b>Comparison (Treatment Group 2)</b>                                            |         |     |                   |
| Head trauma                                                                      | 2.4     | M   | 1                 |
| Fractured tibia/congenital syphilis                                              | 2.4     | M   | 12                |
| Strangulated hernia with delay in seeking care/burns (1st degree to lips)        | 3.5     | M   | 15                |
| Bilateral subdural hematoma*                                                     | 4.9     | F   | 19                |
| Fractured skull                                                                  | 5.2     | F   | 5                 |
| Bilateral subdural hematoma (unresolved)/aseptic meningitis—2nd hospitalization† | 5.3     | F   | 4                 |
| Fractured skull                                                                  | 7.8     | F   | 3                 |
| Coin ingestion                                                                   | 10.9    | M   | 2                 |
| Child abuse/neglect suspected                                                    | 14.6    | M   | 2                 |
| Fractured tibia                                                                  | 14.8    | M   | 2                 |
| Burns (2nd degree to face/neck)                                                  | 15.1    | M   | 5                 |
| Burns (2nd and 3rd degree to bilateral leg)†                                     | 19.6    | M   | 4                 |
| Gastroenteritis/head trauma                                                      | 20.0    | F   | 3                 |
| Burns (splinting/grating)—2nd hospitalization†                                   | 20.1    | M   | 6                 |
| Finger injury/osteomyelitis                                                      | 23.0    | M   | 6                 |

\*One child was hospitalized twice with a single bilateral subdural hematoma.

†One child was hospitalized twice for burns resulting from a single incident.

month of the child's life, in contrast to comparison-group counterparts, nurse-visited women held fewer beliefs about child-rearing associated with child abuse and neglect—lack of empathy, belief in physical punishment, unrealistic expectations for infants ( $P = .003$ ). Moreover, the homes of nurse-visited women were rated as more conducive to children's development by means of the Home Observation for Measurement of the Environment scale ( $P = .003$ ). There was no program effect on maternal teaching behavior, but children born to nurse-visited mothers with low psychological resources were observed to be more communicative and responsive toward their mothers than were children born to low-resource mothers in the comparison group (17.9 vs 17.2;  $P = .03$ ; data not shown). There were no program effects

on the children's use of well-child care, immunization status, mental development, or reported behavioral problems.

#### Maternal Life Course

By the 24th month post partum (Table 8), nurse-visited women reported having fewer second pregnancies and fewer subsequent live births than did women in the comparison group ( $P = .006$  and  $P = .01$ , respectively). The program-control difference in subsequent live births was limited to women with high levels of psychological resources, for whom the rates were 14% vs 31%, respectively ( $P < .001$ ). Although there was some indication that nurse-visited women may have used AFDC slightly less during the second year of the child's life ( $P = .07$ ), there were no program effects on reported educational achieve-

ment or length of employment. By the 24th month, nurse-visited women reported higher levels of perceived mastery ( $P = .005$ ).

#### COMMENT

For the prenatal phase of the trial, there were no treatment differences in length of gestation or birth weight, but there were differences in PIH. For the postnatal phase of the trial, children born to women visited by nurses during pregnancy and infancy had fewer health care encounters in which injuries and ingestions were detected and fewer hospitalization days in which injuries and ingestions were detected than did children in the comparison group (a difference accounted for by more severe and complex diagnoses for comparison children). In addition, nurse-visited women had fewer subsequent pregnancies and live births than did comparison group women.

The pattern of results for the prenatal phase of the study is different from that obtained in the Elmira trial and may be accounted for by different types of risks exhibited by African-American and white women enrolled in the 2 trials. Only 9% of the participants in the current trial smoked 1 or more cigarettes per day at registration, in contrast to 55% in the Elmira trial. Moreover, even in the current study, 6% of the African Americans vs 53% of the whites reported smoking cigarettes. The rates of sexually transmitted diseases, on the other hand, were higher in the current trial among African Americans (47%) than whites (16%). These differences in putative risks for adverse pregnancy outcome may help explain the difference in impact of the prenatal phase of the program in Elmira vs Memphis.

Although a reduction in PIH was hypothesized on the basis of results from the Elmira trial,<sup>1</sup> the information in the medical record did not allow us to make a reliable distinction between preeclampsia or gestational hypertension (nonproteinuric hypertension). Given the nurses' heightened awareness of hypertensive disorders, their monitoring of blood pressure, and their urging the women to communicate with office staff when problems were emerging, it is reasonable to assume that less serious manifestations of PIH were detected in the nurse-visited group. This may help to explain the lower mean arterial blood pressure measured at admission for labor and delivery in the nurse-visited women with PIH. The nurses' promotion of women's eating well-balanced diets, rest, and exercise may explain the reduction in PIH, given that calcium has been shown to reduce the rates of preeclampsia<sup>22,23</sup> and that exercise has been associated with a reduction in both preeclampsia and gestational hypertension.<sup>24</sup>

Additional findings from the current trial are consistent with other studies designed to reduce preterm delivery by increasing the monitoring of pregnant women.<sup>25</sup> We found a higher rate of preterm delivery hospitalization among the nurse-visited women who were in school at registration. The combination of nurses' attention to obstetric complications and a corresponding heightened awareness of these pregnant adolescents' health problems by school officials may have led to greater detection of emerging obstetrical complications and created increased pressure to hospitalize. The lower rate of yeast infections diagnosed after randomization in the nurse-visited groups is probably a reflection of the highly detectable symptoms of yeast infections and the nurses' urging women to comply with treatment.

Findings from the postnatal phase of the current trial, including the reduction in injuries and ingestions noted in the medical record, are more consistent with the Elmira study.<sup>24</sup> It is likely that some portion of the reduction in health care encounters in which injuries and ingestions were detected resulted from the nurses having taught women to observe their children's behavior for signs of illness, to take temperatures, and to call the office staff for guidance when problems arose. In theory, this should have led to a reduction in unnecessary health care encounters and an increase in problems that required more thorough evaluation. The reduction in outpatient encounters where injuries and ingestions were detected may be explained, at least in part, by this feature of the program.

A review of the diagnoses associated with children's hospitalizations, on the other hand, suggests that some portion of the treatment difference in number of days that children were hospitalized with injuries and ingestions resulted from the prevention of deficient caregiving and, in some cases, the prevention of child abuse and neglect. Our interpretation that these treatment differences are indicative of a reduction in deficient caregiving is supported by independent measures of the mothers' childrearing behaviors.

Nurse-visited women attempted breast-feeding more frequently; they provided home environments that were more conducive to children's intellectual and socioemotional development; and they expressed greater empathy, fewer unrealistic expectations, and diminished belief in the value of physical punishment for infants than did comparison-group mothers. While we cannot rule out the possibility that nurse-visited women simply provided more socially desirable responses, some of the beneficial effects of

Table 7.—Adjusted Outcomes on Qualities of Caregiving and Children's Use of Well-Child Care, Immunization Rates, Mental Development, and Behavioral Problems, by Treatment Condition\*

| Dependent Variables                                     | Comparison Group, % | Nurse-Visited Group, % | Odds Ratio†      | 95% Confidence Interval |
|---------------------------------------------------------|---------------------|------------------------|------------------|-------------------------|
| Breastfeeding (attempted)                               | 16                  | 26                     | 1.9‡             | 1.2 to 2.9              |
| Immunizations up to date at 2 y                         | 68                  | 70                     | 1.1              | 0.7 to 1.5              |
|                                                         | Mean                | Mean                   | Mean Difference§ | 95% Confidence Interval |
| No. of well-child visits (0-24 mo)                      | 4.9                 | 4.5                    | 0.2              | -0.1 to 0.6             |
| Beliefs associated with child abuse, Bavoie total score | 100.5               | 98.7                   | 1.9‡             | 0.6 to 3.1              |
| Emotional/cognitive stimulation, HOME total score       | 30.9                | 32.3                   | -1.3‡            | -2.2 to -0.4            |
| Maternal teaching, NCAST maternal total score           | 36.5                | 36.7                   | -0.2             | -0.9 to 0.5             |
| Child responsiveness, NCAST child total score           | 17.4                | 17.7                   | -0.3             | -0.7 to 0.1             |
| Bayley mental development score                         | 94.3                | 94.5                   | -0.2             | -2.4 to 2.0             |
| Behavior problems total score                           | 49.2                | 46.0                   | 3.2              | -0.6 to 7.0             |

\*Estimates adjusted for maternal psychological resources, discretionary household income, and poverty level of census tract. Comparison group was treatment group 2; nurse-visited group, treatment group 4. HOME indicates Home Observation for Measurement of the Environment; NCAST, Nursing Child Assessment Satellite Training.

†Odds =  $p/(1-p)$ ; odds ratio = nurse-visited odds/comparison odds.

‡ $P < .01$ .

§Difference = (comparison mean) - (nurse-visited mean).

Table 8.—Adjusted Maternal Life Course Outcomes During First 2 Years Post Partum, by Treatment Condition\*

| Dependent Variables             | Comparison Group, % | Nurse-Visited Group, % | Odds Ratio†     | 95% Confidence Interval |
|---------------------------------|---------------------|------------------------|-----------------|-------------------------|
| Subsequent pregnancy, 0-24 mo   | 47                  | 36                     | 0.6‡            | 0.4 to 0.9              |
| Spontaneous abortion, 0-24 mo   | 3                   | 5                      | 1.5             | 0.7 to 3.4              |
| Therapeutic abortion, 0-24 mo   | 4                   | 2                      | 0.5             | 0.2 to 1.4              |
| Subsequent live birth, 0-24 mo  | 31                  | 22                     | 0.6‡            | 0.4 to 0.9              |
|                                 | Mean                | Mean                   | Mean Difference | 95% Confidence Interval |
| No. of months worked, 0-12 mo   | 1.7                 | 2.2                    | -0.5            | -1.0 to 0.0             |
| No. of months worked, 13-24 mo  | 3.4                 | 3.4                    | 0.0             | -0.7 to 0.7             |
| No. of months on AFDC, 0-12 mo  | 7.6                 | 7.3                    | 0.3             | -0.4 to 1.1             |
| No. of months on AFDC, 13-24 mo | 8.4                 | 7.9                    | 0.7             | -0.0 to 1.4             |
| Anxiety, 24 mo¶                 | 100.3               | 99.1                   | 1.2             | -0.4 to 2.7             |
| Depression, 24 mo¶              | 100.1               | 99.5                   | 0.6             | -1.0 to 2.2             |
| Mastery, 24 mo¶                 | 99.4                | 101.5                  | -2.2‡           | -3.8 to -0.7            |

\*Estimates adjusted for psychological resources, discretionary household income, and poverty level of census tract. Comparison group was treatment group 2; nurse-visited group, treatment group 4. AFDC indicates Aid to Families With Dependent Children.

†Odds =  $p/(1-p)$ ; odds ratio = nurse-visited odds/comparison odds.

‡ $P < .01$ .

§Difference = comparison mean - nurse-visited mean.

¶ $P < .10$ .

¶Standardized to sample mean=100; SD=10.

the program are based on data derived from reviews of medical records.

Many of the effects of the program on health care encounters in which injuries and ingestions were detected and on qualities of childrearing were greater for mothers with low psychological resources. For example, in contrast to counterparts in the comparison group, the children of nurse-visited mothers who had few psychological resources were observed to be more responsive and communicative toward their mothers. Infant-attachment research suggests that toddlers' behavior toward their mothers reveals the extent to which their mothers are sensitive and responsive rather than hostile, intrusive, or neglectful toward them, with toddlers' behavior being a better indication of the quality of the parent-child

relationship over time than currently observed behaviors of parents.<sup>26,27</sup>

It is important to note, in this regard, that the program was designed to decrease risks posed by limited intellectual functioning, mental health, and mastery on the part of caregivers.<sup>28</sup> The program provided a detailed educational protocol designed to help parents understand and respond appropriately to their children's unique temperament and communicative style by means of educational materials adapted to the intellectual levels of the mothers. Given that limited knowledge and capacity to anticipate children's needs can compromise parents' ability to care for their children, it is reasonable that this program would reduce risks imparted by limited intellectual functioning, even in the absence of an effect on maternal intellectual functioning.

While the program produced no effect on mothers' mental health, it may have reduced psychological distress related to parents' care of their children, which is affected by parents' depression and sense of competence.<sup>28,29</sup> Moreover, by the end of the program at the children's second birthday, there were significant treatment effects on women's sense of mastery. Mastery is a general psychological attribute that affects parents' ability to cope effectively with a wide range of challenges, and a deficit in mastery has been associated with child abuse and neglect.<sup>30</sup> Thus, the program diminished risks posed by limited intellectual functioning, psychological distress, and impaired sense of mastery.

Although there also was a trend for the nurse-visited women to use AFDC about 0.7 month less during the child's second year of life than did women in the comparison group, there were no treatment-comparison differences in educational achievement or labor-force participation after delivery, despite nurse-visited women being in the labor force to a greater degree at the end of preg-

nancy. The discrepancy between the findings for these 2 phases of the study will be examined in future reports. In the Elmira trial, the influence of the program on workforce participation did not emerge until the 2-year period after the program ended, and the influence of the program on promoting women's economic self-sufficiency was preceded by a reduction in the rate of subsequent pregnancy.<sup>31</sup> A 15-year follow-up of the Elmira sample now indicates that these early alterations of maternal life course portend substantial improvements in major maternal life outcomes.<sup>32</sup> It will be important to determine whether a corresponding pattern of results emerges in Memphis after the program ends.

Although one might consider dropping the prenatal phase of the program from the intervention in light of its failure to produce substantial prenatal and newborn effects in the current trial, this would be injudicious. We have only limited insight into the extent to which the salutary postnatal effects are dependent on the prenatal initiation of the service. This issue deserves careful examination

as the program is studied with new populations and in new contexts.

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**Testimony to the House Committee on Government Reform and Oversight,  
Subcommittee on Human Resources**

**Hearing on  
“Early Childhood Interventions: Public-Private Partnerships”**

**Prevention of Child Abuse, Use of Welfare, and Crime with Preventive  
Interventions  
Early in the Life Cycle**

**July 16, 1998**

**David Olds, Ph.D.**

**Professor of Pediatrics, Psychiatry, and Preventive Medicine  
University of Colorado Health Sciences Center**

Mr. Chairman, members of the Committee, thank you for the opportunity to testify on this important topic.

For over 20 years, my colleagues and I have been developing and studying a program of prenatal and early childhood home visitation by nurses that reduces child abuse and neglect, use of welfare, and crime in low-income families. The program serves low-income mothers who have had no previous live births, many of whom are unmarried adolescents.

The nurses visit pregnant women in their homes during pregnancy and the first two years of children's lives. In those visits:

- they help women reduce prenatal cigarette smoking, and use of alcohol and drugs;
- they help women improve their diets, and identify emerging complications of pregnancy that can be treated before they compromise the health of the mother and fetus;
- they help parents provide more responsible care for their children; and
- they help parents develop a vision for their future and plan subsequent pregnancies, complete their educations, and eventually find work.

The program has been developed, refined, and tested over a 20-year period so that today the nurses have structured written protocols and intensive training to guide them in working with families who live in highly challenging and often dangerous situations.

Over the years, we have been encouraged to disseminate the program model, but we have waited to do so until now because we wanted to have sound scientific evidence of its effectiveness and thoroughly developed program protocols. In this way, we can now provide greater assurance to communities that replicate this program will reproduce the results achieved in the research.

We have examined the program in three separate, large scale randomized trials. Randomized trials are the most scientifically credible method of determining the effectiveness of health, social service, and medical interventions.

The first study was carried out in Elmira, New York with Caucasian families.

The second was conducted in Memphis Tennessee, with African American families.

The third is being completed in Denver with a large portion of Mexican-American families.

We have found that the program can reduce some of the most intractable health and social problems facing at-risk families in our society and a recent report by the Rand Corporation shows that the program can more than pay for itself in reduced government expenditures, when it is focused on unmarried, low-income parents.

A recent report on the Elmira study shows that by the first child's 15th birthday, nurse-visited low-income unmarried mothers had:

- 33% fewer subsequent births;
- 30 months greater spacing between first and second births;
- 30 fewer months on welfare;
- 81% fewer arrests and convictions; and
- 79% fewer verified reports of child abuse and neglect;

Compared to their counterparts who had been assigned to comparison services, the 15-year old children born to nurse-visited, low-income, unmarried mothers had:

- 60% fewer instances of running away;
- 56% fewer arrests;
- 81% fewer convictions and violations of probation; and

- 56% fewer days of alcohol consumption.

There were very few benefits for higher income, married women and their children.

One of the hallmarks of good evidence is being able to reproduce it. The major findings from the Elmira trial in the early years of the child's life have now been reproduced in an urban replication conducted in Memphis.

For example, by the children's second birthdays, compared to women and children randomly assigned to comparison services, those who were nurse-visited had:

- 30% fewer hypertensive disorders of pregnancy;
- 50% more frequent breast feeding;
- 81% fewer days that children were hospitalized with injuries or ingestions;
- fewer conditions in the children's hospital records indicative of neglectful or abusive care;
- 30% fewer subsequent births.

During the past decade, the findings from this program of research have been used to promote a wide variety of home-visitation programs for pregnant women and parents of young children. Unless programs share the essential elements of the program tested in these trials, however, those other programs are not likely to produce the same results.

Even when communities choose to develop programs based on models with good scientific evidence, all too often the programs are watered down and compromised in the process of being scaled up. We have begun some work to address this problem.

We have been invited by the Justice Department to disseminate this program in high-crime neighborhoods in different parts of the country. We are using this initiative to learn more about what it will take, in new communities, to develop the program with fidelity to its essential elements. We have established the program in 14 communities and are studying what it will take to successfully develop the program on a much larger scale.

In this initiative, state and local governments are securing financial support for the program out of existing funds, such as TANF, Medicaid, child-abuse, and crime-prevention dollars. The program itself requires no new appropriation. Communities are making these investments in part because the evidence indicates that expenditures in these budgets will be reduced later on. This means that the cost of this program, which in 1998 dollars is about \$7,000 per family for two and a half years of service, can be shared by a variety of government agencies. This reduces the strain on any one budget.

We have recently been invited by a major philanthropy to develop a system of regional replication centers based in schools of nursing and public health to develop this program on a national scale. We have estimated that it will take 20 additional years to develop this program for all low-income women in our society. If we wish to preserve those elements of program quality necessary to reproduce the results I have just summarized on a national scale. This is because quality programming requires recruiting qualified staff, intensive training, and excellent supervisors – capacities that require development over time.

In general, we believe that policies and practices for assisting young children and their families ought to be based upon the best scientific evidence available. Given the recent emphasis on brain development in the first three years of life, there is a lot of enthusiasm these days about the promise of early preventive intervention.

We know that brain development is rapid during the first three years of life and that many neuronal pathways are established during this time. There are very few programs that have been scientifically proven to improve parents' care of their children, however, and I see almost no evidence that programs have been able to improve children's neurological development. At this point, we have lots of theory but not much proven to work.

The few well conducted studies of programs designed to promote early parental care should give us pause, given that almost all of those tested have failed to achieve the kinds of results we so desperately need.

I am particularly concerned about the expansion of Early Head Start before research on its effectiveness is completed. I am deeply concerned that the programs in place have not been sufficiently well developed clinically to produce meaningful results. I have similar concerns about the federal Healthy Start program.

To fund such programs before they have been developed clinically and carefully tested is likely to put in place a system of services for young families that is deficient and not reflective of what our evidence indicates that we, as a society, could achieve.

Public hope and confidence in the promise of such programs is a scarce commodity that we dare not squander on approaches that are not likely to succeed. As health and social welfare policy is redesigned in the near future, I believe that it makes sense to begin with programs that have been tested, replicated, and found to work.

In the next century, we have a unique opportunity to guide policies for children and families with solid scientific evidence. I hope we do not miss the opportunity.

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## ARTICLE

# INCREASING THE POLICY AND PROGRAM RELEVANCE OF RESULTS FROM RANDOMIZED TRIALS OF HOME VISITATION

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*In the present article, we describe the efforts we have made to increase the relevance of findings from our randomized trials of prenatal and early childhood home visitation for the formulation of public policies and programs for pregnant women and parents of young children. We then consider the reasons that findings from well-conducted research often fail to influence policies and programs. Some factors influencing policymaking are especially noteworthy in the context of studies of prenatal and early childhood home visitation. One is that findings from randomized trials are sometimes contradictory, causing confusion among the public and policy communities. A second is that in their understandable zeal to help children and families, advocates for particular health and social welfare programs often overstate the potential benefits of these services. A third is that the*

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*economic and social benefits of well-designed and executed home-visitation programs are spread over multiple domains of government spending, making it difficult for any single organization or branch of government to fund the program on the grounds that it will recover those costs in reduced expenditures within their own budgets. Finally, legitimate questions can be raised about the extent to which results from randomized trials can be used to predict results from programs that are scaled up on the basis of such experiments. Replicated or institutionalized programs often fail to resemble adequately the models upon which they were based. Consequently, effectiveness frequently falls short of expectations. This article concludes with a list of activities that we are conducting to further strengthen the applicability of our findings for policy and program planners. © 1998 John Wiley & Sons, Inc.*

A research orientation to the development of health and human services is founded on the premise that improvement in health and well-being depends, in large part, upon an objective knowledge base regarding service effectiveness. It is based upon a commitment to identifying which programs (or service elements) are more effective than others. Such an approach is based upon an assumption that science can indeed provide guidance in this quest for the identification of those services that work and those that do not. Applications of scientific methods to clinical practice in health care delivery provide reason for optimism.

In the past 20 years, for example, neonatologists have been able to achieve significant reductions in infant mortality through the development and testing of new therapies, such as artificial surfactant, for the treatment of preterm and low birthweight newborns. Artificial surfactant, a substance that allows newborns with immature lungs to breathe more effectively, has been developed through careful application of scientific methods, including testing the therapies with a series of randomized clinical trials (Schwartz, Ruby, Scanlon, & Kellogg, 1994; Vermont-Oxford Neonatal Network, 1996). Findings like these have been adopted rapidly in neonatology units throughout the Western world, with enormous reductions in infant mortality and morbidity. The rapidity with which scientific innovations have altered clinical practice can be accounted for, in part, by inclusion of scientific training in the preparation of new health professionals. New methods, based upon sound scientific evidence, however, have not always been greeted with open arms, even when research suggests changes in relatively focused technologies. The challenges of introducing new drugs or technologies in clinical practice, such as those represented by artificial surfactant, are not really as great, however, as developing whole new models of delivering health and human services, which research sometimes suggests is warranted.

In the current article, we examine our own experience in attempting to design and study a program of prenatal and infancy home visitation to illustrate what we believe is a larger set of issues which must be addressed, if a stronger link is to be forged between science and the formulation of programs and policies in health and human services. Our team of investigators has conducted three large-scale randomized trials among low-income, at-risk families that examine the efficacy of home visitation services as a means of improving the outcomes of pregnancy, child health and development, and parents'

own personal life course development (planning future pregnancies, continuing educations, and finding work). Findings from the first two of these trials, which employed nurse home visitors in Elmira, New York, and Memphis, Tennessee, are consistent and promising (see Olds, Henderson, Kitzman, Cole, & Tatelbaum, this issue). Given that a variety of paraprofessional home visitation programs are now being widely promoted with limited evidence of their efficacy, we are now testing the relative efficacy of nurse and paraprofessional home visitors employing essentially the same program model in a trial in Denver, Colorado. We have conducted these studies with the assumption that the findings would inform policies and programs for low-income pregnant women and parents of young children. Findings from credible research, however, often get short shrift in the design of policies and practice (Weiss, 1983; Weiss & Bucuvalis, 1980; Backer, 1991). We suspect that the results from the current series of trials are similarly fated, unless further efforts are made to bolster their relevance to those in the public and private sectors who allocate resources toward helping this population.

The current debate in American society about the role of public programs in all aspects of health and social welfare puts our original assumption about the role of scientific evidence in policy formulation and program design to an especially stringent test. This is because of the strident positions now being taken on these issues in both political parties. It is also because politicians today often believe that scientific evidence from health and social scientists is fundamentally influenced by ideological motives on the part of investigators, or that evidence is used tendentiously by policy makers to promote personal or partisan agendas. They are particularly suspicious of claims that programs will produce cost savings downstream without solid evidence of future savings.

In the present article, we attempt to accomplish three tasks: (a) We outline the efforts we have made to increase the relevance of these findings for the formulation of public policies and programs for pregnant women and parents of young children; (b) we consider those factors that we think interfere with the application of these findings; and (c) we outline directions for future research that we believe will enhance the utility of these findings for improving the lives of children and their families.

## **INCREASING THE POLICY RELEVANCE OF THE RESEARCH**

Since the initial design of this series of trials, we have attempted to increase the relevance of this work by two general means. First, we have chosen to test a model that with some modification of current standards and procedures could be replicated by many, if not most, public and private agencies. Second, we have examined outcomes that most professionals, policymakers, funders, and the public recognize as clinically and socially important.

### ***Test of Programmatically Feasible Intervention***

In designing a program that is within the reach of most health and human service agencies that conduct home visitation, we chose to augment existing practice in significant ways. Most home visitation programs in existence at the time we began our work (mid-1970s) provided services that either started too late, stopped too soon, or consisted of activities that, in our judgment, had little chance of producing the kinds of effects that we wished to achieve. Simply relying on existing home visitation models would yield weak

results, suggesting that further investment in such programs would be a waste of resources. Indeed, early reviews of home visitation programs supported this negative assessment (Combs-Orme, Reis, & Ward, 1985). On the other hand, if we created a program that was so expensive or required resources that were not in existence in most communities, we might generate positive results that would be unreplicable on a significant scale. The program we designed is described in detail in an article by Olds, Kitzman, Cole, and Robinson (1997).

Briefly, our approach called for biweekly home visits by registered nurses during pregnancy and for much of the first two years of the child's life. Visit guidelines provided structured activities for the nurses to carry out with families to improve maternal and family adaptation with respect to pregnancy outcomes, the health and development of the child, and maternal life-course development. Although the program often has been referred to as the "Cadillac" of home-visitation programs by service providers, the original version conducted in Elmira, New York was no more expensive than other model home-visitation programs for low-income families, such as Home Start, sponsored by Head Start during the same time period that the Elmira program was being carried out (Love, Nauta, Coelen, Hewlett, & Ruopp, 1976). There is also evidence that it produces significant savings in a variety of public costs (Olds, Henderson, Phelps, Kitzman, & Hanks, 1993).

In the Memphis replication, we utilized only nurses with baccalaureate degrees, even though the original trial employed nurses with diploma degrees. We chose to use this standard in the Memphis trial because we wanted the program to reflect what might be considered state-of-the-art practice among urban community health agencies by the mid-1980s. If the program failed, we did not want it to be chalked up to a failure to incorporate the highest standards for selecting nurses for this type of position. Moreover, we conducted the program through the Memphis/Shelby County Health Department on the grounds that one aspect of its feasibility would be reflected by its viability within an existing health or human service system. Here, the rules for hiring and supervising staff, and standards of professional conduct often do not reflect the kinds of very flexible arrangements that sometimes can be introduced when programs are conducted as experiments.

In the Denver trial of paraprofessional vs. nurse home visitation, we chose to employ paraprofessional home visitors who, for the most part, had only high school degrees because we wished to hire visitors who shared many of the background characteristics of the families they visited. It had been argued that the efficacy of home-visitation programs would be strengthened if there was less social distance between the visitors and the families they served (see Hiatt, Sampson, & Baird, 1997). We also wanted our definition of a paraprofessional home visitor to reflect the backgrounds of paraprofessionals working in programs that were being promoted nationally at the time, such as the South Carolina Resource Mothers Program (Heins, Nancy, & Fergusson, 1987) and the Hawaii Healthy Start Program (Sia and Breakey, 1985). This was especially important, because paraprofessional home-visitation programs had been promoted as a source of employment for low-income women (Bell, Burnstein, and Orr, 1987).

To be sure, questions will be raised about the extent to which there are sufficient numbers of baccalaureate-prepared nurses or appropriate training opportunities for paraprofessional home visitors to implement such programs on a much larger scale. However, it can also be argued that with sound evidence of significant effects and cost savings in hand, policymakers and private funders should, or at least could be persuaded to, allocate resources for greater nursing and paraprofessional training in home visi-

tation. Such evidence would justify an effort to begin expanding the infrastructure (visitor training, creation of staff positions within public health and social service agencies, etc.) that will be necessary to scale up home-visitation programs.

### *Examination of Clinically and Socially Relevant Outcomes*

The policy relevance of our work also has been enhanced by our efforts to address maternal and child outcomes that clearly are of clinical and social significance. Each of these domains is elaborated below.

During the prenatal period, we chose to focus this series of trials on the prevention of preterm delivery and low birthweight, the leading correlates of infant mortality and morbidity in Western societies (Institute of Medicine, 1985). The prenatal intervention focused primarily on reducing women's substance abuse during pregnancy, behaviors that not only increase the risk for preterm deliveries and low birthweight, but that increasingly are recognized as risks for neurodevelopmental impairment in children (see Olds, Pettit, et al., this issue). After delivery, the major outcomes for the child included the prevention of maltreatment (a condition that the U.S. Advisory Board on Child Abuse and Neglect, 1990 has called a national emergency) and childhood injuries (the leading cause of childhood mortality among children aged 1 to 14; Christofel, 1990). Among the mothers, we focused on preventing unintended subsequent pregnancy, school dropout, failure to find work, and welfare dependence. These are factors that conspire to enmesh families in poverty, that increase the likelihood women will have poor subsequent pregnancies, and that increase the likelihood of suboptimal care of children (Furstenberg, Brooks-Gunn, & Morgan, 1987; Tygart, 1991). By focusing on the prevention of such problems, while attempting to specify the behavioral, psychological, and social mechanisms through which the program produced its positive effects, we are able to address outcomes that professionals, policymakers, private funders, and the public would identify as worthwhile if the program were successful.

In keeping with this strategy, we chose whenever possible to rely on measures of behavior over measures of beliefs and attitudes, and to base the assessment of those behaviors on direct observation and medical or social service records. Moreover, we attempted to measure most of the important outcomes with a variety of sources of data to increase our confidence that the apparent effects of the program were not limited to some artifact of measurement. So, for example, the assessment of the Elmira program's effect on the prevention of child maltreatment relied upon a review of state central registry records, observations of parents' treatment of their children, and conditions in their homes (Olds, Henderson, Chamberlin, & Tatelbaum, 1986). The convergence of program effects on all of these types of measures, from different sources, strengthened our conviction that the program effects were real.

### **FACTORS THAT INTERFERE WITH THE TRANSLATION OF RESEARCH FINDINGS TO PROGRAMS AND POLICIES**

The reasons that findings from well-conducted research fail to influence policies and programs are numerous, of course, but some factors are especially noteworthy in the context of studies of prenatal and early childhood home visitation.

*Contradiction and Lack of Clarity Among Studies*

Findings from different randomized trials are sometimes contradictory, causing confusion among the public and policy communities. In the early years of work in home visitation for pregnant women and parents of young children, respectable reviews of the literature indicated that such services were not promising. By contrast, and perhaps, driven in part by a desire to overcome this negative conclusion, later reviews, which included quasi-experimental as well as experimental studies, made claims for home visitation that could not be fully supported (Siegel, Bauman, & Schaefer, 1980). More recently, a sufficient number of well-designed and executed studies has become available to begin identifying program characteristics which may explain why some programs are promising, while others are not (Olds & Kitzman, 1990; Olds, 1992, 1993).

Yet, despite accumulating evidence supporting characteristics of effective programs, certain policy bodies such as the National Commission to Prevent Infant Mortality (1985, 1989) and the U.S. Advisory Board on Child Abuse and Neglect (1990, 1991) began promoting home-visitation programs that, while sound in many ways, failed to contain *all* of the elements that emerging evidence suggests are important to program success. Although these recommendations helped raise public awareness of infant mortality and child maltreatment as major societal ills with home visitation as an appropriate response, they also created the impression that these problems can be prevented more easily than current evidence indicates they can. Moreover, program models were advanced that had not yet been tested through randomized clinical trials—the research design best able to produce defensible evidence. If such programs fail to generate the kinds of results promised by these policy groups, the public and policy communities are apt to become even more cynical about the value of health and social science, even though the problem stems not from the science itself but from the underutilization of science.

*Tension Between Advocacy and Science*

In their understandable zeal to help children and families, advocates for particular health and social welfare programs often overstate the potential benefits of these services. Exaggerated claims are, of course, a common and at least temporarily effective way of competing for the limited attention of policymakers and funders. Supporters of home-visitation programs, for example, often note that they have substantially reduced rates of child maltreatment among the families served in their program. Such a strong message attracts widespread interest and even enthusiasm, while simultaneously, and perhaps unwittingly, understates the working of major selection factors that inevitably exist in the populations served by a program. Families at highest risk for child maltreatment may never enroll in the program or may withdraw from the program prior to its completion. As a result, such families are frequently not included in the calculations of who actually is enrolled in the program. Estimates of strong program effects based on voluntary participation are usually moderated when programs are tested in randomized trials, where it is possible to control for selection bias as well as other extraneous factors (Olds & Kitzman, 1993). Although making strong, positive claims may, for a time, increase the likelihood of funding in the long run, such a strategy is apt to backfire. When the promised outcomes do not materialize, the resulting disappointment among policymakers and funders may color their overall perceptions about doing any-

thing worthwhile in the field of activity in which the oversold program was conducted. In other words, overselling runs the risk of undermining policymakers' and funders' confidence in the possibility of producing any valid and reliable evidence, even that based on carefully conducted randomized trials that provide the clearest direction for the design of effective programs. And lost confidence on the part of policymakers and funders ultimately will undermine public commitment to scientific endeavors, thus cultivating our ability to understand what really works in helping low-income pregnant women and parents of young children.

At the same time, however, it must be acknowledged that policy makers cannot always wait for definitive evidence before attempting to address the needs of children and families. We agree with the U.S. Advisory Board on Child Abuse and Neglect that the nation faces an emergency in failing to support adequately families that are at risk. It is untenable to wait for every question about program efficacy and effectiveness to be answered before proceeding. Nevertheless, in our case, we rejected the appeals of many organizations between 1986 and 1994 to replicate our program in their communities. We did so because we reasoned that we needed, from our Memphis replication study, evidence that the program would sustain its effects in different contexts with different populations, before it would make sense to engage in program dissemination. As noted earlier, moving aggressively with widespread dissemination of prenatal and early childhood home visitation, before its true value has been ascertained, may do less good than many expect. Indeed, the Panel on Research on Child Abuse and Neglect of the National Research Council took the position that no new large-scale initiatives in home visitation ought to be undertaken until a much larger empirical base is established to determine the efficacy of different home-visitations programs (National Research Council, 1993).

In making policy and program choices, of course, randomized trials will not be available to inform every decision. It is our strong conviction, however, that empirical evidence should always play a large role in the process. More specifically, any evidence offered on the efficacy of a program should always be qualified as to its level of certainty. Gradually, as the standards of evidence rise, there will be heightened expectations about what level of knowledge should be in place as new initiatives are undertaken. In the meantime, we must find ways of respecting the mutual, albeit, different contributions that advocates and investigators make to improving the lives of children. Part of the resolution of this dilemma may be for advocates to have a better understanding of their own data and its correct interpretation so that they do not promise more than can be delivered. This will require greater efforts in professional and public education regarding research design and the interpretation of statistical evidence.

Investigators, for their part, need to view professionals, parents, and advocates as allies with whom they share an overriding commitment to children and families. They need to overcome their image as cold-hearted scientists concerned more about their data than about the people they study. They also need to make the knowledge they develop about the effectiveness of interventions more useful to the advocacy and promotional efforts that are needed to advance better policies and programs; this will require closer collaboration with parents and professionals to frame questions that make sense from their perspectives. In addition, investigators need to acknowledge that it will be impossible to create the same level of scientific certainty as found in laboratory studies when the interventions examined are of much greater complexity and are almost inevitably altered in response to contextual conditions.

to innovation, however, are two critical variables to examine as influences on whether a particular program will be perceived as compatible with the existing values, past experiences, and needs of potential adopters (Kotter, 1990; Rogers, 1995).

In the absence of a robust causal framework, it has been too easy to treat local context as a fixed constraint, a reality that implementors must take into account but cannot change. The more legitimate reality, as some studies are beginning to show (Hall, 1992), is that context consists of a complex set of interrelated variables, many of which may be subject to negotiation and modification. Understanding better how to manage variations in local environments, in order to ensure that the essential elements of a program are reproduced would represent a significant advance in dissemination strategies.

The fidelity of implementation is also likely to depend on the character of the relationships formed among those who operate the program. In home-visitation services, the primary relationship is between visitors and the families served. In addition, there are key relationships among visitors, and those who supervise them, among individuals staffing the program locally and other service providers which families may need, and among the local program staff and those outside (typically, the developers of the model) who provide them with training, materials, and technical assistance. How these different sets of relationships are defined at the outset, how they evolve or change and why, and how they interact with and affect one another will influence how the model actually gets translated into local practice (Rogers, 1995). A central question is how to ensure that the primary relationship between home visitors and families gets the support it needs from these other relationships to achieve the outcomes desired.

The local context and the character of the relationships formed among those who operate the program are two examples of the many issues that may impinge on the effectiveness with which model home-visitation programs are disseminated. The fact that there is not a well-defined research agenda in this area provides all the more reason to begin giving more critical attention to the challenges that extending the reach of a well-tested program poses.

#### **NEW EFFORTS TO INCREASE THE POLICY AND PROGRAM RELEVANCE OF THE WORK**

In light of these experiences and observations, we have begun a series of new research-related activities to strengthen the applicability of our findings for policy and program planners. Figure 1 depicts the evolution of our research program on prenatal and early childhood home visitation.

##### *Studies of Program Dissemination*

In the winter of 1994–95, we were approached by leaders in the Department of Justice about disseminating our program to some of its "Operation Weed and Seed" sites. Operation Weed and Seed is a multiagency strategy that attempts to "weed out" violent crime, gang, and drug activity in targeted high-crime neighborhoods, and then "seed" the area by restoring these neighborhoods through social and economic revitalization. The Weed and Seed strategy involves linking and integrating federal, state, and local law enforcement and criminal justice efforts with federal, state, and local social services, and private sector and community efforts to maximize the impact of existing programs and resources. Law enforcement suppression activities constitute the "weed" portion of the

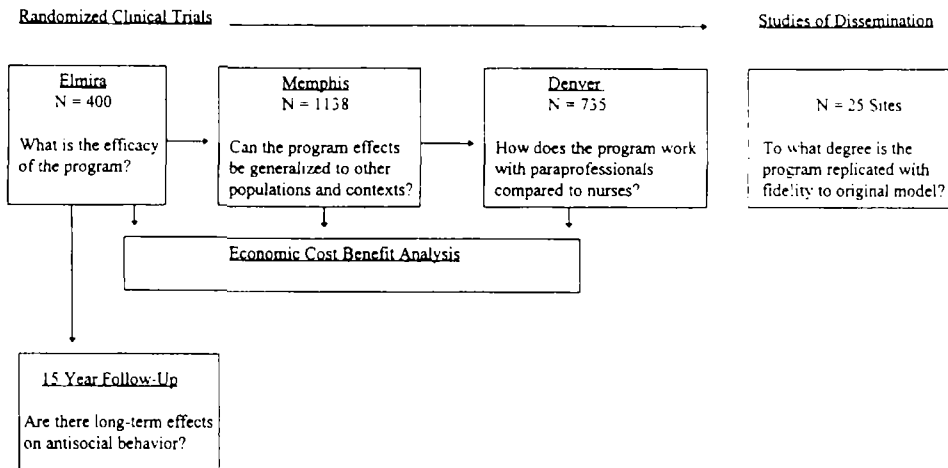


Figure 1. The evolution of a research program: prenatal and early childhood home visitation.

program. Revitalization, which includes prevention, intervention, and treatment services, and then neighborhood restoration constitutes the "seed" element.

Our program was selected for dissemination in six Weed and Seed sites because of its scientific foundations, its effects on child maltreatment and welfare dependence, and its potential for reducing the rates of delinquency, crime, and violence among children as they mature (see Olds, Pettitt, Robinson, et al., this issue). We accepted the invitation from the staff of Operation Weed and Seed because the evidence of program efficacy is increasingly coherent across two sites, at two different times, and with two different populations, and, as alluded to above, because it will give us an opportunity to study the dissemination process.

The selection of the six Weed and Seed sites to participate in the program replication was done through a competitive RFP process, thus providing some assurance that the sites selected had the potential to successfully implement the program at the local level. While the Department of Justice awarded us a grant to cover the costs of training and technical assistance to sites, the local community was responsible for procuring the funds needed to implement the program. In addition to training and technical assistance, sites will be provided with detailed visit-by-visit guidelines evolved over the course of the three clinical trials to provide direction to the nurses' work with families.

Since beginning our initiative with the Department of Justice, we have been approached by health care organizations in Wyoming, Ohio, Oklahoma, Nebraska, New York, and Maryland who have an interest in working with us to replicate the program in their communities. Over the next 4 to 5 years, we plan to identify and develop approximately 25 demonstration sites that will enable us to further our understanding of factors that may impact how well the program is replicated. We will not conduct additional randomized trials, but instead will conduct process studies. These inquiries will enable us to explore those factors at the levels of communities, organizations, staffs, and populations served that affect the extent to which, and how effectively, the program is carried out in accordance with the original program model. Given that many programs lose their vitality once they are institutionalized, we hope to learn something about what it will take to maintain that vitality, including the influence of our own role

as developers of the model and coordinators of the dissemination. We plan to study both local factors affecting fidelity and vitality and our interaction with the local programs, to gain insight into the path by which the ongoing efficacy of the model might be sustained and, ideally, enhanced in a variety of communities. Also, attention will need to be paid to what can be extrapolated from this relatively modest dissemination project that could provide guidance for more extensive efforts to foster and support adoption of the model, recognizing, of course, that a significantly greater scale will present implementation challenges that cannot be fully explored in a replication initiative of this limited scope.

### ***Scientific Focus on the Prevention of Antisocial Behavior and Violence***

As noted in the article by Olds, Pettitt, et al. in this issue, we increasingly have begun to entertain the possibility that the program of prenatal and early childhood home visitation that we have examined in Elmira and Memphis will indeed prevent antisocial behavior and crime. The program has reduced three general domains of risk for the development of delinquency, crime, and violence. They are: (a) a reduction in maternal substance abuse during pregnancy (and possible corresponding reductions in neurodevelopmental impairment on the part of the fetus); (b) a reduction in child maltreatment; and (c) a reduction in family size, closely spaced pregnancies, and chronic welfare dependence. Each of these factors has been shown to increase the risk for conduct disorder, delinquency, crime, and youth violence—especially when they occur together (Yoshikawa, 1994; Raine, Brennan, & Mednick, 1994). With our 15-year follow-up of the Elmira sample, we have begun to ascertain the long-range effects of the program on these types of outcomes (see Olds, Eckenrode, et al., 1997). We intend to conduct a 19-year follow-up that will provide even more definitive data on these aspects of youth behavior. Given the public concern about crime and violence, our focus on their prevention can only increase the relevance of this research for policy.

### ***Integrative Cost Analysis***

We also are planning a more integrative cost analysis that will employ data from each one of the three trials currently underway to examine short- and long-term cost savings to government resulting from an investment in a comprehensive program of prenatal and early childhood home visitation. These trials are in different stages of completion and are being conducted in three different settings with different sample compositions. We have recently received funding to conduct a five year follow-up of the mothers enrolled in the Memphis trial to assess long-term program effects on women's own life-course development. The current program of research thus will enable us to assess government savings through the 15th year of the children's lives in Elmira, the 5th year in Memphis, and the children's second birthday in Denver.

To increase the utility of these findings for policy planners and funders, we intend to specify the extent to which the cost savings to government accrue within particular program areas (e.g., welfare, Medicaid, education) and are realized at the state, federal, or local levels. We also will conduct analyses to specify the extent to which program costs and benefits vary by family characteristics; this will enable targeting scarce resources on families who benefit the most.

### *Dissemination of Findings for Optimum Impact*

All of the further studies and analyses outlined above will have a limited impact unless our findings are effectively communicated and heard by those in a position to advance, or thwart, innovative approaches to home visitation. The experience with social program replication demonstrates that strong evidence for a program, in and of itself, is often not enough to garner enthusiasm for the model among policy makers and funders (The Conservation Company & Public/Private Ventures, 1994). Attention needs to be directed toward educating the public and policy communities, and building coalitions with relevant political constituencies if the program is to gain broad support. In order to be publicly funded, the program must have community support as well as strong support among key legislators. Effective communication strategies must be developed to promote the program at both the grassroots, community, and legislative levels.

Many, maybe even most, social scientists who study social programs are disinclined to wade into the alien, and seemingly tainted, waters of politics. It is not that we are unfamiliar with the importance of communicating our research findings and ideas well. Advancement in our disciplines often depends on not just the quality of our work, but on our success in telling others about it. We often limit the diffusion of our findings by confining our audiences to participants at academic conferences and readers of scholarly journals. We do not gear our messages to be received and understood by policymakers and that larger public, whose pulse they are constantly monitoring, thus contributing to a gap in communication regarding public needs for health care services. The minority in the scientific community who do manage to influence public decisions and resource allocation with the results of their research succeed, much of the time, because they have learned to identify the most appropriate target audiences and how to be persuasive in a more comprehensive, intelligible way.

In the current political climate, the value of such persuasive abilities cannot be overestimated. While the drift is conservative, the overall environment for policymaking and social investment is best characterized by uncertainty. There is no dominant source of power perceived as capable of determining the direction in which actual decisions and choices will be made. Will it be Congress or The White House? Will it be the Federal government, states, or local communities? If the public sector remains hamstrung, will foundations try to fill the leadership gap by parlaying their traditional role in innovation into serving as catalysts in the search for new common ground or consensus on social strategies that work? Though none of these actors can dominate, they will influence the course that policy and funding actually follow. Those who wish to move model programs over this variegated political landscape must have the ability and the will to communicate convincingly with many different audiences.

Our team of investigators is increasingly of the opinion that for our findings to make a significant difference in services for children and families, we must focus on building coalitions with constituents whose support for the program will facilitate its dissemination, while simultaneously continuing to do scientific research to the best of our capability. This strategy will require a more direct approach to sharing our findings with the media, outreach to advocacy organizations at the national level (such as the American Academy of Pediatrics, American Public Health Association, American Nurses Association, American Association of Women's Health, Obstetric and Neonatal Nursing, American Academy of Clinical and Adolescent Psychiatry, American College of Obstetricians and Gynecologists) and to bodies representing state and local interests, and presenta-

tions to public policymakers and private funders. It also will mean crafting brief, straightforward dissemination materials that state the results of our research and explain our model in compelling, practical ways. Further, we believe it will be important to use the forum these efforts create to educate the public about the nature of good scientific work in the home-visitation area and about the role that scientific evidence can, and should, play in shaping more effective and resilient policies.

## CONCLUSIONS

The divisiveness of current national policy debate and the understandable public skepticism about a social science which in the past has promised more than it could deliver, should send us neither into hiding while we wait for a better day nor into overzealous advocacy as we declare our political allegiances. Rather, we should seek to maintain both the integrity and utility of the scientific enterprise—both its capacity for producing new knowledge and the applicability of that knowledge to social problems that must be addressed in the present. This, at least, is the perspective we intend to adopt in our continuing efforts to make what we learn through careful study about effective home-visitation services relevant in the public domain.

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## PARTNER SUPPORT AS A MEDIATOR OF INTERVENTION OUTCOME

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J. Gordon, M.S.W., D. Guthrie, Ph.D.

*Following up on previous work demonstrating that an intervention with at-risk mothers made a positive impact on the quality of mothers' partner support, responsiveness to the needs of the child, the child's expectation of being cared for, and child's response to a brief separation, the present paper examines whether quality of the mother's partner support mediated the impact of the intervention on these outcomes.*

A previous randomized trial (Heinicke, Fineman et al., 1998) demonstrated that the UCLA Family Development Project home-visiting intervention made a positive and significant impact on mothers' responsiveness to the needs of their infants and on infant development of a secure attachment during the first year of life. Central to the intervention is a two-year relationship between a home visitor and the mother, which provides the basis for attempting to resolve both her personal issues and those that arise in regard to her child.

Previous research involving nonintervention samples indicated that the quality of the mother's partner support is associated with both her responsiveness to the needs of her infant and her infant's security of attachment (Heinicke, 1995). Through a relation-based intervention focused on developing a positive connection, the project endeavored to improve the mother's responsiveness to her child and to promote a secure mother-infant attachment. This paper will examine whether the impact of the in-

tervention on the quality of partner support had an effect on these outcomes. In other words, does the quality of partner support mediate the effect of the intervention on the mother's responsiveness and the infant's attachment?

The choice of partner support as a potential mediator of the intervention's influence on these outcome variables was governed by a family-system orientation which holds that the quality of the partner relationship is central to the development of the family system (Cowan, Powell, & Cowan, in press). Choice of variables in this study was also guided by a review linking pre-birth assessments of parent personality and partner functioning to post-birth family development; specifically, mother responsiveness to need and child attachment security (Heinicke, 1995). Couples characterized by positive mutuality, partner autonomy, and the ability to confront problems and regulate negative affect were found to be responsive to the needs of their infants, promote their autonomy, and have more secure and au-

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*Invited for inclusion in this special section of the Journal. Authors are at the Department of Psychiatry, University of California, Los Angeles.*

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tonomous children, as seen throughout the first four years of life. This finding is supported by several prospective longitudinal studies involving parents prior to the birth of their first child. Belsky and Isabella (1986), for example, found that mothers who scored poorly on measures of ego strength and interpersonal affection before the birth of a first child were most likely to experience negative changes in their marriages. In addition, these two personality characteristics, as well as the quality of the postnatal marital experience and the mother's perception of her child's adaptation status, predicted an insecure infant-mother relationship at 12 months.

#### NATURE OF THE INTERVENTION

To bring about changes in our distal outcome variables, we believed that the mother's adaptation, her partner and family support, her relationship to her child, and the child's development would each need to be addressed in a systematic fashion for at least a two-year period. This assumption was based on prior relation-based interventions that focused on the mother's adaptation-competence and partner relationship, as well as other aspects of family functioning, and that have shown a sustained impact on parent-child relations and child development.

*Relationship-based interventions.* Of the 20 controlled intervention studies originally reviewed by Heinicke, Beckwith, and Thompson (1988), eight showed an impact at both the end and follow-up points. All were characterized by planned and successful intervention directed at the mother's adaptation-competence, her partner relationship (Heinicke, 1991), and her relationship to her child and the child's development. In a more recent review of 15 controlled studies of relation-based interventions that lasted at least two years and addressed all aspects of family functioning (Heinicke & Ponce, in press) significant intervention effects were frequently found in the following domains: mother's adapta-

tion, her responsiveness to the needs of her infant, and her facilitation of the child's cognitive development through direct teaching and by exposing the child to stimulating environments.

In summary, these studies influenced our decision to have child development/mental health professionals intervene with families over a two-year period in order to develop a positive working relationship and address all aspects of the family's functioning in a theoretically guided intervention.

*Intervention.* Mothers receiving prenatal care were offered the service as a means of enhancing their parenting. The primary goal is to provide the new mother with a stable and trustworthy relationship that conveys understanding of her situation and promotes her sense of self-efficacy through specific interventions (Bandura, 1986). Engaging mothers involves taking steps to enhance the positive connection and sense of trust that allow them to work on problems and improve their relationship with the infant. These steps include explaining the nature of the project, ensuring the continuity of appointments, and sharing the mother's pleasure in her newborn. Further details of the elements of building a relationship, the interventions used, and the mother's utilization of the home visit have been described elsewhere (Heinicke, 1989).

Following establishment of a positive relationship between the home visitor and the mother, specific interventions are organized around: 1) enhancing the mother's communication and personal adaptation; 2) alternate approaches to her relationship to her child; and 3) direct affirmation and support. In addressing the first two domains, the visitor listens, expresses empathy, and helps the mother to focus her concerns.

Efforts to help a mother explore and discuss issues in her life are guided by principles delineated by Meichenbaum (1979) and Bandura (1986). These include alternate ways of perceiving and resolving concerns, and evaluating solutions. In some instances, mothers' concerns are linked to in-

ternal conflicts that are discussed and interpreted. In the overall process, observation of the child, provision of information, and modeling of alternate solutions (Bandura, 1986) provide the mother additional means for resolving these issues.

Four forms of direct affirmation and support, as well as specific interventions relating to these, have also been defined: 1) general reinforcement of the parent's adaptation and parenting; 2) positive reinforcement of specific responses; 3) advocacy of instrumental steps to reach a goal; and 4) direct assistance in pursuing a goal. Barkley (1981) and Bandura (1986) have emphasized the importance of general positive reinforcement in enhancing a parent's self-confidence, whereas Polansky (1981) argued that a mother's adaptation can be facilitated by outlining steps to solve a problem or by directly assisting her in finding solutions.

Just as the nature of the interventions varied, so did the mother's utilization of the home visit. This was conceptualized along a dimension ranging from the mother's affective discharge to self-reflection. Following Fonagy, Steele, Steele, Moran, and Higgit, (1991), various forms of reflection, as opposed to affective discharge, were seen as signs of achieving a more effective self-organization.

The intervention was monitored in a number of ways. Process notes and ratings of each home visit were examined by an independent reader. Individual and group supervision was provided to the home visitor for each of the families. During the first six months, the home visitor met with mothers on a weekly basis (average number of sessions was 18, range 10-27,  $SD=4.2$ ). Over the next six months, number of sessions ranged from 3 to 31 (average 16,  $SD=5.7$ ).

Although the initial focus of the intervention is on past and present functioning of the at-risk mother, the individualized approach also involves all significant aspects of her environment and the potential im-

pact on the infant's care system. Intervention may be with the couple or directly with the father, members of the extended family, or important others such as friends. Thus, in 42% of families, the father was involved, and in 45%, he was sometimes involved; only in 13% of the families was he not involved. The intervention entails advocacy or direct action on behalf of both parents with child care, job training, health care delivery, preschool, and other social systems.

The UCLA Family Development Project home-visiting intervention is guided by findings that comprehensiveness, professional staffing, and relatively frequent visits increase effectiveness (Olds & Kitzman, 1993), and by factors identified in our own review of the early family intervention literature (Heinicke, 1990), including the mother's willingness to participate and the duration and intensity of the helping process. Broad components of the intervention included home visits, a weekly mother-infant group, and referral to other services as needed. Duration and intensity of contact were ensured by weekly visits in late pregnancy and the first year of the infant's life, bi-weekly visits in the second year, and telephone and follow-up contacts in the third and fourth years. Home visits were carried out by mental health professionals with training in child development and family systems approaches.

The present report aims to further our understanding of the theoretical framework guiding the intervention, so as to refine and improve it in future preventive trials. If the randomized trial found a positive impact on the quality of the mother's partner support as well as on three indices of mother-child attachment—mother's responsiveness to the needs of her child, the infant's expectation of being cared for, and the infant's response to a brief separation (Heinicke, Fineman et al., 1998)—the question here is whether the effect of the intervention on these three indices was facilitated by its prior impact on partner quality.

## METHOD

### Sample

Families enrolled in the project have been receiving Obstetrics/Gynecology and Clinics. Family criteria were: 1) project by a first child, 2) a social history indicator with obvious no current DSM currently using English, 7) residence of the hospital older.

High-risk status of at least one characteristic receiving public support (from par wanted pregnancy physical abuse 6) childhood hood rape, and past experience 10) referral for 11) treatment and 12) home

Two of the 1 lack of support who were ever as the major d study sample. 1 this sample w potential return Fineman et al. lar intake procedure obtained a p deemed appropriate participant was Axis I disorder

In seeking different forms of visiting intervention nonintervent to the mother, assignment to

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system. Intervention couple or directly of the extended such as friends. the father was in- as sometimes in- e families was he ention entails ad- on behalf of both b training, health and other social

velopment Project on is guided by siveness, profes- sively frequent vis- (Olds & Kitzman, ntified in our own y intervention lit- ), including the rticipate and the e the helping pro- of the intervention weekly mother- l to other services intensity of con- eckly visits in late ear of the infant's the second year, w-up contacts in ars. Home visits tal health profes- child development aches.

ms to further our etical framework so as to refine and entive trials. If the a positive impact ther's partner sup- indices of mother- her's responsive- child, the infant's ed for, and the in- separation (Hein- 98)—the question ct of the interven- es was facilitated rner quality.

## METHOD

## Sample

Families enrolled in the intervention had been receiving prenatal care at the UCLA Ob/Gyn and Pediatric Continuity Care Clinics. Families who met the following criteria were offered participation in the project by a clinical social worker who conducted initial interviews: 1) having a first child, 2) identified as at-risk by a social history interview, 3) no family member with obvious health complications, 4) no current *DSM-IV* Axis I diagnosis, 5) not currently using drugs, 6) conversant in English, 7) residing within a 20-minute drive of the hospital, and 8) mother 17 years or older.

High-risk status was defined by the presence of at least four of the following risk characteristics of the mother: 1) poor and receiving public assistance; 2) lack of support (from partner, family, friends); 3) unwanted pregnancy; victim of 4) childhood physical abuse, 5) childhood sexual abuse, 6) childhood emotional abuse, 7) childhood rape, and 8) childhood violence; has past experience of 9) suicidal thoughts, 10) referral for mental/health counseling, 11) treatment for drug or alcohol addiction, and 12) homelessness.

Two of the risk categories—poverty and lack of support—applied to all the mothers who were eventually included, and are seen as the major defining characteristics of the study sample. Other frequent risk factors in this sample were a history of abuse, and potential return to drug abuse (Heinicke, Fineman et al., 1998). As part of the regular intake process, the clinical social worker obtained a psychiatric consultation when deemed appropriate. However, no study participant was diagnosed with a current Axis I disorder.

In seeking informed consent, the two different forms of study participation (home-visiting intervention and pediatric follow-up nonintervention group) were explained to the mother, as was the nature of random assignment to one study condition or the

other. Of the families meeting the inclusion criteria, only 5% declined to participate. Once two consecutive families had agreed to participate, a coin toss determined which of them was in the home-visiting group and which in the pediatric follow-up group.

Thirty-five pairs (i.e., 70 families) were enrolled, and complete data (to the 12-month point) are available on 31 intervention and 33 nonintervention cases. (One-month data are available on all families; including those who discontinued. The original and retained samples do not differ significantly on any of the measures available to the one-month point.) In the intervention sample, 15 infants were male and 16 were female; in the nonintervention group, 17 were male and 16 female.

Demographic details have been reported elsewhere (Heinicke, Fineman et al., 1998). In summary, average age of the mothers was 23; 78% of mothers and 83% of fathers categorized themselves as poor or working class; 10% of mothers were married, the others having varying degrees of support from the biological father; 21.4% of mothers were African American, 35.7% Caucasian, 40.5% Latino, and 2.4% Asian American. Consistent with the selection criteria, many mothers had experienced physical, sexual, or emotional abuse in their childhood. In a third of the cases, there was evidence of previous drug abuse; however, none of the mothers in the sample was using drugs during pregnancy. No statistically significant differences in demographic characteristics were found between the home-visiting group and pediatric follow-up comparison group.

## Procedures and Measures

Data collection procedures and assessment instruments are described below. As previously reported (Heinicke, Fineman et al., 1998), these measures were found to be reliable.

*Maternal support interview.* This consisted of four questions followed by appropriate probes to permit rating of the quality

of partner and family support, as well as the frequency of contact (days per week) with these sources of support. The questions—1) Everything considered, how happy are you in your present partnership? 2) What things do you agree on and where do you tend to differ? 3) Who are the people (other than your partner) that you can depend on for help if you really need it? 4) Do you have close relationships (other than your partner) that make you feel emotionally secure?—were administered by a clinical social worker during the mother's pregnancy, and by a home observer at follow-ups one, six, and 12 months later. Because of the study focus on mediating variables, and since only partner support had improved significantly at six months, only the six-month data on quality of partner support is used in this report.

*Quality of partner support* was measured by tapping into the following: 1) To what extent do the partners communicate clearly, express affection, and show low levels of negative personalized hostility? 2) Can disagreements about decisions be articulated and resolved? 3) Do partners foster the achievements and confidence of the other? Responses ranged from: 1 (very poor adaptation; mother perceives partner relationship as being inadequate) to 5 (excellent adaptation; mother perceives partner relationship as being adequate in regard to majority of salient qualities).

#### *Indices of Attachment*

Two measures of the infant's developing attachment that are used here are dimensional, as opposed to the categorical classifications derived from the Ainsworth Strange Situation (Ainsworth et al., 1978). As noted earlier (Heinicke, Fineman et al., 1998), these measures are significantly associated with the Ainsworth classification.

The two infant measures and the maternal responsiveness rating were based on the 12-month videotaped Bayley Scale Test Situation, as follows: To assess the infant's and mother's response to separation,

the mother was asked at the end of Bayley testing to leave the room for three minutes after saying good-bye to her child. In case of intense distress (judged by the examiner) the mother was asked to return immediately.

*Child's response to separation*, and particularly to the reunion, was rated along a seven-point scale that tapped both anxiety and defensive responses (Heinicke & Westheimer, 1965; Heinicke et al., 1993). In descending order of their ranking, the seven scale points are: a predominantly nonanxious, nondefensive response; low-level anxiety response with positive reunion; high-level anxiety response with positive reunion; low-level anxiety response with anxious/defensive reunion; low-level defensive response; high-level anxiety response with anxious/defensive reunion; high-level defensive response.

Aspects of the mother's and infant's behavior in the total videotaped test situation were also rated. The two used in this report are outlined below.

*Child's expectation of being cared for.* This rating determines whether the child expects that his or her needs will be acknowledged and responded to with immediacy and effectiveness. Assessment focused on the child's willingness and capability to wait for and respond to environmental care. Observations were made of the child's level of contentment versus discontent, with the following behavioral indications: physical tension, irritability, soothability, facial expressions (e.g., smiling), and postural expressions (e.g., arching away). Quality and quantity of the child's response to separation from the primary caretaker were also examined to determine whether it is primarily one of age-appropriate longing, excessive anxiety (as seen, for example, in frantic crying), or defensive avoidance of the parent. Finally, frustration tolerance was evaluated to see if the child can delay need-satisfaction (e.g., hunger, attention) versus being impatient, desperate, and excessively reaching out for

or seeking to co-range of behavior the infant's of being cared for

*Mother response meeting child's* bines empathy refers to the soul to the mother's mination of her primary goal is emotional regu-

#### *Intercorrelation*

As previously man et al., 1995 to reflect the ment—12-month of care and the separation from with each other correlated responsiveness  $r = .43, p < .001$ .

Although measures used in t to measures of rived from the tion, they have ated with the c that situation 1998). Thus, ch vey an expect that their physi be recognized (ratings 7 or 6 are more frequ as secure in th tion ( $\chi^2 = 5.02$ , curely attached the rating of th ing cared for : children (5.9 v also statistical  $p < .01$ ).

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cessively reaching out for

or seeking to control the environment. This  
range of behavior has been included to cap-  
ture the infant's perceived security or sense  
of being cared for.

*Mother responsiveness and efficiency in  
meeting child's needs.* This rating com-  
bines empathy and efficiency. "Needs"  
refers to the sources of distress, "efficiency"  
to the mother's initiation, pacing, and ter-  
mination of her intervention. The mother's  
primary goal is to bring about the infant's  
emotional regulation of distress.

#### *Intercorrelation of Outcome Measures*

As previously reported (Heinicke, Fine-  
man et al., 1998), the measures used here  
to reflect the child's security of attach-  
ment—12-month measure of expectation  
of care and the child's response to a brief  
separation from the mother—are correlated  
with each other ( $r=.44$ ,  $p<.001$ ) and each is  
correlated respectively with mother's re-  
sponsiveness to need ( $r=.68$ ,  $p<.001$  and  
 $r=.43$ ,  $p<.001$ ).

Although the two infant outcome mea-  
sures used in this paper are not equivalent  
to measures of security of attachment de-  
rived from the Ainsworth Strange Situa-  
tion, they have been significantly associ-  
ated with the categorizations derived from  
that situation (Heinicke, Fineman et al.,  
1998). Thus, children who consistently con-  
vey an expectation of being cared for, in  
that their physical and emotional needs will  
be recognized and effectively satisfied  
(ratings 7 or 6 on the seven-point scale),  
are more frequently classified at 14 months  
as secure in the Ainsworth Strange Situa-  
tion ( $\chi^2=5.02$ ,  $df=1$ ,  $p<.05$ ). Similarly, se-  
curely attached children scored higher on  
the rating of the child's expectation of be-  
ing cared for than did insecurely attached  
children (5.9 vs. 4.9), a difference that was  
also statistically significant ( $t=2.6$ ,  $df=62$ ,  
 $p<.01$ ).

Children who responded to a three-  
minute separation from their mother at 12  
months with either no or very little anxiety  
and a positive reunion (scale rating 7 or 6)

were more frequently classified at 14 months  
as secure in the Ainsworth Strange Situation  
( $\chi^2=8.11$ ,  $df=1$ ,  $p<.01$ ). Similarly, securely  
attached children scored significantly high-  
er on the measures of the reaction to sepa-  
ration than did insecurely attached children  
(6.0 vs. 4.9;  $t=3.1$ ,  $df=62$ ,  $p<.01$ ).

#### *Mediational Analysis*

James and Brett (1984) have outlined a  
four-step procedure to determine whether a  
variable acts as a mediator in the relation-  
ship between a predictor variable (i.e., in-  
tervention status) and an outcome: 1) pre-  
dictor and outcome should be correlated, 2)  
predictor and potential mediator should be  
correlated, 3) mediator and outcome should  
be correlated, and 4) in a hierarchical re-  
gression, the regression coefficient of the  
predictor variable should be reduced after  
inclusion of the mediator variable.

#### RESULTS

Data for James and Brett's (1984) Steps  
1 and 2—means and standard deviations  
for the three outcome variables and the po-  
tential mediator, i.e., the six-month posi-  
tive quality of the mother's partner sup-  
port—are shown in TABLE 1. The home vi-  
siting group scored higher on all three mea-  
sures of outcome, and intervention status  
was found to be associated with the hy-  
pothesized mediating variable, namely,  
partner support. The child's 12-month se-  
cure reaction to a brief separation, the  
mother's 12-month responsiveness to need,  
and the child's 12-month expectation of  
being cared for were correlated, respec-  
tively, with partner support as follows: .27  
( $p<.05$ ), .21 ( $p<.10$ ), and .23 ( $p<.10$ ).

Finally, TABLE 2 shows the two steps of  
the hierarchical regressions of each out-  
come. In the first step, intervention status  
was entered; in the second step, quality of  
partner support was added to determine  
whether its inclusion lowers the regression  
coefficient for intervention status apprecia-  
bly. Little change was found between the  
two steps in the regression coefficient for

Table 1  
EFFECTS OF HOME-VISITING (INTERVENTION GROUP) AND PEDIATRIC FOLLOW-UP  
(COMPARISON GROUP) ON MEASURES OF OUTCOME

| MEASURES                                        | HOME-VISITING |        | PEDIATRIC FOLLOW-UP |        | p      |
|-------------------------------------------------|---------------|--------|---------------------|--------|--------|
|                                                 | M             | (SD)   | M                   | (SD)   |        |
| Outcomes                                        |               |        |                     |        |        |
| Child's 12-month secure reaction to separation  | 6.32          | (0.70) | 4.81                | (1.73) | 0.0001 |
| Child's 12-month expectation of being cared for | 5.74          | (0.86) | 4.87                | (0.93) | 0.0004 |
| Mother's 12-month responsiveness to need        | 5.22          | (0.82) | 4.30                | (0.98) | 0.0003 |
| Hypothesized Mediator                           |               |        |                     |        |        |
| Mother's 6-month quality of partner support     | 3.83          | (1.32) | 2.58                | (1.39) | 0.0004 |

group membership upon introduction of partner support, nor does the introduction of partner support explain additional variation in outcomes. Therefore, following the James and Brett (1984) criteria, it may be concluded that partner support does not appear to be a mediator of the effect of the home-visiting intervention on any of the three outcomes.

#### DISCUSSION

Previously, we have shown that a relation-based intervention addressing all aspects of the family functioning of at-risk, first-time mothers made a significant and positive impact on the quality of the mother's partner support, her responsiveness to the needs of her child, and her child's expectation of being cared for and response to a brief separation (Heinicke, Fineman et al., 1998).

Contrary to expectation, the present investigation did not find the quality of part-

ner support to mediate the impact of the intervention. This lack of finding may have various explanations. First, as defined in the project's operational manuals (Heinicke, 1989), all aspects of the family system are addressed at the same time: mother's personal functioning, her interaction with her child, and the child's development. Thus, the intervention affects several domains and no one area of functioning, such as the mother's relationship with her partner, receives exclusive attention. Additional data analysis should permit us to determine whether, over a period of time, all domains are affected by the intervention. If so, the present finding that partner quality was not a mediator, suggests that to be effective in modifying mother responsiveness and mother-infant attachment, all aspects of family functioning must be addressed (Cowan, Powell, & Cowan, *in press*).

There may be other variables that could mediate the impact of a relation-based intervention on mother's responsiveness and child's degree of attachment. Given the van IJzendoorn (1995) finding of an association between child security of attachment and mother's organization of her relationship experience as reflected on the Adult Attachment Interview (George, Kaplan, & Main, 1996), changes in the mother's relationship that occur during the course of an intervention may well mediate part of the effect of the total intervention.

In order to enhance the effectiveness of the home-visiting project in the future, we must consider how a particular intervention interacts with the status of the family at

certain time points (Heinicke, Goorsky, & the mother's generative relationships. At three months, is core of her partner support this level of experience associated with her interactive working relationship visitor in the 6-12-month this ability to work issues anticipates the need to her infant's).

This paper is a step towards refining the efforts to refine the the project, so as to home-visiting intervention. This line of improve useful both in aspects of the intervention improving our ability mother-infant attachment sponsiveness in high

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Table 2  
HIERARCHICAL REGRESSION OF OUTCOME  
MEASURES ON INTERVENTION STATUS  
AND HYPOTHESIZED MEDIATING VARIABLE

| 12-MONTH<br>OUTCOMES                   | INTERVEN-<br>TION STATUS | QUALITY OF<br>PARTNER<br>SUPPORT |
|----------------------------------------|--------------------------|----------------------------------|
| Child's Secure Reaction to Separation  |                          |                                  |
| Step 1                                 | .55                      |                                  |
| Step 2                                 | .53                      | .04                              |
| Child's Expectation of Being Cared For |                          |                                  |
| Step 1                                 | .44                      |                                  |
| Step 2                                 | .42                      | .05                              |
| Mother's Responsiveness to Need        |                          |                                  |
| Step 1                                 | .44                      |                                  |
| Step 2                                 | .43                      | .03                              |

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MATRIC FOLLOW-UP  
HOME

| ERIC FOLLOW-UP<br>(SD) | p      |
|------------------------|--------|
| (1.73)                 | 0.0001 |
| (0.93)                 | 0.0004 |
| (0.98)                 | 0.0003 |
| (1.39)                 | 0.0004 |

ate the impact of the in-  
k of finding may have  
ns. First, as defined in  
tional manuals (Hein-  
cts of the family system  
e same time: mother's  
ng, her interaction with  
e child's development.  
tion affects several do-  
rea of functioning, such  
ationship with her part-  
sive attention. Addition-  
ould permit us to deter-  
a period of time, all do-  
by the intervention. If  
ling that partner quality  
, suggests that to be ef-  
ng mother responsive-  
infant attachment, all as-  
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Interview (George, Ka-  
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project in the future, we  
a particular intervention  
e status of the family at

certain time points. Preliminary analyses (Heinicke, Goorsky et al., 1998) indicate that the mother's general capacity to form positive relationships, as assessed at infant age three months, is correlated with the quality of her partner support at six months, and that this level of experienced support is in turn associated with her ability to form an effective working relationship with the home visitor in the 6–12-month interval. Finally, this ability to work on and resolve various issues anticipates the mother's responsiveness to her infant's needs.

This paper is a starting point in our efforts to refine the theoretical model guiding the project, so as to better explain how the home-visiting intervention achieves its effects. This line of investigation should also prove useful both in revising specific aspects of the intervention, and ultimately in improving our ability to promote secure mother-infant attachment and maternal responsiveness in high risk families.

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## THE HEALTHY STEPS FOR YOUNG CHILDREN PROGRAM



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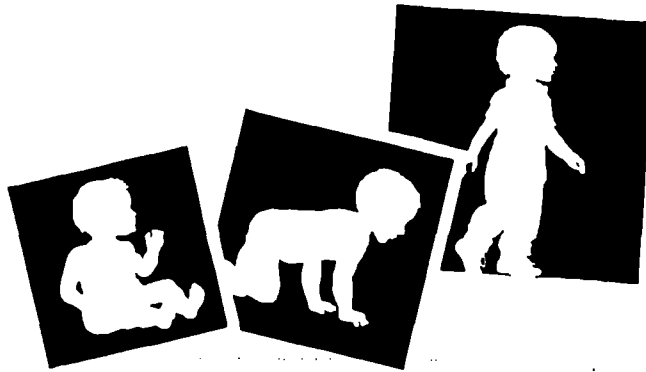
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# **HEALTHY STEPS**

**The New Pediatrics for  
Families with Young Children**

**A Developmental Approach**

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## Chapter 6

# HOME VISITS

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*Home visits provide a special opportunity for the Healthy Steps Specialist to get to know mothers, fathers, and children in an informal and relaxed atmosphere that is apart from the medical office. Such visits typically present numerous teachable moments, the time to conduct a variety of developmental checkups, and many opportunities to offer anticipatory guidance. This chapter presents a rationale for including home visits by Healthy Steps Specialists as part of your developmental approach to pediatric care, discusses administrative aspects of home visiting, and outlines the key features of six home visits. It also includes detailed information and a case study on newborn home visits. Further information on conducting developmental checkups will be found in Chapter 7.*

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- ▶ **OVERVIEW**
- ▶ **WHY DO HOME VISITS?**
- ▶ **QUICK CHECK SHEETS**
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- ▶ **AN INDEPTH LOOK AT A FIRST HOME VISIT**
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## ► ARRANGING SUBSEQUENT VISITS



### RELATED READINGS

*Effects of Prenatal and Infancy Home Visitation by Nurses on Pregnancy Outcomes, Childhood Injuries, and Repeated Childbearing: A Randomized Controlled Trial*, by Harriet Kitzman, David L. Olds, et al. (*JAMA*, August 27, 1997, Vol. 278, No. 8).

This randomized controlled trial concludes that a group of low-income women visited by nurses during pregnancy and the first two years of their children's lives had less incidences of pregnancy-induced hypertension, fewer health care encounters in which injuries or ingestions were detected in their children, and fewer second pregnancies than counterparts assigned to a control group.

*Home Health Visits Improve Maternal Health* (*Robert Wood Johnson Foundation Quarterly Newsletter*, Issue 1, 1998).

Synopsis of two separate studies that both concluded home visitations from a nurse during pregnancy and the ensuing two years resulted in better health outcomes and reduced rates of child abuse and neglect in the families of unmarried, adolescent women.

## OVERVIEW

Home visits are timed to reach the mother, father, and child at predictable critical junctures in their developing relationship. Home visits supplement the guidance on intellectual growth and emotional development given at office visits and strengthen the relationship between the family and the practice. In particular, they provide opportunities for the Healthy Steps Specialist to build a supportive relationship that may not be available to the parents through any other means. These relationships may differ markedly from family to family. Understanding the differences in traditions, routines, and family cultures, appreciating how the home environment fosters a child's development, and learning how important it is to work effectively within the established structure of each family are valuable contributions the Healthy Steps Specialist brings to the pediatric team.

Mothers and fathers often feel more comfortable voicing concerns about their child's health and development in the familiarity and comfort of home. For Healthy Steps Specialists, home visits offer opportunities to observe parent-child interactions and play, take advantage of teachable moments, and provide anticipatory guidance, particularly when increasing periods of time fall between well child visits. In addition, home visits provide an opportunity to gauge children's developmental and family health, activities which may be too lengthy to include in regular office visits (*see Chapter 7: Gauging Child Development and Family Health for a full discussion of such checkups*).

During a child's early infancy, home visits typically focus on general health, nutrition, breast feeding, sleep, and strategies for comforting babies. As the child grows, safety issues will need to be addressed, and attention invariably shifts to issues of toddler autonomy and the management of such behavioral and developmental issues as limit setting, early learning and stimulation, eating, and toilet training.

## WHY DO HOME VISITS?

Starting a family or adding a child to a family is both joyous and challenging. Mothers and fathers do a lot of imagining during the pregnancy: What will the baby look like? How will it behave? How will their lives change? They begin to picture themselves in different situations with the baby — for example, at family celebrations or walking the floor in the middle of the night. They wonder how they will respond to the

responsibilities of parenting. This mental and emotional preparation is important and helpful. But once the baby has arrived and is a reality, mothers and fathers quickly realize how much they have to learn about their baby, themselves, and their interactions as a family.

Both families and professionals have voiced concerns about the lack of resources available to many of today's families during the first few wonderful and stressful weeks after the arrival of a baby. Pediatric practices are in a unique position to help fill this void: they meet the family in the crucial early days after the baby's birth and are acutely aware of the multitude of decisions mothers and fathers need to make in adjusting to their new roles as caregivers, providers, and nurturers. And the practice's ongoing relationship with the family enables them to continue this support throughout the first few years of family life.

Home visits appeal to parents for several reasons. As one parent said, "Convenience is not a luxury; it's a necessity." Packing up one or more children or arranging for child care for a sibling so they can take the baby to the doctor's office adds work to the responsibilities of an already stressed family. Home visiting suggests to parents that a service is being provided that truly fits their needs. While some families may worry whether their house is clean enough for a visitor or may feel the need to entertain you, most welcome the visits as chances to ask questions, express concerns, and learn about their baby and themselves in a less formal and intimidating environment than the medical office.

Finally, David L. Olds, Ph.D., who has conducted research on home visits over a 20-year-period, is finding that such visits can have very long-lasting positive effects on both the child and the family, particularly in the case of families with limited other community resources to help support their parenting through the early years of child raising. He makes a compelling argument for the inclusion of home visits as part of pediatric care.

## **QUICK CHECK SHEETS**

To assist Healthy Steps Specialists in conducting home visits, Healthy Steps has developed a series of Quick Check Sheets. Quick Check Sheets provide a detailed overview of what to discuss at each visit. Each Quick Check Sheet includes a general

discussion of the developmental period, a checklist of child development areas to observe, a series of questions to help mothers and fathers discuss their parenting concerns, and areas in which it would be appropriate to provide anticipatory guidance.

A complete set of Quick Check Sheets can be found in Appendix 5. It is organized chronologically according to the age of the child and includes Quick Check Sheets for office visits in addition to those for home visits. This provides an efficient review of what areas to address in each type of visit.

The suggested questions are intended to elicit information and generate discussion of potential concerns. If the style of the questions is comfortable to you, feel free to use them as they are. But you should feel equally comfortable altering the way the questions are asked to be more consistent with your personal style. During each visit, try to cover at least one item from each area. Depending upon the age of the child and the family's concerns, however, some visits might focus entirely on one particular issue. Quick Check Sheets also are a useful place to record notes so you can share them with other members of the practice team when you return to the office.

Another handy Healthy Steps resource is the Child Health and Development Record (*see Appendix 1*). This resource also gives an opportunity to review developmental milestones with parents and home visits in general are a good time to remind parents that the Child Health and Development Record is a good place to note any concerns they want to discuss at their next well child visit and to reinforce that the Record should be brought to the practice for each visit.

## **A RECOMMENDED SCHEDULE**

### **3-5 Days**

This section recommends a schedule of home visits and outlines the key features of each visit. The schedule is designed to capture those moments where children's developmental changes and growth typically require shifts in parenting, and to provide support to families between well child visits.

- Administer components of the Neonatal Behavioral Assessment Scale (NBAS) to increase parents' understanding of their unique newborn. Among these components are those that examine the newborn's particular response to stimuli

(e.g., noise, light, temperature changes, touch), reflexes, transitions from state to state, sleep patterns, indications of attempts to self-comfort, and signs of readiness for contact with parents. (Note: Unless they have been specifically trained by the Brazelton Institute, Healthy Steps Specialists would not be certified to conduct a complete NBAS nor would it be appropriate for them to use the NBAS for diagnostic purposes.)

- Discuss labor, delivery, and the length of the hospital stay, using the Child Health and Development Record for note taking.
- Include fathers in this visit by inviting them, making the time of the visit convenient to them, and asking about their questions. Discuss how valuable their role is in caring for the newborn.
- Provide encouragement and support for breast feeding.
- Discuss newborn care, e.g., crying, holding, sleep, sleep positions, comforting, etc.
- Ask about parents' state of mind as they adjust to the new family member and if mother is experiencing unusual mood swings.
- Encourage mother to schedule her post-partum health check if she has not done so already.

*See also:*

*Case Study 6.1: (page 6-12)*

*Quick Check Sheet for 3-5-day Home Visit (Appendix 5)*

## **9-12 Months**

- Review results from office visits and previous home visit and follow up on any previously expressed parental concerns.
- Discuss changes in the child's development since previous visit, particularly in regard to increased mobility, e.g., crawling, pulling to stand, cruising along furniture, and perhaps walking.
- Connect enhanced mobility to issues of separation and

autonomy and discuss changes in daily routines for meals, diapering, baths, and sleep that may be happening as a result of mobility.

- Listen for possible differences in opinion between parents in matters of safety, discipline, and setting limits; offer guidance on consensus building.
- Provide anticipatory guidance on how to safetyproof the home. Emphasize the importance of setting firm, caring limits with regard to safety.

*See also:*

*Quick Check Sheet for 9-month Home Visit (Appendix 5)*

## **12-15 Months**

- Conduct a developmental checkup to review the child's growth over the last year. Remind parents of the wide range of normal development, particularly if their child is not yet walking.
- Continue to address issues of safety and discipline, particularly as they relate to feeding, sleeping, temperament, and development.
- Help mothers and fathers prepare for tantrums by stressing that babies and young toddlers on the verge of walking experience many frustrations as they attempt to master new skills.
- Explain that while young toddlers can feel very powerful as they crawl or walk away from trusted caregivers, they quickly become uncertain when the caregiver is no longer in sight and need reassurance that the caregiver is still there.
- Provide anticipatory guidance about the young toddler's beginning internal struggle with autonomy and help parents understand that this struggle will continue for the next one to two years.
- Conduct a family history (*see Chapter 7*) and discuss pertinent community resources.

*See also:*

*Quick Check Sheet for 12-month Home Visit (Appendix 5)*

## **18-21 Months**

Conduct developmental checkups (e.g., BABES, Denver II, and MacArthur) and discuss child's language development (*see Chapter 7*). Remind mothers and fathers of the wide range for normal development and the wide gap between toddler's expressive and receptive language abilities.

- Celebrate the tremendous developmental gains of the previous six months.
- Reassure parents who are facing their toddler's increasingly resistant or negative behavior and reframe this behavior in terms of normal development.
- Suggest that parents review the "Things That Are Going Well" section of the 18-month Well Child Health Check in the Child Health and Development Record.
- Discuss discipline issues. Encourage mothers and fathers to maintain firm but caring limits to ensure safety, while also allowing the toddler to work through its storms of emotion.
- Conduct a family history and discuss pertinent community resources.

*See also:*

*Quick Check Sheet for 18-month Home Visit (Appendix 5)*

## **24-30 Months**

- Continue to provide support, suggestions, and encouragement of firm limit setting with toddlers whose increased self-confidence lends itself to testing limits.
- Use appropriate developmental checkups (e.g., BABES, Denver II, MacArthur) as tools to discuss the child's uniqueness.
- Point out that many parents anticipate a light at the end of the tunnel as tantrums begin to taper off during this year.
- Begin planning for the end of home visits. Think about what additional resources the family may need.

*See also:*

*Quick Check Sheet for 24-month Visit (Appendix 5)*

## **30 Months**

- Prepare families for the fact that this might be the last home visit.
- Celebrate all of the new skills the child has developed over the past six months. These skills are likely to include the ability to engage in symbolic play, to dress and undress, to follow a sequence of directions, and to begin to draw recognizable shapes.
- Discuss changes in daily routines that have occurred over the past six months.
- Talk with the mother and father about how they can help their child express aggression in safe ways.
- Provide guidelines for illness and injury prevention as the child's independence increases.

*See also:*

*Quick Check Sheet for 30-month Home Visit (Appendix 5)*

## **MAKING ARRANGE- MENTS FOR HOME VISITS**

*Call to set up an  
appointment*

The first contact with the family lays the foundation for a long-term relationship.

Do not just drop in. Except for the first newborn home visit, get in touch with the parents two to four weeks before you want to make the visit and follow up with a reminder two days before the visit. You will probably want to schedule the newborn home visit before the baby leaves the hospital. Giving families notice and choice allows them to prepare for your visit. Arrange visits when working members of the family can be at home and to fit the baby's schedule so that it is awake and ready for interaction. Encourage both mothers and fathers to attend and to write down their questions before you get there. The Child Health and Development Record provides a handy place for them to make some notes in advance of your visit.

*Prepare a brief  
introductory statement*

The first phone call to a family you have never met can be awkward. Preparing in advance will help you remember all the

information you need to convey. You might explain your professional role with the Healthy Steps practice to the family and discuss the purpose of the appointment. It is important to remember that the birth of a new baby can be a hectic, even chaotic, time. But once they understand where you fit in, first-time parents in particular are likely to be excited about the fact that someone is coming to check on the baby and answer their many questions.

*Get detailed directions* Healthy Steps Specialists have visited families in every imaginable setting, from the inner city to rural areas where street signs are nonexistent. Many Healthy Steps Specialists find they feel more comfortable carrying a cellular phone so that they can check with the family if they get lost or let their colleagues in the practice know that they have arrived safely or are returning. Most Healthy Steps Specialists recommend, however, that you do not use either a cellular phone or the family's phone in the home. In areas that seem extremely unsafe, you might consider visiting as a team or arranging to check in with the office at a specified time.

*Offer the family several choices for scheduling the visit and let them know that most home visits last between an hour and an hour-and-a-half* Because every household has its own rhythm, home visiting schedules must be flexible. Although most initial home visits will take place during the day, working parents of older children may need to schedule evening and weekend hours.

*Always send a reminder or call the day before* This is very important when great distances are involved or schedules are very tight. Sometimes families forget about the visit or are not there when the Healthy Steps Specialist arrives, which can be very frustrating.

*Make safety your first concern* Always let someone know where you are going and when you should be expected back. Keep alert; be aware of your surroundings at all times. Have a cellular phone available and with a full charge. A pager also is important so that your phone does not need to be on at all times. Your phone should be ready when you need it, however.

*Arrive on time* Show the family you recognize that their time is valuable too.

- Bring small donated gifts* Few people can resist someone who comes to their house with gifts. No matter how small, a toy, book, or other item goes a long way to show you are there as an advocate and friend. In some communities local businesses have been willing to donate these gifts. Judicious use of this technique helps some families open up to the Health Steps message.
- Let the family determine where they want the meeting to occur* When you arrive at the family's home, they may invite you into a particular room. Unless you are invited to see the rest of the home, stay in this room for the entire visit. If the family does not take the lead, ask them where they would be most comfortable having the meeting. Once the room has been chosen, you may also want to ask where you should sit. If you are polite and respectful to families, they will be much more receptive to your message. Ask about the health of others in the home, comment on positive behavior, and *always* find a reason to compliment the child.
- Allow the family to determine the form of the meeting* Some parents will be prepared for the meeting and take the lead in asking questions or expressing concerns. Others may look to you to take the lead.
- Think ahead about how you will structure your time* Linda Kimura, a trainer for The National Committee to Prevent Child Abuse, Healthy Families America, recommends the following:
- Given a period of about one hour, you might divide the time into a Greeting Period (10 minutes), Discussing a Topic (20 minutes), Engaging in a Parent-Child Activity (30 minutes), and Anticipatory Guidance (10 minutes). These steps are not rigid and are offered only as a guide. It is expected that you will adjust these as needed to address current concerns and interests.
- During the Greeting Period, you will want to focus on building trust and furthering the relationship. Let parents know what will happen during the visit and make sure you learn what issues they would like to discuss.
- Both Parent Prompt Sheets and the Child Health and Development Record could serve as a framework for selecting a Topic and further identifying those issues that are of most concern to the family.

The Parent-Child Activity Period provides an opportunity to conduct developmental checkups, review the results of prior checks, facilitate a parent-child activity based on a teachable moment, and, in general, to encourage positive parent-child interaction through a variety of teachable moments strategies.

Anticipatory Guidance might include distribution of Parent Handouts, information on upcoming parent groups, linkages to community resources and activities, activities for parents to use between visits, and guidance on how the child is likely to change developmentally before you see the family again.

## **COMMUNICATING ACROSS THE PRACTICE**

It is important to keep accurate but concise notes about your home visits and to share your knowledge with all members of the Healthy Steps team. Some practices use a home visit summary sheet to share this information; others put notes at the end of each Quick Check Sheet and place them in the child's medical record.

## **AN INDEPTH LOOK AT A FIRST HOME VISIT**

Extremely limited hospital stays after most births mean that parents often return home with many unanswered questions about their child. Most parents are concerned about their newborn's physical well-being and are anxious to understand and respond to their baby's needs. Many of their questions can be addressed by using components of the Brazelton Neonatal Behavioral Assessment Scale (NBAS) (*see Chapter 7 for a fuller discussion of how to use this tool*).

The first home visit typically occurs three-to-five days after the baby's birth — a critical adjustment period for mothers, fathers, and their newborn. If your practice has a three-to-five day office visit, consider scheduling the newborn home visit toward the end of the baby's second week of life.

Checking in with mothers and fathers about how they are doing as they assume the new responsibilities of caring for their newborn is another important aspect of this home visit. Ask if the mother has scheduled her own postpartum visit, and encourage her to do so if she has not. Many new mothers experience a wide range of feelings and mood shifts caused by hormonal changes as their bodies adjust to the postpregnancy or lactating state. It can be very helpful to acknowledge and talk about these "blue" periods during the early weeks.

## CASE STUDY 6.1

### SARAH VISITS THE SMITHS FOR THE FIRST TIME

Robert and Anne Smith are waiting anxiously to meet Sarah, their Healthy Steps Specialist, and to introduce her to their new baby, Michael. Robert is holding the baby when Sarah arrives. Anne immediately starts to ask Sarah a number of questions, among them whether she thinks Michael is getting enough milk. Sarah tries to keep track of the questions, include Robert in the discussion, and observe Michael to get an initial sense of how he is doing.

Sarah asks if she can hold the baby. As she continues talking with Robert and Anne, Sarah begins to conduct parts of the Neonatal Behavioral Assessment Scale, while Robert and Anne watch and listen to Sarah's description of what the baby's behavior can tell them. Sarah shows them, for example, how alert Michael is and points out how interested he is in looking at faces and listening. Sarah also uses Michael's alertness and good reflexes to get back to Anne's concerns about breast feeding. She demonstrates Michael's strong rooting and sucking reflexes and has Anne elicit these responses for herself. Sarah and Anne talk about how natural it is for new mothers to be anxious about breast feeding, the initial discomfort or pain many nursing mothers experience in the early days, concerns about producing enough milk, and the almost constant worry that the baby is not getting enough to eat or may be dehydrated. Sarah gives Anne information about local support groups for breast feeding mothers, where she can get the extra help she needs as well as tips for successful breast feeding.

When Sarah asks Robert how he is feeling about being a father, Robert says that he does not always know what his role should be, particularly when Anne is breast feeding Michael. He admits he worried about these feelings during Anne's pregnancy but figured he would know what to do once the baby was really here. Sarah suggests that Robert participate in Michael's care by bathing, diapering, and dressing him and that he also take a few extra minutes to talk and sing to Michael and help him focus on his face. She stresses that this is an invaluable learning experience for Michael.

Sarah asks Anne how she is doing, particularly whether she is feeling down or blue as many women do after the birth of a baby. While Anne does report feeling moody and at times

unable to handle the simplest tasks, she also notes that she was not surprised by these feelings, as several friends had had similar experiences. Sarah also asks Anne if she has scheduled a postpartum checkup with her obstetrician/gynecologist and lets both Anne and Robert know how important it is to take care of themselves and each other — especially since Michael needs them so much.

## TO THINK ABOUT

- *Which common concerns of infancy was Sarah able to address in this home visit?*
- *What techniques did Sarah use to involve both Anne and Robert?*
- *Other than the behaviors noted above, what else would you be looking for when using the Neonatal Behavioral Assessment Scale?*
- *How might Anne and Robert have used the Child Health and Development Record to set the agenda for the visit? How would you suggest this to them?*
- *What are some ways that Sarah can share what she has learned at the home visit with other members of the Healthy Steps team?*

## COMMON PITFALLS

Boundary confusion is a common problem between home visitors and families. Think about the following common pitfalls as you plan your home visits:

- Taking on the parent's responsibilities (trying to solve their problems for them).
- Imposing one's own values upon the parents.
- Becoming a "friend."
- "Prescribing" for the family (telling them what they need to do).
- Generalizing from one situation to another.
- Taking on too much (not setting limits and focusing on program goals).

- Failing to deal with the whole family.
- Presenting limited options.
- Not spending enough time focusing on promoting positive parenting.
- Expecting change too quickly.
- Assuming that everyone learns the same way.
- Ignoring safety issues.
- Failing to be consistent.
- Failing to recognize that one's own lack of knowledge or skills is OK and feeling embarrassed to ask for additional training.
- Avoiding difficult issues.
- Failing to recognize when home visiting is not enough.
- Violating confidentiality.
- Pitying the family.
- Using one's own money for gifts or family emergencies.
- Wanting to take a parent or child home (rescuing).
- Assuming all participants can read.
- Transporting children without their parents.
- Feeling guilty for not doing enough.
- Not expecting some "failures."
- Not remembering that the home visitor has a life outside of work and that he/she deserves and needs personal time and support too.

*Adapted by Linda Kamura from: Family Support Worker Training Materials, ©National Committee to Prevent Child Abuse, Healthy Families America. Used with permission.*

## **ARRANGING SUBSEQUENT VISITS**

Setting up an ongoing schedule of visits is an important next step. Ideally, home visits will fall between well child checkups to provide the most ongoing support to families. Let the family choose the options that best meet their needs, and change those options as their needs change. Some parents may prefer only a few home visits. They may be uncomfortable with this aspect of the program or not convinced of its necessity. These families may need only two or three well-timed home visits over the child's first three years, with their other informational needs met through office visits and the Child Development Telephone Information Line.

Some parents may request more than the recommended six visits. They might find a particular stage of their child's development difficult to understand or have concerns as children move toward developmental milestones at a slower or faster pace than expected. Further, as you get to know each family, you may become aware of issues that require additional support, such as domestic conflict, substance abuse, or mental illness. You might recommend additional home visits to such families to support the manner in which they are dealing with these problems.

Some families recognize from the beginning that they need frequent support. For them, providing a monthly home visit or some extra time together in the office in conjunction with each well child appointment will optimize their use of the Healthy Steps practice.

As you get to know the families in your practice, you will be able to anticipate the times at which they are most likely to need additional support. As babies become toddlers, for example, many new situations surface. Even parents who have prepared themselves may be surprised by the intensity of the attachment, separation, and autonomy issues that emerge. Parents may feel that they need every available resource to weather these periods.

## TO THINK ABOUT

- *Do any agencies in your community automatically conduct home visits (e.g., some states require a home visit in cases where infants are discharged from the hospital before they are 24 hours old; similarly, some hospitals or medical plans send a lactation specialist to visit new mothers during the week following a child's birth)? How can you coordinate with these agencies and what impact will their activities have on the home visits you schedule in your practice?*
- *Does your practice typically schedule an office visit during a child's first three to five days of life? If so, how will this affect your scheduling of the first home visit? Since home visits typically take more of a Healthy Steps Specialist's time than an office visit, what accommodations, if any, are needed in your scheduling system to show this?*
- *What communications procedures will Healthy Steps Specialists use to keep in touch with the practice when they are out of the office conducting home visits?*
- *What methods will be used to ensure that home visit information is shared with all members of the practice?*
- *Will your practice automatically schedule six home visits with each child or use some other method to determine how many visits are needed during the child's first three years? If the latter, what criteria will you use?*

## Quick Check: 3-5 days

|                    |                                                                              |
|--------------------|------------------------------------------------------------------------------|
| Date: _____        | HSS: _____                                                                   |
| Time: _____        | Type of visit: <input type="checkbox"/> Home <input type="checkbox"/> Office |
| Baby's Name: _____ | People Present: _____                                                        |
| Family Name: _____ | _____                                                                        |

This contact is scheduled to be a home visit using the NBAS to begin a discussion about the infant's responses to caregivers and to the environment. Focusing on greater understanding of their newborn's behavior will help mothers and fathers to explore their new roles and relationships. The birth of a new baby is a time of transition. The family system is vulnerable and establishing a supportive connection to the Healthy Steps Team is invaluable. Remember that these are guidelines and suggestions for your visit. You may not have time to cover all of this information during the visit. You may cover some areas in more detail than others depending on the needs of the family.

### Infant Developmental Checklist:

- ☐ responds to changes in light and sound intensity
- ☐ tracks rattle and faces
- ☐ turns head in response to voice
- ☐ brings hand to mouth
- ☐ quiets to voice, touch, being held, being swaddled

### Observation of Parent-Infant Interaction:

- ☐ parent is responsive to infant's cues
- ☐ parent seems comfortable holding, feeding, and diapering infant
- ☐ parent beginning to establish a feeding routine, is open to suggestions, and is learning when infant is satisfied or needs help to focus on feeding

### Checking in with Mothers and Fathers:

- ☐ Why did you choose the baby's name?
- ☐ How are you feeling? How did the delivery go? Did things go as you expected?
- ☐ Do you have any questions about feeding or caring for your baby?
- ☐ What are some of your worries and concerns?
- ☐ What are some of your successes?
- ☐ Who else can you talk to?
- ☐ Who can you ask for extra help if you need it?
- ☐ How are the other children reacting to their new sibling?
- ☐ Is there anything that's disappointing or frustrating?
- ☐ What's the most important thing in the world to you right now?

## Anticipatory Guidance

illness and injury prevention

*recognizing early signs of illness and knowledge of emergency procedures*

*check smoke detectors and have an exit plan for all family members*

*keep the home smoke free*

*use an infant car seat*

- breast feeding and review of nutritional requirements
- bottle feeding and review of formula mixing and cleaning bottles and nipples
- infant sleep position (propped on the side or on the back)
- bathing, skin care, cord care, care of circumcision
- upcoming immunizations
- growth and development: sleeping for longer stretches, staying awake a little longer between naps, recognizing voices of caregivers, study faces

[illegible]

# Quick Check: 9 Month Visit

|                    |                                                                              |
|--------------------|------------------------------------------------------------------------------|
| Date: _____        | HSS: _____                                                                   |
| Time: _____        | Type of visit: <input type="checkbox"/> Home <input type="checkbox"/> Office |
| Baby's Name: _____ | People Present: _____                                                        |
| Family Name: _____ | _____                                                                        |

This is scheduled to be a home visit. This is a time of transition for both infants and parents. Many infants at this age are focusing on learning to walk which includes pulling to stand and cruising along furniture. Some infants become so focused on mastering this skill that feeding and sleeping disturbances occur. The infant would rather practice walking than sit at the table during meal time. Some infants wake at night and practice pulling to stand in their cribs. As mothers and fathers struggle to keep established routines in place, they must also face decisions about how to discipline their child consistently. The infant's increased mobility foreshadows the separation/autonomy issues soon to occur. Some parents view their child's increasing independence with joy while others see it as a loss of their very small infant. Mothers and fathers need to provide a safe structure in which their child can freely explore new skills and gain confidence. This is a difficult balance to achieve.

## Infant Development Checklist:

- ☐ crawls, pulls to stand, cruises along furniture
- ☐ moves forward by scooting on bottom
- ☐ participates in social games like peek-a-boo and imitates sounds
- ☐ inferior pincer grasp
- ☐ uses index finger to poke or point
- ☐ finger feeds and begins using a cup
- ☐ babbles using strings of consonant-vowel combinations ("sentences")
- ☐ says "mama" and "dada" nonspecifically
- ☐ beginning to understand tool use, problem solving, cause and effect and object permanence
- ☐ specific affectionate responses for family members
- ☐ waves "bye-bye"
- ☐ shakes, bangs, drops, and throws objects

### Behaviors

1. unusual placement/child
2. distraction with novel object
3. reach for pen
4. hide object under cloth
5. peek-a-boo

## Observation of Parent-Infant Interaction:

- ☐ parent responds to child's resistant behavior with firm gentle limits
- ☐ parent can assist resistant child through familiar routines using facial expressions, voice and touch
- ☐ parent initiates social games with infant
- ☐ parent recognizes and responds to infant's initiation of play
- ☐ parent expands on infant's play
- ☐ parent can predict how infant will react to changes in routine, to new situations, and to new people
- ☐ parent praises infant's accomplishments, encourages exploration and use of new skills

## Checking in With Mothers and Fathers:

- ☐ How are you? What are your questions and concerns today?
- ☐ Is the baby trying solid foods? How is this going?
- ☐ Do you have a nap and bedtime routine? How is this going?
- ☐ What is it like to watch your baby develop so many new skills?
- ☐ How does it feel to have your infant become more independent?
- ☐ Who can give you a break when you need one from your responsibilities as a parent?
- ☐ What is the most difficult time of the day (or night) for you and your infant?
- ☐ What works well when your infant is resistant?
- ☐ What do you do when you're frustrated or angry?
- ☐ Is your baby waking up during the night? How are you dealing with that?

## Anticipatory Guidance:

*illness and injury prevention*

*gates for entrances and stairs*

*use safety plugs in electrical sockets*

*locks for medicine cabinets*

*window safety (screens and locks)*

- ☐ pros and cons of using a walker
- ☐ feeding table foods
- ☐ object permanence continues to develop (single displacement)
- ☐ says "mama" and "dada" specifically, uses gestures to communicate, understands simple phrases
- ☐ has pincer grasp
- ☐ stands alone, walks several steps

| DATE | NOTES | FOLLOW-UP |
|------|-------|-----------|
|      |       |           |
|      |       |           |
|      |       |           |
|      |       |           |
|      |       |           |

## Quick Check: 12 Month Visit

|                    |                                                                              |
|--------------------|------------------------------------------------------------------------------|
| Date: _____        | HSS: _____                                                                   |
| Time: _____        | Type of visit: <input type="checkbox"/> Home <input type="checkbox"/> Office |
| Baby's Name: _____ | People Present: _____                                                        |
| Family Name: _____ | _____                                                                        |

This month a clinic visit, developmental check-up, and home visit are scheduled. Combining the developmental check-up and the home visit will help families feel less overwhelmed and give you the opportunity to spend time with parents discussing their child's development. A one year old is on the brink of achieving several milestones. Mothers and fathers often compare their child to others close in age, worrying if their neighbor's child is walking or using words before their child. Reminding parents of the wide range of normal development can be very helpful. The young toddler practices walking: pulling to stand, letting go, taking steps, and falling. The intense focus on this activity often leads to disruptions of meal times, diapering, and sleeping. Learning to walk increases frustration which spills over into other activities. Any small frustration during play or daily routines can lead to tantrums. For parent and child the exhaustion and frustration are often forgotten in the joy of successful walking. The world of the toddler is greatly expanded and they feel very powerful. But the delight of walking down the hallway quickly dissolves when the toddler realizes her parents are no longer in sight. The concerned cries of the young toddler who has wandered too far highlight the push and pull between independence and the need for the active involvement of caregivers. This struggle will continue for some time.

### Infant Development Checklist

- ☐ stands alone and initiates steps
- ☐ participates in social games like peek-a-boo and imitates household activities
- ☐ says "mama" and "dada" specifically, has several words, uses facial expressions and gestures to communicate
- ☐ understands simple commands
- ☐ pincer grasp, stacks two blocks
- ☐ places simple puzzle piece
- ☐ object permanence, can find hidden item even if moved from first hiding place to second hiding place
- ☐ increases in problem solving ability
- ☐ finger feeds and drinks from a cup

#### Behaviors

1. reach for pen
2. stranger anxiety
3. pop-up toy

### Observation of Parent-Infant Interaction

- ☐ parent responds to resistant behavior with firm gentle limits
- ☐ parent can assist resistant child through familiar routines using facial expressions, voice and touch
- ☐ parent initiates social games with infant and responds to infant's initiation of play
- ☐ parent expands on infant's play
- ☐ parent can predict how infant will react to changes in routine, to new situations, and to new people
- ☐ parent praises infant's accomplishments, encourages exploration and use of new skills

- ☐ parent able to anticipate infant's actions and use distraction to redirect
- ☐ parent anticipates safety issues and removes infant or unsafe item from the situation

## Checking in with Mothers and Fathers

- ☐ How are you? What are your questions and concerns? How are things going in your family?
- ☐ Are you getting enough rest? Are you getting time to be together?
- ☐ How does it feel to have your baby become more independent?
- ☐ How do you feel when your child tantrums? How do you feel when your child refuses to eat or makes a mess? How does your partner feel?
- ☐ What are some of the things you enjoy most about your child?
- ☐ What is most frustrating to you at this time?
- ☐ Do you and your partner agree about how to discipline your child? What happens when you don't agree?

## Anticipatory Guidance

*illness and injury prevention*

*upcoming immunizations and PPD*

*teething (molars) and using fluoride and brushing teeth*

*keep toddler a way from kitchen appliances*

*continue using gates*

- ☐ stands and stoops, walks forward and backward, runs
- ☐ holds crayon and scribbles
- ☐ stacks and plays with containers
- ☐ understands simple commands
- ☐ effects of TV viewing
- ☐ transition from high chair to booster seat
- ☐ sleeping through the night
- ☐ using consistent limit setting for the whole family

| DATE | NOTES | FOLLOW UP |
|------|-------|-----------|
|      |       |           |
|      |       |           |
|      |       |           |

## Quick Check: 18 Month Visit

|                                                                        |                                                                                                                     |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Date: _____<br>Time: _____<br>Baby's Name: _____<br>Family Name: _____ | HSS: _____<br>Type of visit: <input type="checkbox"/> Home <input type="checkbox"/> Office<br>People Present: _____ |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|

This month the family is scheduled to complete a clinic visit, a home visit, and an developmental check-up. Again, combining the home visit and the developmental check-up may help parents who are working or juggling multiple responsibilities. Reviewing developmental gains with mothers and fathers can help them realize how far they have come when the strain of parenting a toddler seems overwhelming. The increasing negativism of the 18 month old requires the parent's determination to maintain firm limits to ensure safety and maintain daily routines such as afternoon nap. The low frustration tolerance of the toddler often leads to prolonged crying and tantrums. Parents can continue to provide support while allowing children to work it out for themselves. Occasionally, the toddler will lose control and hit or bite. For many mothers and fathers this kind of behavior is very concerning. Parents will wonder if they have been too lenient or made other mistakes to cause this behavior. Losing control is also scary for the toddler who may be surprised by their own behavior. Letting the toddler know that grownups can help them stay in control or regain control can be very reassuring. It's important to let the toddler know that they are still loved even when their behavior is inappropriate. Helping mothers and fathers understand that this is a normal part of toddlerhood can relieve their fears. Fortunately, these negative behaviors are counterbalanced by the increasingly prosocial behavior of the 18 month old. Toddlers of this age are often spontaneously affectionate to caregivers and family members. They often try to comfort others who seem sad or distressed. In addition to recognizing the emotions expressed by others, the toddler's sense of self is also increasing. Toddlers often explore their own bodies and label body parts, including the eyes, nose, mouth, navel, and genitalia. Expressions of self-recognition, self-consciousness, shyness and shame also appear, seemingly overnight. These abilities have been linked to gains in cognitive development such as better recall memory, even for complex sequences of events, and the ability to think abstractly. These are tremendous changes for the toddler.

### Infant Development Checklist:

- ☐ walks upstairs, kicks ball forward, runs, jumps
- ☐ uses spoon, fork, cup, helps to put on clothing,
- ☐ wash and dry hands, brushes teeth with help
- ☐ places circle and square in puzzle, scribbles spontaneously
- ☐ tower of 4-6 cubes, picks up small pieces
- ☐ less use of trial and error, increased problem solving
- ☐ understands causality, object permanence with several displacements, symbolic play involving imitation of daily events, emergence of brief cooperative play sequences
- ☐ names one picture, names 2 colors, points to 4 pictures, some 2 and 3 word combinations, dramatic vocabulary increase of up to 5-6 new words each week, imitates words, understands action verbs ("go", "come", "bring")
- ☐ enhanced sense of self and broadening emotional responses (responds to praise, takes pleasure in successes, prosocial behaviors, expression of affection)
- ☐ can follow a few simple rules

#### Behaviors

1. *filling, dumping, throwing*

## Observation of Parent-Child Interaction

- ☐ parent offers child choices, is flexible in finding solutions to conflicts
- ☐ parent respectful of child's bid for independence, allows child to be alone when fussy if child desires
- ☐ parent can sometimes distract child to prevent a tantrum
- ☐ parent keeps child safe during tantrum and allows child to work it out
- ☐ parent encourages child to use words meaningfully to express thoughts and feelings
- ☐ parent names objects and people and repeats child's vocalizations
- ☐ parent responsive when toddler initiates social interactions or seeks help
- ☐ parent joins toddler in symbolic play and allows child to take the lead
- ☐ parent and toddler enjoy their play together
- ☐ parent praises child's accomplishments and prosocial behavior
- ☐ parent expresses caring for child while limiting negative behaviors
- ☐ parent helps child with transitions such as separation by preparing child ahead of time

## Checking in with Mothers and Fathers

- ☐ How are you? What are your concerns and questions today?
- ☐ Are you able to maintain routines like bed time and bathing these days?
- ☐ What happens when your toddler tantrums? Are you using time outs?
- ☐ Have there been any changes in your family since we last spoke?
- ☐ What is most stressful in your life right now?
- ☐ What do you enjoy doing most?
- ☐ What do you enjoy most about your child at this age?
- ☐ What happens when you and your child separate?
- ☐ How do you feel if your child is crying when you leave?
- ☐ How do you feel when your child hits or bites you or others?
- ☐ Do you ever get so angry with your toddler that you are worried about what you might do next?
- ☐ Have you thought about or begun toilet training?
- ☐ Does your toddler have play times with other toddlers?
- ☐ Do you get any time to yourself? Do you get any time with your partner?

## Anticipatory Guidance

*injury and illness prevention*

*lead screening and PPD*

*oral health and eye exam*

*use locks on cabinets and keep cleansers out of reach*

*never leave toddler alone*

*use bike helmets*

- ☐ stack six blocks, draw circular and horizontal strokes, complete three piece puzzle
- ☐ follows two step command, has vocabulary of 20 words or more, uses 2-4 word sentences
- ☐ pretend play, some cooperative play, sense of humor, problem solving, cause and effect
- ☐ weaning, toilet training, dressing, washing
- ☐ effects of TV viewing

[illegible]

## Quick Check: 24 Months

|                    |                                                                              |
|--------------------|------------------------------------------------------------------------------|
| Date: _____        | HSS: _____                                                                   |
| Time: _____        | Type of visit: <input type="checkbox"/> Home <input type="checkbox"/> Office |
| Baby's Name: _____ | People Present: _____                                                        |
| Family Name: _____ | _____                                                                        |

This is a combination home visit/developmental check-up in addition to a well child visit at the clinic. Reaching the child's second birthday is a landmark for everyone. Mothers and fathers are probably working hard to maintain their patience and sense of humor in the face of disrupted sleep, mealtimes, or family outings, and lack of time alone or together. Parents may see that there is relief in sight as their two year old's ability to communicate and understand language increases tremendously. The toddler at 24 months can speak in 2-4 word sentences and often converses with herself as a way to explain events. Symbolic play grows increasingly complex as the child takes on new roles and uses objects in new ways. The two year old can find creative solutions to problems that were beyond her reach a short time ago. This is also due to increased coordination of the thumb and fingers and a sense of competence in gross motor abilities. At two years, toddlers can seem very self-assured and grown-up! There are still challenges ahead. Mothers and fathers may need encouragement to continue setting firm but caring limits for a toddler who is challenging rules at almost every opportunity. Many toddlers use facial expressions and teasing behaviors that let their parents know that they understand a rule is being broken. Toddlers are often trying to learn the boundaries of acceptable behavior and their own capabilities. Many parents have begun toilet training or are worried about their two year old's night terrors. The joy and frustration expressed by mothers and fathers can mirror the intense emotional expression of the two year old. Tantrums still occur and may be linked to the toddler's inability to choose or make a decision. Listening to parents, supporting their efforts, and offering new suggestions continues to be important work for the Healthy Steps Practice.

### Child Development Checklist

- ☐ walks up stairs, runs well,
- ☐ kicks ball forward, throws overhand
- ☐ strings beads, imitates vertical line and circle, tower of 6-8 cubes, completes simple puzzle
- ☐ handedness
- ☐ uses 2-4 word sentences that include verbs, adjectives and adverbs, names 4 objects, names 6 body parts, responds to 2 step commands, speech half understandable
- ☐ expanded symbolic play and problem solving skills allowing for the use of objects in novel ways, begins to classify and sort (match)
- ☐ feeds self, brushes teeth, undresses, puts on simple clothing items
- ☐ cooperative (at least sometimes), aware of own and others feelings, shows sense of self, gender identification
- ☐ plays with joy and spontaneity, has a sense of humor

#### Behaviors

1. puzzle
2. joint attention/problem solving

## Observation of Parent-Child Interactions

- ☐ parent maintains limits in firm but caring manner
- ☐ parent participates in child's symbolic play and allows child to take the lead
- ☐ parent and child can play with spontaneity
- ☐ parent and child take turns in conversation
- ☐ parent encourages and praises child's cooperative and prosocial behaviors
- ☐ parent follows toddler's lead with regard to play, parent respects toddler's attempts to complete difficult tasks and responds to requests for help
- ☐ parent and toddler continue to demonstrate flexibility in their relationship

## Checking in with Mothers and Fathers

- ☐ How are you? What are your questions and concerns?
- ☐ How are you dealing with tantrums? How are you disciplining your two year old?
- ☐ Have you started toilet training yet? How is it going?
- ☐ What do you and your husband do when you're angry with each other?
- ☐ How are meal times and sleeping for your toddler?
- ☐ Are your child care arrangements working well? Does everyone agree about discipline?
- ☐ What do you and your toddler enjoy doing together?
- ☐ Can your toddler entertain herself if you are near-by?
- ☐ Who can give you extra help when you need it?
- ☐ Does your toddler have the opportunity to play with other children?
- ☐ Is your toddler becoming helpful with household tasks?
- ☐ How does your toddler show she is independent?

## Anticipatory Guidance

illness and injury prevention

lead screening and PPD

eye exam and oral exam

first dental appointment by age 3

keep a well stocked first aid kit and have emergency numbers posted by phone

use safety locks on cabinets

review fire plan

never leave toddler alone

stranger safety and good touch/ bad touch

- ☐ expansion of symbolic play and language abilities
- ☐ names four colors and can count to 3
- ☐ sorts and matches
- ☐ uses scissors, builds 8 cube tower, draws a cross
- ☐ supervise all play near streets or driveways

| DATE | NOTES | FOLLOW-UP |
|------|-------|-----------|
|      |       |           |

## Quick Check: 30 Month Visit

Date: \_\_\_\_\_  
Time: \_\_\_\_\_  
Baby's Name: \_\_\_\_\_  
Family Name: \_\_\_\_\_

HSS: \_\_\_\_\_  
Type of visit: ☐ Home ☐ Office  
People Present: \_\_\_\_\_

This month the family is scheduled for a home visit and an developmental check-up. It is possible that this could be the last home visit for the Healthy Steps Specialist with the family. This can be a nice time to show how the developmental gains of the last three years have combined to allow new gains in the child's ability to use memory skills, symbolic play, and creative thinking, increasingly complex language skills, and more polished fine and gross motor skills. The tremendous developmental gains of the last 2 ½ years and the toddler's strong expression of a sense of self let parents know that they have done a good job! Parents can use and expand upon the skills they've learned to meet successive developmental challenges. As the toddler heads toward three there will likely be a rapid decrease in resistant or negative behaviors, often surprising parents. At the same time there may be an increase or recognition of aggressive feelings which are difficult for the toddler to manage. Aggressive feelings can be scary and may be expressed during the day and at night as fears. Helping children express aggression in safe ways by talking about the feelings and modeling socially appropriate alternatives remain challenging tasks for parents. The toddler may need to be reminded that self-comforting behaviors can work when fears are present. The Healthy Steps Specialist and the family can also discuss unresolved concerns and decide if additional referrals are necessary.

### Child Development Checklist

- ☐ spontaneously engages in symbolic play, creating roles or using imaginary characters
- ☐ matches by color and shape, names a missing object,
- ☐ understands concept of one
- ☐ uses scissors, builds 8 cube tower, draws a circle and a cross
- ☐ feeds self, dresses and undresses except for fastenings, toilet training
- ☐ uses names of self and others, names 6 body parts, identifies own gender
- ☐ approaches familiar children and plays with them
- ☐ knows 3 adjectives, names 4 colors, understands 3 prepositions, knows 4 actions, speech half understandable
- ☐ overhand throw, balances on each foot for 2 seconds

#### Behaviors

1. *symbolic play with car, baby, person, and bottle*
2. *follows 2-3 step commands*

### Checking in with Mothers and Fathers

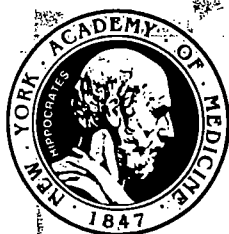
- ☐ How are things going?
- ☐ What are your questions and concerns today?
- ☐ Are you thinking about having more children?
- ☐ What do you imagine it will be like with two or more children?
- ☐ Is your toddler still having tantrums? What has changed?
- ☐ How are daily routines going?
- ☐ Is your toddler experiencing any fears?

- ### Anticipatory Guidance:

*use bicycle helmets*

[illegible]

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## CHILD DEVELOPMENT AND PEDIATRICS FOR THE 21ST CENTURY: THE HEALTHY STEPS APPROACH

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STEVEN PARKER, MD, MICHELE YELLOWITZ, MPP,  
AND MARGOT KAPLAN-SANOFF, EdD

A Healthy Steps Specialist from a pediatrician's office, making a routine 6-week phone call to a new mother, finds the mother of two frustrated and showing signs of distress. The mother has tried everything and yet can neither calm her toddler nor stop her 6-week-old baby from crying. The Healthy Steps Specialist senses that the mother is at her wit's end and very anxious. The Specialist offers immediate help and support. While still on the phone, she tells the mother to put the infant in the crib and to put the toddler in his room, with toys, and to close the door to the toddler's room so that both children are safe. The Specialist helps the mother calm down with breathing exercises, then begins to talk with her. The mother reveals that she had been on antianxiety medication prior to the birth of her baby, and that she feels isolated because she has to take care of two crying children all day by herself. The Healthy Steps Specialist suggests ways for the mother to discuss these feelings with her husband, encourages her to speak with her doctor about resuming the medication, and suggests parent groups that the mother could join. The Specialist shares ideas with the mother about consoling her baby and offers strategies for setting limits with the toddler.

At the 2-month office visit, the mother and babies are doing well. The mother has successfully created strategies with her husband, and he will take over some of the care of the two children and help more with household tasks. She also has spoken with her physician about the possibility of resuming her antianxiety medication and has been using strategies that the Healthy Steps Specialist taught her to manage her anxiety issues and to feel more competent in her daily child rearing.\*

At the birth of a new baby, the infant and family are in such a dynamic state of flux that parents are receptive to professional information, guidance, and

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\*M. Yellowitz and P. Garza, personal communication with Healthy Steps Specialist, 1998.

services to help cope with the demands of parenthood. Traditionally, the health system is the first institution that parents encounter with their newborn, and over the course of the child's first years, the pediatric clinician is often the only professional who has consistent and frequent contact with the family. The American Academy of Pediatrics recommends 10 visits before the age of three,<sup>1</sup> and in the context of an ongoing relationship, pediatric clinicians are ideally poised to provide information and guidance on child rearing and family well-being—the kind of information that the mother discussed above seriously needed.

Traditionally, too, information from the pediatrician has been designed to deal with a limited view of child health, focusing largely on accident prevention and general health issues. However, as we approach the 21st century, a convergence of four forces will mandate that pediatric clinicians adopt a broader view about how to support families and young children, especially including more support and advice about promoting children's development and behavior. These forces include a changing world, financial strains, new morbidities, and the importance of early experiences.

*Families are raising children in a changing world.* Successful parenting takes time: time to get to know the child, time to learn and understand signals, time to respond, and time to master the parenting role and feel confident in it. Yet, pressures on both parents to work mean that infants and toddlers have less time with their parents. Over half (56%) of mothers with children under 3 years are in the paid workforce, and 57% of all parents would like to spend more time with their young children.<sup>2</sup>

Beyond basic tasks and the time necessary to care for and rear young children, parents often are insecure and troubled about raising their children and helping them to grow up in a world that little resembles the world of their own childhood. Should they raise a child who is focused on making friends, or would it be more advantageous to raise a child who is fiercely competitive? Should they foster their child's cognitive development, or is emotional development more important?

*Many young children live in poverty or in families struggling to provide the basics.* One in four children under 3 years is living in poverty,\* a higher percentage than for any other age group. The links between poverty and child health and development are profound; these children find themselves in "double jeopardy." They encounter manifold risks in their lives, such as medical illnesses, family

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\*According to the March 1996 Current Population Survey, US Bureau of the Census, compiled by the National Center for Children in Poverty.

stress, parental depression, and inadequate social support. More serious consequences arise from these risks for children in poverty than for children from higher socioeconomic levels. This double jeopardy of increased exposure and more-serious consequences lays the groundwork for children living in poverty to have an increased likelihood of developmental delays and subsequent problems in school.<sup>3</sup>

Budgets also are particularly tight for low-income and moderate-income families who are working to make ends meet. Nearly one-quarter of young children in families with incomes between \$20,000 and \$40,000 have parents who have difficulty paying for their young child's medical expenses and basic needs. Parents report problems paying for basic items such as formula, food, diapers, clothes, and shoes (Figure).

*New morbidities threaten child health and development.* The development of new immunizations and effective treatments for many childhood disorders has decreased selective causes of childhood morbidity and mortality. This change means that parental health (health behaviors, as well as parental mental and reproductive health issues) will become relatively more common as causes of children's health and development problems. For example, parental cigarette smoke is associated with respiratory, learning, and behavior problems in children.<sup>4</sup> Unintended pregnancies can be associated with child abuse and behavior problems.

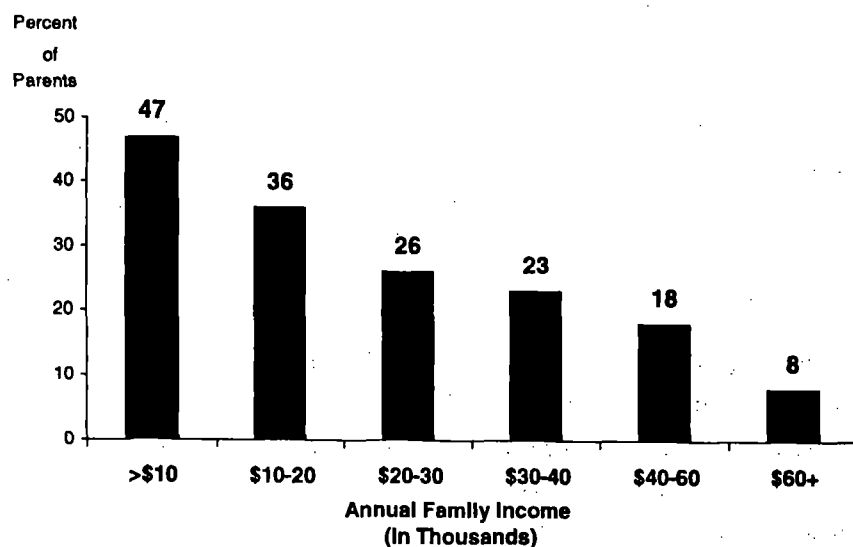


**FIGURE** Difficulty in paying for basics, by family income. Source: *The Commonwealth Fund Survey of Parents with Young Children*. Princeton Survey Research Associates/DataStat, Inc., 1996.

Parental mental health problems, especially depression, are associated with a myriad of child behavior and learning problems and childhood injuries. In a 1996 national survey of mothers and fathers with children under 3 years, 9% of mothers and 4% of fathers reported experiencing three to five depressive symptoms (e.g., feeling depressed, sad, or not finding life enjoyable) at least some of the time during the week prior to the survey.<sup>2</sup> Those parents who experienced these depressive symptoms were less likely to be able to cope with the demands of child rearing than were parents who reported no depressive symptoms. Parents were significantly more likely to be frustrated with their child's behavior or to yell at their child and were less likely to engage in positive child-rearing behaviors such as reading, singing, playing, cuddling, and establishing daily routines (Table I).

*Advances in neuroscience document the importance of a child's early experiences.* Unlike other organs, such as the heart, the brain is not fully developed at birth. While researchers still agree that children are born with a certain genetic makeup, they now believe that there is much more plasticity in the child's developing brain than was previously recognized.<sup>5,6</sup> Positron emission tomography scans and magnetic resonance imaging studies and counting synaptic density show that, in humans, the full complement of neurons is formed before the third trimester of pregnancy, but the connections or synapses among these neurons occur largely after birth. The structure or architecture of the adult brain to a significant degree is shaped by the young child's environment and early experiences—both positive and negative. The excessive synaptogenesis and later "pruning" processes that occur in a child's developing brain are socially constructed to a large degree in these early years.

**TABLE I** Depressive Symptoms and Daily Child Rearing\*

| Practice                              | No Depressive<br>Symptoms in<br>Past Week, % | More than Three<br>Depressive<br>Symptoms in<br>Past Week, % |
|---------------------------------------|----------------------------------------------|--------------------------------------------------------------|
| Frustrated more than two times        | 21                                           | 44                                                           |
| Yell sometimes/often                  | 34                                           | 51                                                           |
| Read to child                         | 43                                           | 27                                                           |
| Sing or play music                    | 61                                           | 54                                                           |
| Play                                  | 87                                           | 72                                                           |
| Hug and cuddle                        | 90                                           | 80                                                           |
| Daily routines (naps, meals, bedtime) | 58                                           | 31                                                           |

\*From *The Commonwealth Fund Survey of Parents with Young Children*.<sup>2</sup>

The quality of the everyday interactions of parents—talking, cuddling, reading, singing, smiling, and being responsive to the infant—actually shapes the wiring or the intricate circuitry of the child's developing brain.<sup>5</sup> These experiences to a large measure influence a child's future abilities and character, yet many parents do not understand fully how their daily interactions with babies and toddlers affect child development and learning. Many parents erroneously believe that the more stimulation a baby receives, the better off the baby will be, and the more caregivers a baby has, the better that child will be at adapting and coping with change.<sup>7</sup>

#### **WHAT PARENTS WANT FROM THEIR CHILD'S PEDIATRIC CLINICIAN**

Since the mid-1960s, reports from pediatricians' offices indicated that almost half of all mothers were more concerned about child development and behavior than other medical issues.<sup>8</sup> By the 1980s, parenting issues were often parents' primary concern in pediatric practices. One study reported that psychosocial issues comprised 81% of the questions parents had for pediatric clinicians.<sup>9</sup> Another study reported that, for 70% of the mothers, child behavior or parenting questions were their primary concern.<sup>10</sup>

Yet, studies indicate that, while parents are full of questions, opportunities are being missed to address these concerns. Only 28% of mothers report having discussed their concerns with their child's pediatrician, and in 60% of the routine well-child visits, the physician ignored the concern or provided no information or guidance.<sup>10</sup> It has been reported that pediatricians frequently spend less than 1½ minutes on anticipatory guidance during a routine visit with a young child.<sup>11</sup>

*Parents are interested in child development and parenting information.* The *Commonwealth Fund Survey of Parents with Young Children*, conducted in 1996, provides the most up-to-date information about the child-rearing concerns of mothers and fathers and the types of information and services they receive or would like to receive from a child's pediatric practice/physician.<sup>2,12</sup> The survey is based on 25-minute in-depth structured telephone interviews with a representative sample of 2,017 parents with children younger than 3 years.

According to the survey, while parents use multiple sources, including books, magazines, television, and parenting classes, for information on child rearing, a majority of parents with infants and toddlers still desire expert information and guidance on common areas of child-rearing issues—newborn care, sleep patterns, response to a crying baby, discipline, and encouragement of children's learning. Nearly four of five parents (79%) state they could use more information in one area, and over half (53%) say they could use help in at least three areas. Surpris-

ingly, parents were most interested in information on how to encourage their young child to learn, with over half of the parents requesting help in this area. Four of 10 parents stated that they could use more information on how to discipline their child and how to toilet train their child (Table II).

While nearly two-thirds of parents who were surveyed talked with their child's doctor or nurse about newborn care, few parents actually discussed other common child-rearing concerns. Fewer than one-quarter of parents actually talked with the pediatric clinician about how to help their child learn or how to discipline their child, and fewer than one-third talked with their child's clinician about toilet training. In sum, the two topics—early learning and discipline—that parents most desire information about were the topics least likely to be addressed in the context of a pediatric visit. As pediatric clinicians approach the 21st century, now may be the time to reconfigure the agenda for routine health maintenance to address better the new priority concerns of mothers and fathers.<sup>12</sup>

Parents also reported that, if their child's pediatric clinician discussed child-rearing concerns with them, it could affect parental behavior positively. When the clinician encouraged the mother to breast-feed, she was more likely to do so than if she did not receive encouragement (74% vs. 45%,  $P < .001$ ). Likewise, when the clinician discussed how to encourage early learning, parents were more likely to read to their child on a daily basis than those parents who did not have the opportunity to discuss learning (47% vs. 37%,  $P < .001$ ). The authority and voice of pediatric clinicians still has clout with parents, and the trustful encouragement and advice of pediatric clinicians seems to leave its mark on parents' behavior. So, too, the silence presents a missed opportunity to help families with young children.

TABLE II Common Child-Rearing Concerns\*

| Topic                     | Parents Who Want<br>More Specific<br>Information, % | Parents Who Have<br>Discussed with<br>Health Professional,<br>% |
|---------------------------|-----------------------------------------------------|-----------------------------------------------------------------|
| Newborn care              | 19                                                  | 62                                                              |
| Crying                    | 23                                                  | 35                                                              |
| Sleep patterns            | 30                                                  | 41                                                              |
| Toilet training           | 41                                                  | 29                                                              |
| How to discipline         | 42                                                  | 23                                                              |
| How to encourage learning | 54                                                  | 23                                                              |

\*From *The Commonwealth Fund Survey of Parents with Young Children*.<sup>2</sup>

*Parents value enhanced pediatric services.* As reported by parents in the Commonwealth Fund survey, nearly all infants and toddlers (88%) had a regular source of health care, and more than three of four (76%) young children were reported to be in excellent health. Two-thirds of parents felt that their child's regular physician did an excellent job of providing overall pediatric care, listening carefully, and answering questions. However, mothers and fathers were less satisfied about other aspects of their child's pediatric care. Only slightly more than half of parents felt that the physician provided guidance on how to care for their child, helped them understand their child's growth and development, and was easily accessible by telephone (Table III).

The survey findings revealed that enhanced pediatric services, such as home visits, developmental assessments, a child development telephone information line, and records to chronicle the child's health and development were valued by a large majority of parents. Yet, most parents are not receiving these services. For example, despite short hospital stays after the birth of a baby, only one in five mothers received a home visit in the newborn period, and only a third of parents had access to a telephone information line to answer their child-rearing questions. Yet, two-thirds of parents who received a home visit found it very useful, and over four in five parents reported having access to a child development telephone line was very useful (Table IV).

The survey also revealed that parents who received these enhanced services reported significantly higher levels of satisfaction with their child's pediatric clinician. When parents received three or more of these services, compared to parents who received none of them, they were more likely to rate their child's pediatric clinicians as excellent in providing good health care, child development guidance, and help in understanding how their child was growing and developing (Table V).

The majority of parents who did not receive enhanced pediatric services also

**TABLE III** Parents' Satisfaction with Child's Pediatric Clinician\*

| Parent Rating for                                 | Excellent,<br>% | Good,<br>% | Fair/Poor,<br>% |
|---------------------------------------------------|-----------------|------------|-----------------|
| Providing good overall pediatric care             | 69              | 28         | 3               |
| Listening carefully to questions                  | 66              | 29         | 5               |
| Helping understand child's growth and development | 58              | 35         | 6               |
| How to care for the child                         | 56              | 37         | 5               |
| Reaching child's physicians by telephone          | 54              | 32         | 12              |

\*From *The Commonwealth Fund Survey of Parents with Young Children*.<sup>2</sup>

**TABLE IV** Enhanced Pediatric Services\*

| Service                          | Parents Received<br>Services, % | Parents Found<br>Services Very<br>Useful, % |
|----------------------------------|---------------------------------|---------------------------------------------|
| Packet of information on newborn | 89                              | 54                                          |
| Booklet to track health status   | 66                              | 83                                          |
| Checkup reminder system          | 42                              | 85                                          |
| Telephone advice line            | 32                              | 87                                          |
| Home visit                       | 20                              | 67                                          |

\*From *The Commonwealth Fund Survey of Parents with Young Children*.<sup>2</sup>

believed that such services would have been helpful. More than half stated that they felt the following additional pediatric services would be very useful: a packet of information on newborn care (73%), a home visit by a nurse (67%), a special telephone advice line (87%), a reminder service (85%), and a booklet to keep track of their child's health information (83%).<sup>2</sup> Regardless of whether parents received the aforementioned services, nearly two-thirds (62%) of all parents reported that they would be willing to pay a modest monthly fee for the opportunity to receive all of these services and this kind of child development information from their child's pediatric clinician.

According to the Commonwealth Fund survey, parents clearly are interested in receiving enhanced pediatric services. In sum, parents are eager for guidance and seek information; health providers who offer parents information and support can make a positive difference; and parents are more satisfied with health providers who offer supportive services.

#### THE HEALTHY STEPS APPROACH: MEETING PARENTS' NEEDS

"Babies definitely bring stress to the family," says a Healthy Steps physician, "but Healthy Steps is bringing back joy into parenting. I know the families in Healthy Steps not only tolerate the difficult early stages of adjusting to parenthood, but also are actually enjoying

**TABLE V** Pediatric Care Professionals Rated "Excellent" by Parents\*

|                                  | No Special<br>Services Received,<br>% | Three or More<br>Special Services<br>Received, % |
|----------------------------------|---------------------------------------|--------------------------------------------------|
| Provided good health care        | 49                                    | 71                                               |
| Helped understand child's growth | 42                                    | 63                                               |
| Provided guidance                | 35                                    | 61                                               |

\*From *The Commonwealth Fund Survey of Parents with Young Children*.<sup>2</sup>

them. This means that parents are better adjusted, the children are happier and stress has been reduced."<sup>\*</sup>

Responding to both the circumstances facing families today and the survey findings, which suggest the strong need for a new breed of pediatrics as we approach the 21st century, is the Healthy Steps for Young Children Program. The Healthy Steps program was initiated in late 1994 by the Commonwealth Fund in partnership with some 60 foundations and health providers. The program is cosponsored by the American Academy of Pediatrics and is currently operating in 24 pediatric and family practices across the country.

Healthy Steps is an innovative approach to pediatric primary care for families with infants and toddlers. It aims to enhance a pediatric practice's ability to meet the desires of mothers and fathers for information and to help provide pediatric clinicians with additional tools to improve the health and well-being of young children. The program is based on three premises:

1. Promoting the physical, emotional, and intellectual development of young children from birth to age 3.
2. Promoting the knowledge, skills, and confidence of parents in their child-rearing abilities.
3. Expanding the clinical capacity and effectiveness of pediatric primary care to meet the needs of families with young children.

These premises emphasize a two-generation approach to pediatric care and appreciate that many of the issues that infants and toddlers face are strongly intertwined with parental issues and behaviors. Healthy Steps aims to implement the *Bright Futures* health supervision guidelines for infants and toddlers and is based on seven key components that, as a package, augment traditional pediatric primary care.<sup>13,14</sup> The components of Healthy Steps include

- *Enhanced well-child office visits.* A pediatric clinician and a Healthy Steps Specialist conduct visits either jointly or consecutively. The visits are designed to answer questions about infants' or toddlers' upcoming developmental stages, as well as to administer physical examinations and developmental assessments and to encourage early reading activities as part of the Reach Out and Read program. Pediatric clinicians and Healthy Steps Specialists are trained to take advantage of "teachable moments" to help parents understand their child's temperament and development through

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<sup>\*</sup>R. Gould, Vignettes and Views on Healthy Steps, unpublished manuscript, 1998.

shared experiences in the office. In addition, health risks, such as maternal depression, household smoking, safety, and substance abuse, are identified.<sup>15</sup>

- *Home visits by Healthy Steps Specialists.* A sequence of seven home visits—or more if needed—is offered to parents over 3 years at predictable junctures of the child's development. Mothers and fathers are more comfortable in their own home and often will share concerns about their child's development that they may be hesitant to bring up initially in a doctor's office. In addition, the Healthy Steps Specialist is able to observe the home for safety and other anticipatory guidance issues.
- *A child development telephone information line.* Healthy Steps Specialists staff a child development information line, which complements a medical information or emergency line. Parents call with questions about their child's behavior, such as crying, sleeping difficulties, discipline, and other common child-rearing concerns.
- *Parent groups.* These monthly group sessions are both learning sessions and opportunities for social support from other parents in their communities. Sessions are run by the Healthy Steps Specialists, at times in collaboration with a local parenting group. Frequently, group sessions include discussions of topics such as infant temperament, cardiopulmonary resuscitation, play, and toilet training.
- *Child development assessments.* Assessments or "checkups" begin at 6 months of age. The assessments detect early signs of developmental or behavioral problems and provide teachable moment opportunities to discuss the child's learning and coping style, as well as the child's pattern of development, including language, temperament, and social/emotional behavior.
- *Written informational materials for parents that emphasize prevention.* Parents receive a variety of materials—all emphasizing prevention or teaching about what to expect at the next developmental milestone. Each parent receives "LINKletters" two weeks before a scheduled well-child visit to address questions frequently asked during visits; handouts on a variety of medical, developmental, and practical topics; and a Healthy Steps Child Health and Development Record to chronicle immunizations, physical growth, developmental milestones, parental concerns, and accidents through age 18.
- *Links to community resources.* The Healthy Steps Specialists compile a book that lists community resources, and they develop a parent-to-parent bulletin board in the office that contains an assortment of information, from child care resources and public programs to baby equipment sales.

A key aspect of Healthy Steps is the addition of a new professional to the pediatric practice: the Healthy Steps Specialist. Most Healthy Steps Specialists are trained in early childhood education, nursing, or social work. The Specialist becomes the primary resource for this new model of pediatric care and collaborates with the pediatric clinician to provide the seven components of the program. The Healthy Steps Specialist does the following:

- Makes home visits to the family, starting in the child's newborn period
- Performs child development assessments on all children at targeted times
- Meets with the parents before, during, and after a well-child visit to discuss behavioral and developmental issues further
- Is available through a special telephone line to answer parents' questions about development or behavior
- Leads parent group sessions
- Ensures that the pediatric practice has made all of its requisite community linkages for families so that referrals are made in a seamless and timely way
- Aids in early detection of family stresses such as depression, substance abuse, or domestic violence<sup>16</sup>

*Views from Healthy Steps Physicians.*

According to one physician involved in the Healthy Steps program, "The Healthy Steps Specialists free me up from having to spend 30 minutes digging out the nature of a family's problem. The Specialists come to me with a summary, giving me a sound basis for a medical decision. In a high-volume practice, this will be important and certainly cost effective. Healthy Steps Specialists have the time that doctors don't have to handle certain behavioral and developmental problems. You just can't rush those things." Another physician says that the extra attention for families "bonds them with the practice. We noticed that, to a certain extent, parents find talking to the doctor somewhat intimidating. The Healthy Steps Specialists create an important bridge between families and physicians."<sup>\*</sup>

The addition of the Healthy Steps Specialist allows the pediatric practice to emphasize a team approach to care that is tailored to the needs and issues of each specific family.

**ACTIONS OF A HEALTHY STEPS PRACTICE**

The Healthy Steps system of pediatric primary care expands and enhances the practices' ability to focus on child-rearing and parenting skills that often get overlooked in the confines of a well-child visit. It is a challenge for a pediatric clinician to have the time in a 15–20-minute visit to give appropriate attention to medical issues and still to have time to encourage positive parenting skills with each family. Healthy Steps practices are able to solve this problem using a

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<sup>\*</sup>Ibid.

team approach to care with an additional member of the team who has the skill, time, and interest to help parents promote their children's development.<sup>16</sup> The Healthy Steps practice promotes child development, identifies problems, provides parental support, promotes early learning, assists in securing the basics, and practices a two-generation approach to child health.

#### PROMOTION OF CHILD DEVELOPMENT

Healthy Steps provides opportunities to promote child development. Parents often bring anxieties, questions, concerns, and vulnerabilities about their children and themselves to the pediatric office. Such concerns often result in a heightened sensitivity to input from the pediatric clinician and the Healthy Steps specialist, making the pediatric visit a special opportunity to help parents be more successful in their child-rearing roles.

##### *A view from a Healthy Steps Specialist.*

According to one Healthy Steps Specialist, parents learn through interactions with their Specialist that "you don't just feed babies, change their diapers and put them to sleep. You play with them right from birth. We teach parents a balance between stimulation and a baby's need for quiet time. Taking care of infants means more than caretaking; it means nurturing them too. That's our message to parents."<sup>\*</sup>

The time that is spent with the pediatric clinician and Healthy Steps Specialist is an opportunity to equip parents better to understand their child's behavior and development through shared experiences in the office—teachable moments. The young child's behaviors in the pediatric office offer a view for parents and pediatric clinicians about the child's development. Observing these actions with parents enables a conversation that promotes understanding and confidence in parenting.<sup>16</sup>

##### *A view from a family.*

When the Healthy Steps Specialist performed a section of the Brazelton Neonatal Behavioral Assessment Scale (NBAS) during the newborn visit, a new mother learned that her newborn really did know her. The Healthy Steps Specialist held the baby and asked the mother to speak in one ear and the Healthy Steps Specialist spoke in the other—the infant recognized the mother's gentle voice and turned. This led to a discussion of the infant's auditory capacities and emerging ability to think. This enabled the mother to really understand that newborns do have the ability to hear, discriminate sounds and recognize a familiar voice. This teachable moment helps promote the mother's bond with her newborn and sets the foundation for forming a relationship of trust with her baby. By observing the infant's behavior in the office at the same time together, this shared experience becomes a springboard for facilitating parental understanding and confidence about their infant.\*

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\*Ibid.

#### PROBLEM IDENTIFICATION

Developmental and behavioral surveillance provide opportunities for teachable moments and identification of potential problems. A vital component of enhancing infant development is detecting such delays at an early stage and instituting prompt and appropriate diagnostic and therapeutic measures. Recently, pediatricians have stressed the importance and efficacy of developmental surveillance (as opposed to screening) in young infants.<sup>17</sup> Parental concerns about children's development, presence of risk factors associated with developmental problems, and skilled clinical observation of development provide a reasonably sensitive and specific first cut. If parents are concerned or milestones are delayed, then the chances of a developmental problem are much greater. In such a situation, the child may need to be referred for a complete developmental evaluation and/or be followed closely.

Observation of the interactions and the developing relationship between parent and child during clinical visits may detect possible emotional and attachment issues. Is there warmth and affection evident throughout the examination? Are the parents reassuring and soothing? Do the parents respond appropriately to the child's behavioral cues? Is there mutual eye contact, smiling, and regard? In some cases, most of the exam may be spent talking about the parent's feelings about how things are going with the child. As the only professional seeing both parent and child, it is the pediatric clinician and/or Healthy Steps Specialist who is best poised to detect an early poor fit, for example, between a child with a difficult temperament and an insecure parent. If such a mismatch is detected early, targeted interventions by the pediatric clinician or Healthy Steps Specialist, or referral for counseling, can serve to prevent later problems.

Developmental delays in children usually are apparent in the first two years of life, with language delays being the most common. Some delays may be caused by preventable environmental factors, such as elevated levels of household smoking or such psychological or social factors as parental isolation and/or depression. For instance, household smoke could lead to repeated ear infections, hearing loss, and subsequent language delays. A critical element of the Healthy Steps program is detecting these potential delays at an early stage and problem solving with the parents to find prompt solutions. This translates not only into improved child health and development, but also into money saved on future health care and social services.

#### *A view from a Healthy Steps Specialist.*

A Healthy Steps Specialist performed her first home visit for a newly enrolled Healthy Steps family. During the visit she observed that the entire extended family, all living in

the same home as the infant, smoked in the home and around the newborn. The Healthy Steps Specialist mentioned to the mother that the smoke could make her baby sick and that not smoking around the baby could prevent frequent respiratory infections. The Healthy Steps Specialist held off from the "hard sell" until she began to form a trusting relationship with the mother. Concurrently, although the baby was developing normally, he began to develop frequent respiratory problems. The Healthy Steps Specialist, in concert with the pediatric clinician, began a campaign to teach this mother what the smoking was doing to her baby. This enabled the mother to understand that she could prevent some of these illnesses now and the potential for increased problems later, which could include language delays and learning problems. The Healthy Steps Specialist counseled her on how to approach the rest of her family about only smoking outside. The mother has now successfully quit and the family smokes only outside—and the baby is healthier and at a decreased risk for later problems.\*

#### PROVISION OF PARENTAL SUPPORT

Many new parents feel unsure about the quality of their parenting and the decisions they make regarding their new baby. According to Dr. T. Berry Brazelton, "Parents are passionate for the answers to two questions when they come for their child's check up: 'How am I doing as a parent?' and 'How is my baby doing?' Unless they get some answer, they leave the visit seriously disappointed."<sup>18</sup>

#### *A view from a Healthy Steps parent.*

"Everyone thinks I should know what to do because we have two other children, but what I really need is some positive feedback to know I am doing things right," stated a mother of three who is concerned about her newborn baby's slow weight gain. Using the team approach, the Healthy Steps Specialist and the baby's pediatrician offer that feedback and support. During a recent office visit, the Healthy Steps Specialist reassures the mother by telling her, "It takes time to learn about each new baby, to figure out their signals." The Healthy Steps Specialist leans over the exam table, talking and cooing as the baby squirms. The 2-week-old baby brightens, turning to the Specialist's voice. "You see how she responds," the Specialist tells the mother. "Her development looks good. When the doctor comes in we'll ask about her feeding schedule."

The physician confirms that the baby is healthy, but he advises more frequent bottles, even if it means waking her from a peaceful sleep. He asks for a feeding demonstration. Nestled in her mother's lap, the baby takes a few gulps and then rears her head. The Healthy Steps Specialist offers her expertise in child behavior. "You see how she arches her back to get away from that bottle. The nipple probably drips too fast, and the baby is having trouble coordinating her breathing, sucking and swallowing. She is doing a good job of giving you those signals, but it's wearing her out to work so hard."

The mother verifies that the baby tends to "conk out" after feeding, sleeping long hours until the next bottle. That explains why the baby has not gained weight. The Healthy Steps Specialist holds the bottle upside down over the table to confirm the too quick succession of drips. Even though this nipple is labeled for newborns, it does not suit the baby. The Healthy Steps Specialist offers a slower nipple and the baby seems much happier—so does her mom.

"The doctor and Healthy Steps Specialist are doing such a great job helping me," says the mother, the relief visible on her face. "I should have called with the feeding questions. I'll make more use of that Healthy Steps service now."<sup>\*\*</sup>

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\*Ibid.

The short amount of time allotted in a traditional pediatric visit likely will allow little time for parents to ask nonmedical questions and to receive support. The extra time and emotional support from members of the Healthy Steps team is often invaluable and underestimated.

#### PROMOTION OF EARLY LEARNING

Many parents are not aware that talking and reading to their young children are meaningful activities that promote their child's readiness to learn and language development.<sup>16</sup> Looking at books gives children a pleasurable and positive way to elicit parental attention. Although many parents know that reading aloud to children is important, some are not sure how to proceed. Many do not realize that they should support their child's learning in infancy.

Healthy Steps promotes early reading activities through the Reach Out and Read program, which starts when the infant is 6 months of age.<sup>19</sup> During scheduled well-child visits, the pediatric clinician gives the child a book, comments on the child's response to the book in the examination room, and offers information on the child's cognitive development. The child then is given the book to take home. For many parents, the very fact that the book comes from a pediatric clinician communicates the importance of reading more effectively than any amount of explanation would do.

Researchers agree that children's early literacy environment is critical to their later reading success.<sup>19</sup> By starting early, pediatric clinicians are able to capitalize on a mother's and father's desire to have a "smart child" who does well in school. The emphasis that reading to infants and young children not only can enhance language, skills, and interest in learning, but also can lead to a closer attachment between the parent and child is a powerful and not-often-heard message from a physician. At 6 months, the infant will begin to be interested in a book with pictures of other babies or common objects. However, it is the emotional closeness of this reading or book-sharing interaction that can facilitate the attachment process even as it sets the stage for later interest in reading. In fact, the case could be made that reading to a child is the perfect activity to "promote early brain development." All of the senses are engaged by the warmth from the parent's body, tactile stimulation from being held, vestibular stimulation from being rocked, emotional closeness, contingent responses to the child, cognitive stimulation, and a great deal of language and shared attention.<sup>16</sup>

#### *A view from Healthy Steps pediatric clinicians.*

One pediatric clinician was surprised at the relative lack of reading he observed parents doing with their children, even though the people he saw in his practice were a fairly

educated population. "Healthy Steps made us realize that one-fifth of all families do not read to their children. By offering developmentally-appropriate books, we can teach parents about the importance of early reading and give those children a head start in preparing them for learning."<sup>\*</sup>

#### **ASSISTANCE IN SECURING THE BASICS**

It is difficult, often impossible, for families to use health or child development information if they lack the bare necessities of life—adequate housing, heat, food, and health insurance. For many disadvantaged families, the pediatric clinician may be the only professional who is aware of their plight and its effects on their children. This may mean asking questions that do not come easily to many clinicians: Do you ever run out of food? How many people are living in your house? Do you have enough money to pay your bills?

Serving as an advocate for parents in helping to provide these basics is the first layer of promoting infant health development for many families. For some practices, this means easy access to a social worker, case manager, or family advocate and an exhaustive understanding of local and governmental resources and entitlements such as WIC (supplemental food program for Women, Infants, and Children). The advocacy efforts by individuals who are part of a pediatric system of care can be extremely compelling in forcing the appropriate agency to respond to help provide the basics and can serve as a base for other health and development efforts.

#### *A view from a Healthy Steps pediatric clinician.*

A young girl with severe asthma was a patient in the Healthy Steps program. She was on steroids to control the attacks and was not doing well—and frequently ended up in the emergency room. The mother followed our recommendations in terms of alterations to her home to the best of her ability, but the rental apartment was damp due to a leak in the pipes and had musty wall-to-wall carpeting. As the young girl continued to do poorly, the mother spoke to the Healthy Steps team about her current situation, and the fact that she had repeatedly discussed the problem with her landlord, to no avail. The Healthy Steps Specialist suggested that the mother speak with a legal aid lawyer affiliated with the practice. The lawyer contacted the landlord and was able to convince him to fix the leak and remove the carpet. Not surprisingly, the young girl's health is significantly better, she is off the steroids, and emergency room services are no longer necessary.\*

#### **A TWO-GENERATION APPROACH TO CHILD HEALTH**

The best way of helping children is to help their parents, and the best way of reaching parents is through their children.<sup>16</sup> The relationship between parental and child health has received inadequate attention in the past. New and effective treatment of some important adult health problems has become available recently. These findings suggest the need for a two-generation approach to child health

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\*Ibid.

that uses the pediatric visit to enhance parents' health (especially health behaviors and mental health) by identifying problems and by referring parents to primary care or to a specialist to address a specific problem. After pregnancy, the pediatric primary care system may represent the only health system in which parents are involved consistently, and it affords a window of opportunity to provide health promotion interventions.

*A view from a family.*

A mother was experiencing symptoms of post-partum depression after her second child was born. Feeling desperate, the father called the Healthy Steps Specialist and asked her to come to speak with his wife. The Healthy Steps Specialist was present when the two-year-old toddler stood by his mother's bed as she stared into space, and asked, "Mommy, are you mad at me?" This sad exchange enabled a door to open toward the healing process. The Healthy Steps Specialist helped the mom understand her older child's feelings. In turn, the mom began to trust the Healthy Steps Specialist, and spoke about her feelings of depression. The Healthy Steps Specialist visited her twice a week for several weeks and then referred her to a post-partum support group. She is subsequently doing very well—and is emotionally available for her family. According to this Healthy Steps Specialist one of the priceless aspects of Healthy Steps "is the time we spend with families and the explanations we can give. Often they hear the words from the physicians but need time to figure it out, review it with us, anticipate what is coming up next. . . . They know what they can handle and what they can't and when to ask for help."<sup>\*</sup>

Many parental problems can and should be identified by the clinicians in a Healthy Steps practice. Mental health problems, especially depression, among mothers occurs commonly and has well-documented adverse effects on children's health, including increased risk of low birth weight, behavior problems, poor growth, accidents, and affective illness.<sup>20</sup> Drug addiction, alcoholism, and smoking are common parental addictions that are troublesome as well. Pediatric clinicians within Healthy Steps practices can provide linkages with mental health professionals or specialists with training in problems of addiction.

**LOOKING TOWARD THE 21ST CENTURY: THE VALUE OF THE  
HEALTHY STEPS APPROACH**

"By applying the principles of total health care in a systematic way, Healthy Steps offers a great boost to all of us. While some doctors have been using such methods in a less structured way for years, Healthy Steps offers validation. Because the program has developed consistent ways across the board to practice primary care pediatrics, we can deliver health care in a more efficient, cost effective way," says a chairman of the department of pediatrics in a major health system in the Midwest.\*

As pediatric clinicians think about their practice of primary pediatric care in the 21st century, the old model of a solo practitioner trying to address a burgeoning agenda of medical and psychosocial issues of young children and families

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\*Ibid.

will need to change. Practices will need to be transformed into a team approach in which the pediatric clinician and Healthy Steps Specialist collaborate to meet the needs of families with young children better. The adoption of the Healthy Steps philosophy creates a marked change in a pediatric practice's daily routine. The successful integration of Healthy Steps requires a team approach to serving families, and building such a team takes time, planning, and patience. Logistical problems cause further challenges—for example, coordination of the schedules of the physicians and Healthy Steps Specialists and finding ample time and a place in high-demand room space to perform developmental assessments and follow-up with families about child-rearing concerns. The real world accounts by families, physicians, and Healthy Steps Specialists testify to the early and possible far-reaching benefits of the Healthy Steps approach. Physicians welcome the addition of the Healthy Steps Specialists to their pediatric teams. Healthy Steps Specialists enhance doctors' ability to communicate with families and help bond families to the practice while building parents' confidence in their mothering and fathering skills.

*A view from a Healthy Steps physician.*

"No question, Healthy Steps is a fantastic way to practice medicine. A lot of parents just take their child to the doctor for shots, but Healthy Steps turns our office into a place where they can learn about their child, develop a good relationship with them and properly stimulate and respond to them. As a result parents feel more comfortable in their role; they use medical services more judiciously. And the children are well nurtured. In the long run, they will be healthier both mentally and physically."<sup>\*</sup>

However, the dynamic world of managed care and health insurance places a growing emphasis on the services that make a difference and are cost effective. Healthy Steps is no exception, and as such, this multiyear initiative is being evaluated extensively at the 15 national evaluation and 9 affiliate sites by a team of researchers at Johns Hopkins University. Two major questions must be answered: Is Healthy Steps improving outcomes in children, parents, and pediatric practices? Is the Healthy Steps approach cost effective and generalizable? That is, in the era of managed care, will third-party payers and health care administrators provide financial support for a new professional in the pediatric practice? In an era of cost containment in health care, some may question recommending a new initiative that adds a professional member to the pediatric team—but the potential benefits, both with monetary and societal value, are being recognized by top management in health systems.

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<sup>\*</sup>Ibid.

*Views from a health care system.*

An executive vice president of a large Midwestern insurance company says, "The prospect of lower long-term costs made our company want to support Healthy Steps. We spend millions each year covering illnesses and injury—it appears that Healthy Steps is a promising program in terms of prevention and worthy of investing in to see if the preventive features could lower costs over the long haul. And Healthy Steps offers a competitive advantage. Anytime a health plan manager can put in place programs that bond patients to the plan it is a plus."<sup>\*</sup>

The director of the community benefits program for one of the larger integrated health care systems in the Northeast sees Healthy Steps as extremely valuable. "We believe Healthy Steps will make a measurable difference in parents' ability to use the health care system. Already they make better use of primary care, and avoid emergency room visits. Over a longer period of time we will be able to identify contributions Healthy Steps is making to children's readiness to succeed in school and the influence on making healthier choices in high risk situations such as drugs."<sup>\*</sup>

It is widely recognized that the health system has the potential to address the multifaceted nature of a young child's development as an integral part of assuring child health. Health plans, pediatric clinicians, and Healthy Steps practices, in particular, are uniquely positioned to offer families high-quality, comprehensive health promotion and preventive services that enhance the ability of families to nurture and rear healthy children as we look toward the 21st century.

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