

Early Effects of the Healthy Steps for Young Children Program

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Objective: The Healthy Steps for Young Children Program (HS) incorporates early child development specialists and enhanced developmental services into routine pediatric care. An evaluation of HS is being conducted at 6 randomization and 9 quasi-experimental sites. Services received, satisfaction with services, and parent practices were assessed when infants were aged 2 to 4 months.

Methods: Telephone interviews with mothers were conducted for 2631 intervention (response rate, 89%) and 2265 control (response rate, 87%) families. Analyses were conducted separately for randomization and quasi-experimental sites and adjusted for baseline differences between intervention and control groups. Hierarchical linear models assessed overall adjusted effects, while accounting for within-site correlation of outcomes.

Results: Intervention families were considerably more likely than controls to report receiving 4 or more developmental services and home visits and discussing 5 in-

fant development topics. They also were more likely to be satisfied and less likely to be dissatisfied with care from their pediatric provider and were less likely to place babies in the prone sleep position or feed them water. The program did not affect breastfeeding continuation. Differences in the percentage of parents who showed picture books to their infants, fed them cereal, followed routines, and played with them daily were found only at the quasi-experimental sites and may reflect factors unrelated to HS.

Conclusions: Intervention families received more developmental services during the first 2 to 4 months of their child's life and were happier with care received than were control families. Future surveys and medical record reviews will address whether these findings persist and translate into improved language development, better utilization of well-child care, and an effect on costs.

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IN RECENT years, the general public has shown increasing interest in early child development. Demand for further information has contributed to the growth of news media reports, Internet sites, and parenting instruction books regarding sleeping and feeding. However, these dissemination efforts are only a beginning. In a recent survey of parents of children younger than age 3 years, 79% reported wanting more information in at least 1 of 6 areas of child rearing, and fewer than half of all parents discussed issues such as discipline, sleep patterns, and practices to stimulate early learning with their pediatric providers.¹

Despite parental demands, pediatricians historically have focused only a small proportion of the average preventive care visit on behavior or development.²⁻⁴ Lack of time, inadequate training, and staffing shortages have been cited as obstacles to de-

voting more time to these issues.⁵⁻⁷ Findings from the recent Future of Pediatric Education II (FOPE II) Project affirm that providing optimal health care for children in the 21st century will require renewed focus on preventive efforts, including "guiding or modifying parental and child behavior to improve outcomes."^{8(p176)} The FOPE II report also suggests that nonpediatrician child health professionals may play an increasing role in direct patient contact to meet the needs of children and families.

A new model of pediatric care delivery that relies on a physician-child development specialist partnership to enhance developmental services is the Healthy Steps for Young Children Program (HS) designed by the Commonwealth Fund, New York, NY, and an interdisciplinary team from Boston University, Boston, Mass.⁹ The principal components of HS, given in **Table 1**, combine a limited number of home visits with extended developmental

The affiliations of the authors appear in the acknowledgment section at the end of the article. A complete list of the Healthy Steps Evaluation Team appears on page 478.

SUBJECTS, MATERIALS, AND METHODS

SAMPLE

Enrollment of families began in September 1996 at one site, followed by staggered initiation at subsequent sites and completion of enrollment during a 2-year period. Eligible newborns were identified either in the hospital following birth as patients from the HS site or in the practice up to 4 weeks of age. Children were excluded only if (1) their parents expected to move from the area or change site of care within 6 months; (2) their mothers (or fathers if they were the custodial parents) did not speak English or Spanish fluently; (3) they were to be adopted or placed in foster care; or (4) they were too ill to make an office visit within the first 4 weeks of life. In the case of multiple births, 1 child was randomly selected for the evaluation.

Of 6287 eligible families contacted to participate in HS, 469 (7.5%) declined to participate, and 253 (4.0%) deferred participation and did not make a visit to the practice within 4 weeks of birth (**Figure 2**). The study sample includes 5565 consecutively enrolled infants, 2235 enrolled at RND sites (51% intervention, 49% control) and 3330 at QE sites (55% intervention, 45% control).

DATA SOURCES

Data reported here were obtained from 2 sources: a brief questionnaire completed by parents at enrollment, and a telephone interview with parents, conducted when the infant was between 8 and 18 weeks of age. Both were available in either Spanish or English. The questionnaire provided data on the family's demographic characteristics.¹³ The interview, conducted by trained staff at Battelle Centers for Health Research and Evaluation, Baltimore, Md,

included additional demographic data and questions about the services and care the families received from the HS site and their overall satisfaction with them. Parents also answered questions regarding practices such as showing picture books to their infants and sleep position.

STUDY VARIABLES

Three sets of variables were compared between HS intervention and control families: receipt of HS services; parents' satisfaction with their infant's care; and parents' practices related to their infant's safety, feeding, and development. A dichotomous variable measured the receipt of 4 or more HS components available to families during the first few months of life, including office visits regarding the baby's development; office visits regarding general care of the baby; a telephone number to discuss the baby's development; a letter to prepare for office visits; brochures regarding the baby's development; special health booklets; and parent support groups.

Home visits, also an HS service, were examined separately because of their importance in developing an early relationship between the HSS and the family. Visits from someone at the practice as well as other agencies were included because we were uncertain if parents could distinguish visits specifically from their child's pediatric practice. All HS families were expected to have been offered 1 home visit in the first month of the baby's life.

A dichotomous variable described whether families discussed each of 5 topics with someone at the practice related to infant health and development—calming the baby, sleep position, routines, solid foods, and car seats. These were among the anticipatory guidance topics identified in the HS operations and training manuals as being important to discuss with parents of young infants.

We developed 2 scales to measure parent's perception of the care their baby received from the study site. These

Continued on next page

services provided by the Healthy Steps specialist (HSS) during regularly scheduled well-child office visits.¹⁰

The HS is being evaluated at 15 sites across the country. (The randomization design [RND] sites are located in Allentown, Pa; Amarillo, Tex; Florence, SC; Iowa City, Iowa; Pittsburgh, Pa; and San Diego, Calif. The quasi-experimental [QE] sites are located in Boston, Mass; Chapel Hill, NC/Birmingham, Ala; Chicago, Ill; Detroit, Mich; Grand Junction, Colo/Montrose, Colo; Kansas City, Kan; Kansas City, Mo; New York, NY; and Richmond, Tex/Houston, Tex.) The sites include group practices (n=8), hospital-based clinics (n=3), and pediatric practices in health maintenance organizations (n=4). At each site, 2 HSSs (or their full-time equivalents) work as a team with 4 to 8 pediatricians and pediatric nurse practitioners; each HSS serves approximately 100 children and their families. The HSSs—an early childhood educator, nurse, nurse practitioner, social worker, or other professional with expertise in early childhood development—are trained in HS by the Boston University team. The specialist conducts office and home visits and oversees the HS activities given in Table 1.^{11,12}

At each of 6 RND sites, approximately 400 children have been randomly assigned to intervention and control groups

of 200 each. It was not possible to randomize the intervention at all sites owing to constraints of sample size, the need to have a separate physical area for the intervention, and the willingness of practices to provide different services to families. At 9 QE sites, an intervention and comparison practice with a similar organizational setting and patient profile was selected, and up to 200 children are being followed from birth to age 3 years at each location. Children in the control group receive routine pediatric care but have no exposure to the HSS or to the materials specific to HS.

The HS is designed to strengthen parents' knowledge, attitudes, and behaviors in ways that promote child health and development (**Figure 1**). The HS evaluation will assess whether HS succeeds in meeting its objectives, measure the program's costs, and relate the program's costs to its outcomes.¹³ This article focuses on parent perceptions and parent practices when infants were aged 2 to 4 months. Of note, several national efforts, including the Consumer Assessment of Health Plans and the Child and Adolescent Health Measurement Initiative, sponsored by the Agency for Healthcare Research and Quality, Rockville, Md, and the Foundation for Accountability, Portland, Ore, respectively, recognize the

scales were based on responses of parents to questions that asked them to strongly agree, agree, disagree, or strongly disagree with descriptions of the care their baby received from the physicians and/or nurse practitioners.

In developing the satisfaction scales, we reviewed the content of the items, combining those with similar content into 2 subscales. The first was related to giving time to the family and listening to and encouraging questions from parents, and the second, to supporting parents in the care of their child and giving parents advice about resources or activities they might engage in with their baby. The internal consistency of the scales for physicians and/or nurse practitioners was assessed using the Cronbach α and the item-to-total correlation for each item in the scale (items listed in Table 5). The total score was divided by the number of items in the scale and a cutoff value indicating that the parents were, on average, not satisfied with care was used to create a dichotomous variable for each scale.

A similar approach was used to organize items in the questionnaire regarding the care provided by the HSS into scales covering 3 content areas: (1) listens and shows respect to parents, (2) helps parents promote the growth and development of their child, and (3) provides emotional support to parents. The α values for scales exceeded .80, the generally accepted level for an internally consistent scale.

We examined parent practices relevant to 3 domains: safety, feeding, and development. These included use of the prone sleep position at both nap time and bedtime; continuation of breastfeeding among women who initiated breastfeeding; showing picture books to the infant at least once a day; playing with the infant; and following routines at bedtime, nap time, and mealtime. These practices were among the positive parenting practices the HSS was expected to emphasize with families of young infants. Moreover, as noted earlier in this article, growing scientific evidence supports their roles in promoting infant health. Other health-related interventions, not specifically targeted by

HSSs, were examined and included other safety, feeding, and development practices.

ANALYSES

Data analysis was conducted using the SAS programming package (SAS Institute Inc, Cary, NC). Because the RND and QE sites had different sampling structures, analyses were conducted separately for each type of site. In bivariate analyses, we compared the distribution of HS services received, satisfaction with care, and parenting practices between intervention and control families. The χ^2 test of independence was used to evaluate differences in variables across groups.

Hierarchical linear models were estimated to determine the overall adjusted effect of HS, while accounting for within-site correlation of outcomes.^{17,18} These models account for within-site correlation by treating site as a random variable; these correlations arise because families within sites are more alike than are families between sites. Adjusted analyses controlled for site of enrollment (hospital or office), age of the infant at interview, and potential differences in the baseline characteristics of the mother (age, education, race/ethnicity, employment), father (employment), family (marital status, father in household, number of siblings, owned own home), and baby (low birth weight, source of payment for care).

HUMAN SUBJECTS

Institutional Review Board approval was obtained from The Johns Hopkins University School of Hygiene and Public Health Committee on Human Research, Baltimore, and the institutional review boards of the parent organization for each HS and control practice. Informed consent was obtained at the time of enrollment and reviewed immediately prior to the interview.

role of parents' experiences seeking care for their children as important components of quality of care.

We examine whether HS met parents' demand for child-rearing information in this early period and, in turn, whether HS increased parental satisfaction with pediatric care and encouraged positive infant parenting practices related to safety, feeding, and infant development. Infant safety, feeding, and promotion of early literacy were among those practices the HSS was expected to emphasize with families of newborns. Growing scientific evidence supports their respective roles in promoting infant health. Improper sleep position has been related to the risk of sudden infant death syndrome,¹⁴ while breastfeeding promotes general health and growth and decreases the infant's risk for infections,¹⁵ and sharing books with children has been associated with early vocabulary acquisition.¹⁶

RESULTS

All study families provided enrollment data for this report, and 4896 families (88%) provided parent interview data. The sample excludes 537 families (10%) who did not complete the parent interview because they declined (2%),

could not be located (6%), or were ineligible (2%); 53 families (<1%) who completed the interview outside the age range of 8 to 18 weeks; and 79 families (1%) who did not report making at least 1 visit to the practice before the interview. For 69% of families, the mother alone was the respondent to the enrollment questionnaire; for 30%, the mother and father; and for fewer than 2%, the father alone. By design, the mother was the respondent in more than 99% of the parent telephone interviews.

Approximately 7% of infants were low birth weight, 48% had no other siblings, and 13% were born to teen-aged mothers (**Table 2**). Of mothers, 42% had worked during their last month of pregnancy, and close to one third used Medicaid for their prenatal care; 16% had not graduated from high school, but 28% had completed college; 34% were unmarried; slightly more than 20% were Hispanic; and 24% were African American. Just more than 88% of fathers were employed at the time of their child's birth. Overall, respondents to the parent interview tended to have demographic characteristics that would place them at less risk for poor outcomes than nonrespondents. Comparing respondents, there were no statistically significant differences between

intervention and control families at RND sites on any of the maternal demographic characteristics. However, at QE sites, mothers in the intervention group were at less risk demographically than mothers in the control group.

RECEIPT OF DEVELOPMENTALLY RELATED SERVICES

In terms of the quality of care, 48% of families received 4 or more developmentally related services, 57% had a

home visit, and 35% discussed all 5 developmentally appropriate topics. Nevertheless, a markedly greater per-

Table 1. Programmatic Components of Healthy Steps for Young Children Program

Healthy Steps Specialist (HSS) and package of services *Enhanced well-child care.* Well-child office appointments conducted jointly or sequentially by a pediatrician, family physician, or nurse practitioner, and an HSS; designed to answer parents' questions about child development, identify family health risks, take advantage of "teachable moments."

Home visits by HSSs. Timed to reach parents and their children at predictable junctures in their developing relationships; inform parents about fostering infant's intellectual and emotional development; a minimum of 6 home visits are offered during a 3-year period.

Child development telephone information line. The HSS is available to answer questions about day-to-day worries and developmental concerns.

Child development and family health check-ups. Used to detect early signs of developmental or behavioral problems, identify family health risks, and provide teachable moments.

Written information materials for parents that emphasize prevention. Bulletins sent out before well-child visits; handouts on a variety of issues; Child Health and Development Record.

Parent groups. Facilitated by the HSS, these meetings of parents offer social support as well as interactive learning sessions and practice in problem solving.

Linkages to community resources. Practice provides information to parents about community resources and parent-to-parent connections.

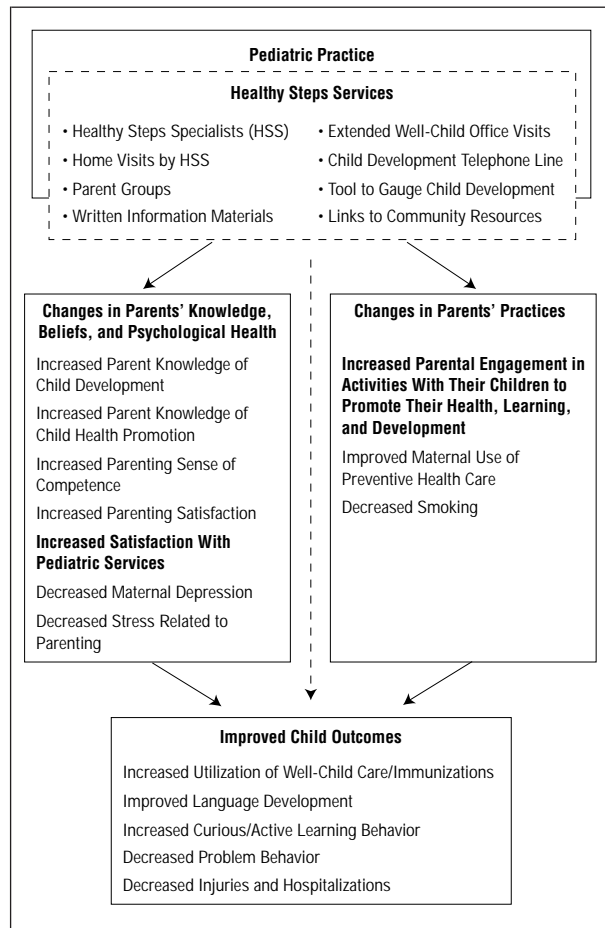


Figure 1. Conceptual framework for understanding the effect of Healthy Steps for Young Children Program on parents and children (domains evaluated at 2-4 months in boldfaced text).

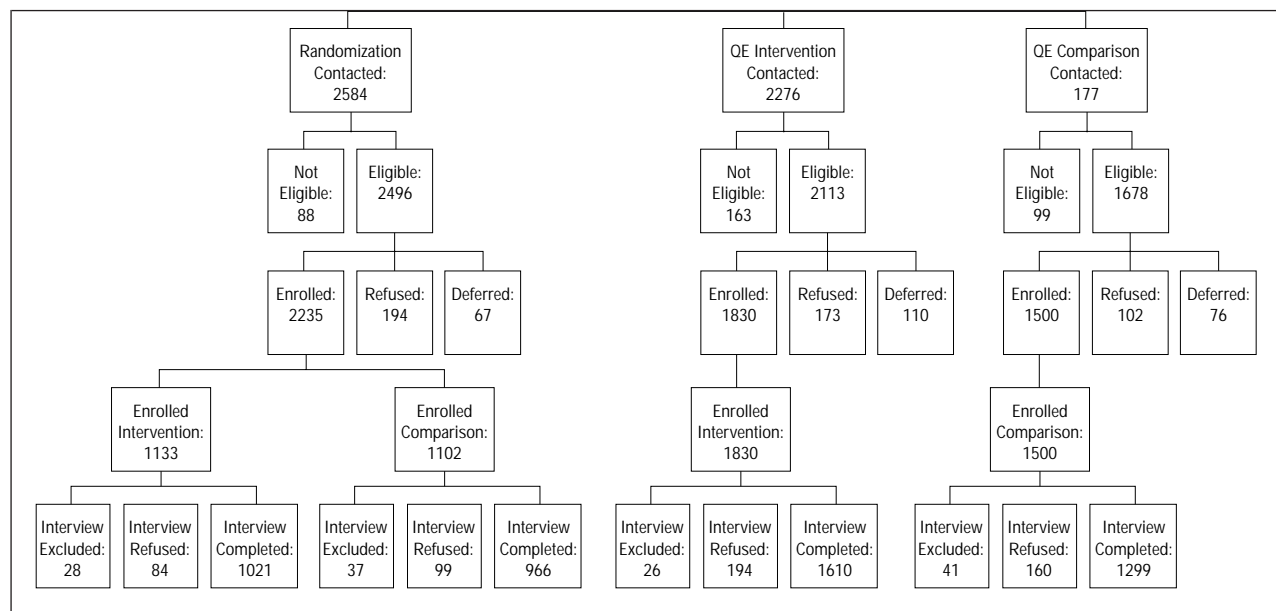


Figure 2. Healthy Steps for Young Children Program enrollment and 2- to 4-month family interview completion. QE indicates quasi-experimental; deferred, families who deferred participation in Healthy Steps and did not make a visit to the practice within 4 weeks of birth; interview excluded, families who completed the interview outside the age range of 8 to 18 weeks and families who did not make an office visit before the interview.

Table 2. Percentage Distribution of Mother's Demographic Characteristics, Insurance Status, and Baby's Birth Weight for Respondents and Nonrespondents in Intervention and Control Groups at Randomization and Quasi-Experimental Sites*

| Characteristic | Randomization Sites | | | | | | |
|--------------------------------|---------------------|-----------------|---------------------|----------------|-----------------|---------------------|---------------------|
| | Intervention | | | Control | | | Total (N = 2235) |
| | R (n = 1021) | NR (n = 112) | Total (n = 1133) | R (n = 966) | NR (n = 136) | Total (n = 1102) | |
| Mother's age, y†‡ | | | | | | | |
| <20 | 15.5 | 12.5 | 15.2 | 14.5 | 18.4 | 14.9 | 15.1 |
| 20-29 | 51.9 | 63.4 | 53.0 | 51.2 | 53.7 | 51.5 | 52.3 |
| ≥30 | 32.6 | 24.1 | 31.8 | 34.3 | 27.9 | 33.5 | 32.6 |
| Mother's education†‡§¶ | | | | | | | |
| 11 years or less | 14.5 | 27.7 | 15.8 | 15.3 | 21.5 | 16.1 | 16.0 |
| High school graduate | 30.5 | 33.9 | 30.8 | 27.8 | 39.3 | 29.2 | 30.0 |
| Some college/vocational school | 30.6 | 27.7 | 30.3 | 31.9 | 24.4 | 31.0 | 30.6 |
| College graduate | 24.4 | 10.7 | 23.1 | 25.0 | 14.8 | 23.7 | 23.4 |
| Mother's race†‡¶ | | | | | | | |
| White | 62.0 | 60.0 | 61.8 | 63.4 | 54.3 | 62.3 | 62.1 |
| African American | 24.9 | 26.4 | 25.0 | 23.8 | 27.1 | 24.2 | 24.6 |
| Asian/Native American | 4.4 | 1.8 | 4.1 | 3.9 | 6.2 | 4.2 | 4.1 |
| Other | 8.7 | 11.8 | 9.0 | 8.9 | 12.4 | 9.3 | 9.2 |
| Mother's ethnic origin†‡§¶ | | | | | | | |
| Hispanic | 17.6 | 26.8 | 18.5 | 18.4 | 34.6 | 20.4 | 19.5 |
| Mother's marital status†‡§¶ | | | | | | | |
| Married | 62.9 | 50.4 | 61.6 | 64.6 | 54.8 | 63.4 | 62.5 |
| Live birth order†§ | | | | | | | |
| First | 47.3 | 36.6 | 46.3 | 45.9 | 40.4 | 45.2 | 46.7 |
| Insurance during pregnancy†§¶ | | | | | | | |
| Medicaid | 35.0 | 47.8 | 36.3 | 34.4 | 48.2 | 36.1 | 36.2 |
| Baby's birth weight | | | | | | | |
| <2500 g | 7.5 | 11.6 | 7.9 | 7.2 | 6.7 | 7.1 | 7.5 |

*All values are given as percentages. R indicates respondents; NR, nonrespondents.

†Significant difference ($P \leq .05$) between respondents in intervention and comparison groups at quasi-experimental sites.

‡Significant difference ($P \leq .05$) between respondents and nonrespondents in intervention group at quasi-experimental sites.

§Significant difference ($P \leq .05$) between respondents and nonrespondents in intervention group at randomization sites.

¶Significant difference ($P \leq .05$) between respondents and nonrespondents in comparison group at randomization sites.

¶Significant difference ($P \leq .05$) between respondents and nonrespondents in comparison group at quasi-experimental sites.

centage of intervention than control families at both RND and QE sites reported receiving these services promoted by the HS program (**Table 3**). Close to 74% of intervention families vs 13% to 24% of control families reported receiving 4 or more HS services. Moreover, among the intervention families, 2.7% received 0 to 1 service; 23.3%, 2 to 3 services; 26.1%, 4 services; and 48.0%, 5 to 7 services. When examined as individual services and topics, intervention families were more likely than control families to report receiving each component of care (**Table 4**). Seventy-six percent of intervention families vs 32% to 35% of control families reported receipt of home visits from the practice or another source (Table 3). Nearly twice as many intervention families as control families discussed all 5 infant development topics.

Table 5 gives the hierarchical analysis results for receipt of HS services. The odds of receiving 4 or more HS services was 18 times greater among intervention families than control families at RND sites and 26 times greater for intervention families at the QE sites. The odds ratios for home visits from the practice or another agency for intervention families were close to 16 at RND sites and nearly 8 at QE sites. They were between 2 and 3 for intervention families for talking to some-

one at the practice about the 5 developmentally related topics.

PERCEPTIONS OF CARE

Parents were notably pleased with their infant's care, regardless of whether they participated in HS (**Table 6**). Close to 60% of families reported someone going out of their way to help them, although the percentage was greater for intervention than for control families at both RND and QE sites. Across groups, fewer than 8% of families reported dissatisfaction with either help or listening from the physician and/or nurse practitioner at their infant's pediatric practice, although intervention families were less dissatisfied than control families.

When adjustment was made for baseline characteristics and correlation within sites, intervention families had a 2 times greater odds as control families of reporting that someone at the practice went out of their way to help them (**Table 7**). The hierarchical analysis findings also showed decreased dissatisfaction with care among families participating in the intervention. For each of the perceptions of care variables, HS effects at the RND sites were similar to those at the QE sites, although they

| Quasi-Experimental Sites | | | | | | | |
|--------------------------|-----------------|---------------------|-----------------|-----------------|---------------------|---------------------|--|
| Intervention | | | Control | | | Total (N = 3330) | |
| R (n = 1610) | NR (n = 220) | Total (n = 1830) | R (n = 1299) | NR (n = 201) | Total (n = 1500) | | |
| 12.1 | 18.4 | 12.8 | 12.1 | 12.9 | 12.2 | 12.6 | |
| 46.3 | 48.6 | 46.6 | 54.2 | 56.7 | 54.5 | 50.2 | |
| 41.6 | 33.0 | 40.6 | 33.7 | 30.4 | 33.2 | 37.3 | |
| 14.7 | 34.9 | 17.1 | 19.7 | 34.3 | 21.6 | 19.2 | |
| 22.1 | 23.4 | 22.2 | 27.2 | 26.8 | 27.1 | 24.4 | |
| 27.0 | 21.6 | 26.4 | 29.0 | 28.8 | 29.0 | 27.6 | |
| 36.2 | 20.2 | 34.2 | 24.2 | 10.1 | 22.3 | 28.8 | |
| 61.8 | 44.0 | 59.6 | 51.0 | 41.2 | 49.7 | 55.2 | |
| 21.7 | 25.7 | 22.2 | 26.9 | 26.6 | 26.9 | 24.3 | |
| 5.3 | 7.3 | 5.6 | 3.4 | 5.0 | 3.6 | 4.7 | |
| 11.2 | 22.9 | 12.6 | 18.7 | 27.1 | 19.8 | 15.8 | |
| 16.8 | 25.4 | 17.9 | 23.3 | 29.4 | 24.1 | 20.7 | |
| 70.0 | 50.7 | 67.7 | 63.0 | 59.9 | 62.6 | 65.4 | |
| 47.3 | 39.1 | 46.3 | 44.7 | 48.8 | 45.3 | 45.8 | |
| 27.9 | 45.5 | 30.0 | 26.2 | 35.0 | 27.3 | 28.8 | |
| 6.3 | 7.0 | 6.4 | 5.5 | 6.1 | 5.6 | 6.0 | |

Table 3. Receipt of Services by Intervention and Control Families at Randomization and Quasi-Experimental Sites*

| Variable | Randomization | | | Quasi-Experimental | | | All Total (N = 4896) |
|--|----------------------------|----------------------|---------------------|----------------------------|-----------------------|---------------------|-------------------------|
| | Intervention (n = 1021) | Control (n = 966) | Total (n = 1987) | Intervention (n = 1610) | Control (n = 1299) | Total (n = 2909) | |
| Four or more HS services (excluding home visiting)† | 75.1 | 23.7 | 50.3‡ | 73.4 | 13.0 | 46.5‡ | 48.0§ |
| Receipt of any home visit from practice or another source | 76.4 | 32.2 | 54.9‡ | 76.3 | 34.9 | 57.8‡ | 56.6§ |
| All 5 topics covered by provider | 44.3 | 27.9 | 36.3‡ | 43.0 | 21.3 | 33.2‡ | 34.5 |

*Up to 4% of the data may be missing for variables. All values are given as percentages.

†HS (Healthy Steps for Young Children Program) services: parent support groups, office visits about baby's development, office visits about taking care of the baby, telephone number to discuss baby's development, letter to prepare for office visits, brochures about baby's development, special health booklet.

‡P ≤ .001.

§P ≤ .05.

||Topics discussed: calming baby, sleep position, routines, solid foods, and car seat.

generally were somewhat stronger at the QE sites than at RND sites.

Intervention parents overwhelmingly were satisfied with the care provided by the HSS, with more than 40% specifically identifying that the HSS went out of his/her way for them. (Control families were not asked these questions because they did not receive care from the HSS.)

Most intervention parents (96.4%) indicated that the HSS treated them with respect, listened to them, and answered their questions. A similar percentage (96.7%) reported that the HSS promoted ideas and activities related to their child's health and development. Finally, 91.3% agreed that the HSS helped them with their feelings related to parenting.

Table 4. Receipt of Individual Services and Topics Discussed Among Intervention and Control Families at Randomization and Quasi-Experimental Sites*

| Variable | Randomization | | | Quasi-Experimental | | | Total (N = 4896) |
|---|-------------------------|-------------------|------------------|-------------------------|--------------------|-------------------|------------------|
| | Intervention (n = 1021) | Control (n = 966) | Total (n = 1987) | Intervention (n = 1610) | Control (n = 1299) | Total† (n = 2909) | |
| HS services | | | | | | | |
| Brochure about baby's development | 83.8 | 62.2 | 73.3† | 89.7 | 57.5 | 75.4 | 74.5 |
| Special health booklet | 88.7 | 53.2 | 71.5† | 88.9 | 58.4 | 75.3 | 73.7 |
| Office visit about care of baby | 45.5 | 7.5 | 26.9† | 44.0 | 4.7 | 26.4 | 26.6 |
| Office visit about baby's development | 47.7 | 5.9 | 27.4† | 48.3 | 4.2 | 28.6 | 28.1 |
| Letter before well baby visits | 72.0 | 40.6 | 56.7† | 61.5 | 16.8 | 41.5 | 47.7 |
| Telephone number to call about baby's development | 95.1 | 89.5 | 92.4† | 93.7 | 81.5 | 88.3 | 90.0 |
| Parent's group | 10.6 | 7.3 | 9.0‡ | 14.1 | 5.7 | 10.3 | 9.8 |
| Topics discussed§ | | | | | | | |
| Calming baby | 64.8 | 45.4 | 55.3† | 67.7 | 33.7 | 52.4 | 53.6 |
| Sleep position | 87.9 | 76.5 | 82.4† | 86.9 | 63.9 | 76.6 | 78.9 |
| Routines | 73.9 | 56.9 | 65.6† | 71.0 | 51.2 | 62.2 | 63.6 |
| Solid foods | 71.0 | 61.3 | 66.3† | 66.8 | 57.6 | 62.7 | 64.1 |
| Car seats | 94.6 | 85.0 | 90.0† | 89.9 | 76.6 | 84.0 | 86.4 |

*All values are given as percentages. Up to 3% of the data may be missing for variables.

†P < .001.

‡P ≤ .05.

§Topics discussed: calming baby, sleep position, routines, solid foods, and car seat.

Table 5. Receipt of Services by Families at Randomization and Quasi-Experimental Sites Between 2 and 4 Months Postpartum

| Variable | OR (95% CI)* | |
|---|----------------------------|----------------------------|
| | Randomization | Quasi-Experimental |
| Four or more HS services (excluding home visiting)† | 11.42 (9.08-14.38) | 21.69 (17.41-27.03) |
| Receipt of any home visit from practice or another source | 15.66 (11.56-21.19) | 7.79 (6.43-9.43) |
| All 5 topics covered by provider‡ | 2.07 (1.70-2.52) | 3.20 (2.68-3.83) |

*Adjusted odds ratio (OR) and 95% confidence interval (CI) analyses account for the fact that subjects within sites tend to be more similar to one another than they are to families at other sites. They further control for site of enrollment (hospital or office), age of the infant at interview, and potential differences in the baseline characteristics of the mother (age, education, race/ethnicity, employment), father (employment), family (marital status, father in household, number of siblings, owned own home), and baby (low birth weight, source of payment for care). Significant results are in boldface.

†HS (Healthy Steps for Young Children Program) services: parent support groups, office visits about baby's development, office visits about taking care of the baby, telephone number to discuss baby's development, letter to prepare for office visits, brochures about baby's development, special health booklet.

‡Topics discussed: calming baby, sleep position, routines, solid foods, and car seat.

PARENTAL PRACTICES THAT PROMOTE CHILD HEALTH AND DEVELOPMENT

Parent practices examined included safety practices, feeding practices, and practices that promote the infant's development. Eleven percent of intervention families and 14% of control families reported use of the prone sleep position at both nap time and bedtime. These differ-

ences between intervention and control groups were significant for parents at both RND and QE sites (Table 6). Other safety practices such as the use of car seats and lowering the water temperature at home were examined, but these practices did not differ for intervention and control families as most families followed the safety practices.

Among women who initiated breastfeeding, differences in the proportions of women continuing breastfeeding at 2 to 4 months postpartum were significant only at the QE sites (Table 6). Regarding other feeding practices, a smaller proportion of intervention mothers at QE sites gave their infant cereal or water by 2 to 4 months of age than did control mothers. The effect of HS was in the same direction at RND sites but was small and not significant.

A higher percentage of intervention parents at both QE and RND sites showed picture books to their infants at least once a day. For other parenting practices that may promote infant development but were not emphasized by the HS program, there were no differences in the use of routines, and a higher percentage of parents played with their baby once a day or more at the QE sites.

The results of the hierarchical analysis indicate that HS may have influenced the position in which the parents placed their baby to sleep (Table 7). The odds of placing their baby to sleep on the stomach was 25% lower among intervention families at both QE and RND sites than among control families. A similar reduction in the percentage of intervention parents who gave their infants water was noted at both QE and RND sites. Although intervention mothers at the QE sites were significantly more likely than control mothers to continue to breastfeed, the HS effect was not significant in the adjusted analysis, suggesting that it is likely a result of ini-

Table 6. Perceptions of Care and Practices Among Intervention and Control Families at Randomization and Quasi-Experimental Sites*

| Variable† | Randomization | | | Quasi-Experimental | | | All Total (N = 4896) |
|---|-------------------------|-------------------|------------------|-------------------------|--------------------|------------------|----------------------|
| | Intervention (n = 1021) | Control (n = 966) | Total (n = 1987) | Intervention (n = 1610) | Control (n = 1299) | Total (n = 2909) | |
| Perceptions of care | | | | | | | |
| Someone went out of the way to help | 66.4 | 48.9 | 57.9‡ | 67.6 | 49.6 | 59.6‡ | 58.9 |
| Dissatisfied with help§ from physician and/or nurse practitioner | 4.8 | 7.9 | 6.3 | 4.4 | 10.5 | 7.1‡ | 6.8 |
| Dissatisfied with listening¶ from physician and/or nurse practitioner | 4.8 | 5.7 | 5.2 | 4.9 | 7.7 | 6.2 | 5.8 |
| Safety practices | | | | | | | |
| Parent used wrong sleep position at both nap time and bedtime | 11.4 | 14.4 | 12.8# | 10.6 | 13.9 | 12.1 | 12.4 |
| Parent placed car seat in back seat | 90.3 | 89.6 | 89.9 | 91.3 | 92.1 | 91.7 | 91.0 |
| Parent lowered water temperature on hot water heater | 30.8 | 32.6 | 31.7 | 29.4 | 27.5 | 28.5 | 29.8 |
| Feeding practices | | | | | | | |
| Mother is continuing to breastfeed** | 55.6 | 54.0 | 54.8 | 57.1 | 51.5 | 54.7 | 54.7 |
| Baby has been given cereal | 30.2 | 32.2 | 31.2 | 23.9 | 29.5 | 26.4‡ | 28.3 |
| Baby has been given water | 37.5 | 40.7 | 39.1 | 38.4 | 50.7 | 43.9‡ | 41.9 |
| Practices that promote development | | | | | | | |
| Parent showed picture books ≥1 time/day | 28.0 | 26.4 | 27.3# | 30.0 | 23.1 | 27.0‡ | 27.1 |
| Parent followed 2 or more routines at bedtime, nap time, or mealtime | 94.4 | 93.4 | 93.9 | 94.0 | 95.4 | 94.6 | 94.3 |
| Parent played with baby ≥1 time/day | 93.2 | 93.1 | 93.2 | 91.8 | 87.1 | 89.7‡ | 91.1 |

*All values are given as percentages.

†Up to 6% of the data may be missing for variables.

‡P ≤ .001.

§Help indicates points out what parents do well; acts like parents understand information; make parents feel like they are doing a good job; suggests things to do with baby in daily life; understands that parents know their baby best; helps parents get needed information; gives parents advice to use at home; gives parents new ideas to do with baby.

||P ≤ .01.

¶Listening indicates time to answer questions; understands main reason for visit; doesn't have other things on mind; gives parents a chance to ask questions; thinks carefully about questions; not in a rush; encourages questions.

#P ≤ .05.

**Percentages include mothers who initiated breastfeeding. Randomization: intervention, n = 729; control, n = 683; total, n = 1412; quasi-experimental: intervention, n = 1297; control, n = 971; total, n = 2268; and total, n = 3680.

tial baseline differences between intervention and comparison families. In adjusted analyses, HS had a modest positive effect on showing picture books to babies, feeding the baby cereal, following routines, and playing with the baby only at the QE sites.

COMMENT

This report provides the first opportunity to evaluate the implementation and effects of the HS intervention. Our study results indicate that developmental services promoted by HS clearly were being delivered to families even when infants were 2 to 4 months of age. Differences between intervention and control families at both the RND and QE sites were large for most services specifically implemented as part of the program. These findings are important for 2 reasons. First, they clearly document a different array of services provided to intervention families—services which, based on prior surveys, parents specifically demand for their young children. Second, many evaluations of early parenting interventions have demonstrated substantial deviations from the intended program and significantly lower levels of involvement than reported in this article by parents involved in HS.¹⁹

Families overwhelmingly were pleased with their baby's care. This finding is not surprising as the sites, including comparison sites, were chosen selectively as ex-

cellent pediatric practices. The effects of HS on 2 of the 3 satisfaction variables were weaker at the RND sites compared with the QE sites. This finding may reflect the fact that the same physicians and staff were providing services to both intervention and control families at the RND sites, while at the QE sites, intervention and control families received services from different providers. Other possible explanations for the stronger effects at QE sites may include better integration of the HSS into QE practices or unobserved differences between QE intervention and comparison sites, leading to stronger effects.

One parental practice that may have been influenced by HS was the position in which the baby was placed to sleep. Intervention families were somewhat less likely to put their baby to sleep on the stomach, the incorrect position, than were control families. Despite major media campaigns throughout the United States, there remains considerable room to improve parenting practices regarding infant sleep position.¹⁴ This finding is particularly hopeful in that HS seems to have been successful at both RND and QE sites alike in promoting change in this behavior.

The results suggest that the program did not affect the percentage of women continuing to breastfeed during the first few months. It may be that the HSSs' contacts with families came too late to influence mothers' decisions regarding continuation of breastfeeding. In ad-

Table 7. Families' Perceptions of Care and Parenting Practices at Randomization and Quasi-Experimental Sites Between 2 and 4 Months Postpartum

| Variable | OR (95% CI)* | |
|---|-------------------------|-------------------------|
| | Randomization | Quasi-Experimental |
| Perceptions of care | | |
| Someone went out of way to help | 2.21 (1.82-2.68) | 2.15 (1.83-2.52) |
| Dissatisfied with help† from physician and/or nurse practitioner | 0.59 (0.41-0.91) | 0.34 (0.25-0.47) |
| Dissatisfied with listening‡ from physician and/or nurse practitioner | 0.86 (0.58-1.28) | 0.59 (0.43-0.81) |
| Safety practices | | |
| Mother used wrong position at bedtime and nap time | 0.76 (0.57-0.99) | 0.76 (0.60-0.96) |
| Parent placed car seat in back seat | 1.08 (0.80-1.46) | 0.85 (0.64-1.13) |
| Parent lowered temperature of hot water heater | 0.93 (0.76-1.13) | 0.96 (0.80-1.15) |
| Feeding practices | | |
| Mother is continuing to breastfeed | 1.15 (0.91-1.45) | 1.15 (0.96-1.39) |
| Baby has been given cereal | 0.88 (0.72-1.08) | 0.80 (0.67-0.96) |
| Baby has been given water | 0.80 (0.65-0.98) | 0.75 (0.63-0.88) |
| Practices that promote development | | |
| Mother showed picture books to baby ≥1 time/day | 1.08 (0.88-1.32) | 1.33 (1.12-1.58) |
| Parent followed 2 or more routines at bedtime, nap time, or mealtime | 1.27 (0.87-1.84) | 0.71 (0.51-0.99) |
| Parent played with baby ≥1 time/day | 1.02 (0.72-1.45) | 1.37 (1.04-1.80) |

*Analyses account for the fact that subjects within sites tend to be more similar to one another than they are to families at other sites. They further control for site of enrollment (hospital or office), age of the infant at interview, and potential differences in the baseline characteristics of the mother (age, education, race/ethnicity, employment), father (employment), family (marital status, father in household, number of siblings, owned own home), and baby (low birth weight, source of payment for care). Significant results are in boldface.

†Help indicates points out what parents do well; acts like parents understand information; makes parents feel like they are doing a good job; suggests things to do with baby in daily life; understands that parents know their baby best; helps parents get needed information; gives parents advice to use at home; gives parents new ideas to do with baby.

‡Listening indicates time to answer questions; understands main reason for visit; does not have other things on mind; gives parents a chance to ask questions; thinks carefully about questions; not in a rush; encourages questions.

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dition to maternal sociodemographic and employment factors measured in our study, prenatal and postnatal breastfeeding education and support programs and health system factors have been shown to positively influence continuation rates.^{15,20,21} Few of the HSSs were specifically trained to provide these services. It also is possible that differences in breastfeeding rates may be seen for women who continue breastfeeding beyond the first few months. Similarly, while there were differences between groups in the percentage of parents who had showed picture books to their baby or gave their infants cereal during the first 2 to 4 months of life, these differences were found only at the QE sites; they likely reflect unobserved factors not related to the program. Hierarchical analyses, however, did identify reduction in parents giving their babies water at both RND and QE sites; future analyses of HSS contact logs will reveal whether intervention families were more likely to discuss related feeding practices than control families.

Our findings are tempered by several limitations. First, the pediatric practices were selected, in part, because they were thought to deliver excellent pediatric services. Our results may underestimate the impact of HS to the degree that such an intervention may improve pediatric care to an even greater extent at sites not providing as high quality care as those participating in the evaluation. On the other hand, our results also may overestimate the impact that HS might have in other practices if they are unable to incorporate new providers and services into their existing practice structures owing to limited interest of clinicians and/or limited administrative expertise.

Second, the results were observed when families had no more than 4 months' experience with the program. This suggests that the level of services received by families is quite intensive. Yet families may be less likely to report such positive experiences with care as their children's ages and their interaction with the HSS is reduced. Alternatively, because their relationship with the HSS is well established early, findings may persist and become even stronger at older ages.

Third, use of a telephone interview resulted in an advantaged sample, as indicated by education, race, insurance coverage, and work status. Whether disproportionate inclusion of advantaged families overestimates or underestimates the effect of HS is unclear. More advantaged families may preferentially choose to receive services to promote their children's development, or they may believe that such services are not necessary. Future subgroup analyses by income will address issues of preferential uptake and impact.

Among recommendations of the FOPE II Task Force was the need to "collaborate with families and other child health professionals to identify and address challenges and barriers to the health and well-being"^{8(p207)} of children. It is likely that meeting the needs of parents regarding their children's early development will require modification of existing clinical practices. In the current environment, it is unlikely that physicians will be able to extend the length of visits or provide more direct services to families without relying on other professional staff. The HS represents a new multidisciplinary approach to meet the needs of families with young children. Whether the introduction of a

new child health professional into routine pediatric care provides added value to children and families will depend in part on whether the benefits are greater than, equal to, or less than the costs.

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