

The MOM Program: Home Visiting in Partnership With Pediatric Care

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ABBREVIATIONS

CI—confidence interval
OR—odds ratio

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abstract

OBJECTIVE: Home visiting programs aim to improve child health, reduce developmental risks, and enhance use of community resources. How these programs can work in collaboration with pediatric practice has been understudied. The MOM Program was a randomized controlled trial of an innovative home visiting program to serve urban, low-income children. Program aims included promoting child health through regular pediatric visits and enhancing school readiness through developmental screenings and referrals to early intervention. The objective of this report was to describe the partnership with the pediatric community and selected program results.

METHODS: A total of 302 mothers were enrolled in the program at the time of children's birth. Eligible infants were full-term, without identified neurologic/genetic disorder or ICU intervention, and from high-poverty zip codes. A total of 152 were randomized to the home visiting program, with 9 visits over 3 years, scheduled before well-child visits; 150 were randomized to the control condition with no home visits. Medical records and case notes provided information on pediatric appointments kept and program outcomes.

RESULTS: Eighty-nine percent of both groups were retained throughout the 3-year program; 86% of the home-visited group received at least 7 of the 9 planned home visits. Home-visited mothers were >10 times as likely to keep pediatric appointments, compared with those not visited. Barriers to service access were varied, and theory-driven approaches were taken to address these.

CONCLUSIONS: Home visiting programs can provide important partnerships with pediatric health care providers. Integrating home visiting services with pediatric care can enhance child health, and this subject warrants expansion. *Pediatrics* 2013;132:S153–S159

Home visiting programs are widely recognized as important for promoting healthy outcomes in mothers and children. Targeted for mothers who are considered “at risk” for reasons of their age, income, or identified psychosocial issues, home visiting programs have reported success in improving child and maternal health outcomes, delaying subsequent pregnancies, improving rates of maternal employment, and raising subsequent family income.^{1–5}

Home visiting programs differ greatly in their aims, scope, and types of services and resources they provide to parents; they also differ in whom they target.^{2,6} Some programs aim to improve the physical and mental health of mothers, such as increasing time to subsequent pregnancies and improving parenting skills, whereas others address child health and development or attempt to reduce child abuse. Services in these programs may include a structured health or parenting protocol during home visits, emotional support and assistance with referrals, or accompanying mothers and children to visits with service providers. Accordingly, programs may provide parents with social support, linkages to resources, literacy education, parenting coaches, role models, or expert help in maternal and child health and well-being.² Those targeted by home visiting programs include teen mothers,^{7,8} first-time mothers,^{3–5} mothers at risk for child abuse,⁹ or mothers with a variety of indicators of “risk” status.^{10,11} These programs are generally intensive in terms of number of planned visits and broad in the scope of intended program outcomes.

Although embracing pediatric health outcomes, home visiting programs have generally existed in parallel, rather than in partnership, with outreach efforts launched from pediatric practices. However, home visiting programs can target child health outcomes closely, and collaboration with child

health services may be part of the intervention process. Representative programs include a 4-visit, randomized controlled trial over 6 months to promote breastfeeding and mothers’ management of infant health problems¹²; a single home visit public health initiative to encourage mothers to enroll in the Supplemental Nutrition Program for Women, Infants, and Children¹³; an 8-session program (4 prenatal visits and 4 postnatal visits spaced 2 weeks apart) over 2 months to promote maternal health¹⁴; and a 5-visit program over 12 months to identify infant health problems and promote receipt of immunizations.¹⁵

Another model for implementing a home visiting program in partnership with pediatric care is that offered by the MOM Program (MOM is not an acronym but simply the name of the program). As reported earlier,^{16,17} the MOM Program is an innovative home visiting program designed to serve urban, low-income mothers and children, evaluated through a randomized controlled trial. The primary aim of this trial was to demonstrate whether participation in this home visiting program led to differential changes in referral to early intervention and receipt of early intervention services. Earlier reports have described that those children whose mothers were randomized to receive the home visiting intervention compared with those in the control group, which did not receive home visits, were significantly more likely to be referred to and receive early intervention. These referrals to early intervention occurred in the context of children attending well-child visits regularly. Attending well-child visits was thus a key component of the intervention for those who had been randomized to receive home visits. The current report presents information on attendance for well-child visits for those in the intervention arm of the study and how this action relates to the receipt of home visits.

Other key features of the MOM Program include: 9 home visits, each occurring just before a scheduled pediatric well-child visit and including information designed to increase mothers’ understanding of the purpose of the visit and to formulate any questions about their child; use of a team of home visitors rather than a single visitor per family; and weekly supervision meetings to monitor the progress of all children enrolled in the program. The final home visit occurred at infant age 33 months. Outcome assessment occurred at age 36 months. Other program elements include structured, model-driven checklists for each visit and use of regular reminder calls before home visits and before and after the scheduled well-child visits. Detailed records of attempts to contact mothers are kept by staff members, and these efforts are also discussed in the weekly staff meeting. Home visitors included both lay workers and pediatric nurse practitioners. The entire home visiting team and supervisory staff participate in troubleshooting regarding making successful contacts with the participant mothers. All activities are prescribed in the program manual.

The current report describes program retention and engagement, and the extent that completed home visits for those in the intervention arm of the MOM Program are related to completed appointments for pediatric primary care to illustrate partnership with the pediatric community.

METHODS

The Human Subjects Committee of the Institutional Review Board of The Children’s Hospital of Philadelphia approved and oversaw the conduct of this study.

Participants

To be eligible for the study, mothers had to live in predetermined ZIP codes in a large northeastern city with high

poverty rates and had to have given birth to a singleton healthy infant (weight ≥ 2500 g; no identified genetic or developmental disorders). Recruitment was conducted in the postpartum unit of an urban academic hospital between July 2001 and January 2002. Participants were randomly assigned to either the intervention ($n = 152$) or control ($n = 150$) conditions. The current report uses data only on the 152 intervention group mothers, who are described in Table 1. These were largely high-school educated (mean \pm SD years of education: 12.0 ± 1.9), African American (94%), and in their early twenties (mean age: 23.1 ± 5.6 years). Of the children, 54% were female and 44% were first births. Most participants (74%) reported having ≥ 10 prenatal visits. As described earlier,^{16,17} these mothers did not differ significantly from those assigned to the control group.

Measures

Demographic Characteristics

Demographic characteristics were assessed through a series of questions regarding mothers' age, race/ethnicity,

child gender, level of education, employment status, receipt of public services, and other social indicators. Members of the study team collected demographic information from the mothers through interviews at study enrollment.

Program Retention

Mothers who remained in the program from initial enrollment for 36 months were considered "retained" in the program, regardless of the number of home visits that were completed. Only those mothers who asked to be taken out of the program were discontinued.

Target Program Dosage

Similar to the approaches taken by Heinrichs¹⁸ and McFarlane et al,¹⁹ the target home visit dosage in the MOM Program was set at, minimally, 75% completion of all planned home visits (eg, completion of at least 7 of the 9 planned home visits in the first 33 months of the child's life).

Program Implementation

Program implementation was evaluated by using staff records of all attempts to

contact participant mothers, including telephone calls to set up a home visit, home visits, telephone calls to remind mothers of upcoming primary care visits, and follow-up calls to determine if mothers had kept the scheduled primary care visit or followed through with recommendations. These program records included notation of which staff member completed each activity as well as the number of 5-minute time units spent on each activity. Program evaluation records were kept through the duration of the study.

Procedure

To assess program involvement, retention, dosage, and linkage to care, 2 trained research assistants examined participant charts for the intervention group mothers and extracted and coded the aforementioned program implementation variables. Because mothers who had been assigned to the control condition did not receive any home visits, there are no comparable data on program implementation for those individuals. Two checks for interrater reliability were conducted. For the first 10 charts, research assistants separately extracted and coded program implementation variables. Data were examined for consistency, and 95.3% agreement was attained. Discrepancies between the 2 coders were discussed, and necessary clarifications to coding categories were agreed on. In a second interrater reliability review, 1 research assistant independently coded a random 20% of all charts coded by the second research assistant; interrater reliability exceeded 95% agreement. Throughout the study, all data were double-entered and checked for accuracy.

Data on linkage to primary pediatric care were available only for the intervention, home-visited mothers. Because part of the home visiting intervention involved calling mothers to

TABLE 1 Comparisons of Participants Retained and Not Retained in the MOM Program Through Age 33 Months ($N = 152$)

Baseline Variable	Retained ($n = 136$)	Not Retained ($n = 16$)	<i>P</i>
Maternal age, y	23.3 ± 5.9	20.4 ± 4.2	.06
Maternal level of education, y	11.9 ± 1.9	11.9 ± 1.8	.97
No. of other children	1.0 ± 1.3	0.5 ± 0.6	.20
No. of months at residence	62.2 ± 76.2	89.3 ± 78.5	.06
No. of months pregnant when prenatal care started	2.9 ± 2.0	2.8 ± 1.2	.63
Infant gestational age, wk	39.4 ± 1.6	39.3 ± 1.3	.82
Infant birth weight, g	3303 ± 466	3246 ± 367	.64
No. of prenatal visits			.64
0	3 (2.0)	0 (0)	
1–4	10 (7.4)	0 (0)	
5–9	17 (12.5)	2 (10.5)	
≥ 10	106 (77.9)	14 (87.5)	
Pregnancy problems ^a	41 (30.2)	2 (12.5)	.14
Child gender			.19
Female	70 (51.5)	11 (68.8)	
Male	66 (48.5)	5 (31.3)	
Cesarean delivery	26 (19.1)	5 (31.3)	.25
No. (%) other children in early intervention	9 (6.6)	0 (0)	.52
No. (%) other children with learning problems	7 (5.2)	0 (0)	.54

Data are presented as mean \pm SD or n (%).

^a Pregnancy problems include hypertension, gestational diabetes, infection, passed out, premature labor, delivery problem, intrauterine growth retardation/inadequate fluid, and other.

determine if they had kept their primary care appointments, it was necessary to avoid calling mothers assigned to the control group to obtain similar information (to avoid contaminating the control group with additional encouragement to keep well-child visits). Data on whether mothers had kept scheduled appointments were collected only through maternal report on whether the visit had occurred and, therefore, only from mothers in the intervention group and not those in the control group. The primary care providers for children in the MOM Program were scattered throughout the city, and MOM Program staff were not equipped to obtain independent verification of attendance at each scheduled visit. Immunization data collected from providers at the completion of the study permitted verification of completed visits, although information on incomplete visits was collected only from the mothers in the intervention, home-visited group.

Statistical Analysis

The number of home visits and telephone contacts made over the course of the program and the time needed to complete contacts were tabulated and summarized by using standard descriptive statistics. Logistic regression was used to determine how program characteristics (ie, staff background, amount of time expended for each participating mother, number of telephone calls and home visits), and demographic characteristics (ie, mother's age, first-time mom status, child gender) predicted program dosage. Model fitting procedures were conducted by first testing single covariates with the use of simple logistic regression models and then using backward selection procedures in which all single statistically significant covariate terms ($P < .10$) were included as candidates in a multiple logistic regression model. Nonsignificant terms were dropped from consideration iteratively based on overall

fit statistics of relevant nested models. The method of generalized estimating equations for binary outcome was then used to evaluate how the home visits (complete versus incomplete) were related to primary care physician visits (complete versus incomplete). The odds ratio (OR) of having completed primary care physician visits for previous completed home visits compared with previous incomplete home visits was also determined.

RESULTS

Program Involvement, Retention, and Program Dosage

Results on maternal retention are presented in Table 1. Of the 302 mothers originally enrolled in the MOM Program, 89.7% (271) completed the entire 33-month program, including 136 (89%) of those in the intervention (home visiting) group. Mothers who were retained in the intervention arm of the MOM Program for 33 months were found to differ very little in demographic characteristics and other variables from those who were also

enrolled at baseline and assigned to the intervention arm of the study but were not retained until the end of the program.

Program dosage results for those mothers receiving home visits are presented in Table 2. Mothers who received the target dosage (ie, having completed at least 7 of the 9 planned home visits; $n = 130$ [86%]) were compared with those who did not receive the target dosage ($n = 22$ [14%]) to determine if systematic differences in baseline maternal characteristics could be identified. Mothers who received the target program dosage were found to be slightly older than those who failed to receive the target dosage (23.3 vs 21.3 years; $P = .05$) and were more likely to have male children (93.3% of mothers of male children received full program dosage; $P = .02$).

Table 3 presents home visit completion rates, as well as information on incomplete visits, cumulative dropouts, and missing participants. High rates of completed home visits were maintained throughout the intervention,

TABLE 2 Comparisons of Participants Who Did and Did Not Receive Target Program Dosage in Intervention Arm of the MOM Program Through Age 33 Months ($N = 152$)

Baseline Variable	Engaged ($n = 130$)	Nonengaged ($n = 22$)	<i>P</i>
Maternal age, y	23.3 ± 6.0	21.3 ± 4.1	.05
Maternal level of education, y	11.9 ± 1.9	11.6 ± 1.7	.35
No. of other children	1.0 ± 1.2	0.9 ± 1.1	.75
No. of months at residence	63.3 ± 75.4	75.5 ± 84.4	.49
No. of months pregnant when prenatal care started	2.9 ± 2.0	2.8 ± 1.3	.61
Infant gestational age, wk	39.4 ± 1.6	39.5 ± 1.2	.84
Infant birth weight, g	3301 ± 478	3272 ± 311	.72
No. of prenatal visits			.75
0	3 (2.3)	0 (0)	
1–4	10 (7.7)	0 (0)	
5–9	16 (12.3)	3 (13.6)	
≥10	101 (77.7)	19 (86.4)	
Pregnancy problems ^a	40 (30.8)	3 (13.6)	.13
Child gender			.02
Female	64 (49.2)	17 (77.3)	
Male	66 (50.8)	5 (22.7)	
Cesarean delivery	29 (22.3)	2 (9.1)	.25
No. other children in early intervention	9 (6.9)	0 (0)	.57
No. other children with learning problems	7 (5.4)	0 (0)	.73

Data are presented as mean ± SD or *n* (%). "Target program dosage" was defined as having completed at least 7 of the 9 planned home visits.

^a Pregnancy problems include hypertension, gestational diabetes, infection, passed out, premature labor, delivery problem, intrauterine growth retardation/inadequate fluid, and other.

with findings ranging from 82% (at age 4 months) to 91% (at age 6 months). Relatively few mothers dropped out of the home visiting program, and they did so at fairly even rates throughout the duration of the program.

Program Staff and Activity

During the 3-year program, there was no turnover in home visiting staff. No statistically significant differences were found in measures of staff activity for those mothers who did and did not receive target program dosage. Mothers who received the target program dosage received 2.25 ± 0.84 follow-up calls per month compared with 2.19 ± 1.26 follow-up calls for mothers who did not receive the full program dosage. The actual numbers of home visits per month were similar: 0.51 ± 0.13 home visits for those receiving full program dosage; 0.60 ± 0.32 home visits for those not receiving the full dosage. Likewise, no statistically significant differences

were found between the total amount of time staff spent with each family per month, averaging 13.5 ± 2.05 minutes for those receiving full dosage, and 12.1 ± 5.1 minutes for those who did not receive full dosage.

Program Results

Table 4 presents rates of completed home and primary care provider visits throughout the intervention. Rates of completed well-child visits ranged from 26% (at age 30 months) to 90% (at age 6 weeks). Rates of completed home visits and primary care provider visits were generally parallel, with exceptions at 15 and 30 months of age. Table 5 presents the logistic regression model between completed home and medical care visits. The odds of having a successful health care provider visit when there was a previous successful home visit were 10.77 times higher than that of having a successful health care provider visit without a successful

home visit (OR: 10.77 [95% confidence interval (CI): 6.05–19.17]; *P* < .0001).

Predictors of Involvement

Table 6 presents the final logistic regression model predicting engagement. The final multivariable logistic regression model showed that receiving the targeted dosage of the home visiting intervention was associated with the total amount of staff time (OR: 1.13 [95% CI: 1.065–1.208]), the number of home visits (OR: 0.74 [95% CI: 0.599–0.924]), and child gender (male versus female; OR: 3.84 [95% CI: 1.171–12.64]).

DISCUSSION

These results illustrate the important role that home visiting programs can have in promoting child health outcomes in partnership with pediatric care. For those mothers in the intervention who received regular home visits for their child’s first 33 months, completing a home visit was associated with a notably higher rate of pediatric visit completion compared with those mothers in the intervention group who did not receive a home visit just before a scheduled pediatric appointment. Attending well-child pediatric visits is key to overall health and developmental monitoring and the provision of needed health or developmental intervention services.²⁰ Earlier research on MOM Program outcomes¹⁷ found that, despite equivalent amounts of developmental delay in the children of the home-visited and non-home-visited mothers, those children assigned to the home visiting condition were significantly more likely to be referred to and receive early-intervention services by 33 months of age. The current results show that the home visiting program also promoted primary care attendance, an essential precursor to children receiving these important early-intervention services. The relatively high rate of completed well-child visits is not

TABLE 3 Home Visits Completed Throughout Intervention (*N* = 152)

Child Age	Completed Home Visits	Incomplete Home Visits	Cumulative Dropouts	Missing
6 wk	136 (89.4)	14 (9.2)	2 (1.3)	0 (0.0)
4 mo	125 (82.2)	21 (13.8)	4 (2.6)	1 (0.7)
6 mo	138 (90.8)	9 (5.9)	5 (3.2)	0 (0.0)
9 mo	131 (86.1)	15 (9.9)	6 (4.0)	0 (0.0)
12 mo	133 (87.5)	11 (7.2)	8 (5.3)	0 (0.0)
15 mo	131 (86.2)	12 (7.9)	9 (5.9)	1 (0.7)
18 mo	135 (88.8)	5 (3.3)	12 (7.9)	1 (0.7)
24 mo	132 (86.8)	5 (3.3)	14 (9.2)	1 (0.7)
30 mo	129 (84.9)	4 (2.6)	15 (9.9)	4 (2.6)

Data are presented as *n* (%).

TABLE 4 Completed Home Visits and PCP Visits (*N* = 152)

Child Age	Completed Home Visit	Completed PCP Visit
6 wk	136 (89.5)	137 (90.1)
4 mo	125 (82.2)	123 (80.9)
6 mo	138 (90.8)	127 (83.6)
9 mo	131 (86.2)	116 (76.3)
12 mo	133 (87.5)	117 (77.0)
15 mo ^a	131 (86.2)	91 (59.9)
18 mo	135 (88.8)	117 (77.0)
24 mo	132 (86.8)	125 (82.2)
30 mo ^{a,b}	129 (84.9)	40 (26.3)

Data are presented as *n* (%). PCP, primary health care provider.

^a No immunizations were given to children at these visits.

^b This visit was primarily used to monitor children’s enrollment into early intervention or transition into 3- to 5-year programs.

TABLE 5 Results of Logistic Regression Model With Generalized Estimating Equation Relating Home Visit Completion With Completed Medical Care Visits

Parameter	Estimate	SE	z	OR (95% CI)	P
Visit	-0.32	0.03	-9.71	0.73 (0.68-0.77)	<.0001
Completed home visits	2.38	0.29	8.08	10.77 (6.05-19.17)	<.0001

TABLE 6 Final Logistic Regression Model Predicting Program Participation

Parameter	Estimate	SE	Wald chi-square	OR (95% CI)	P
Total time	0.13	0.03	15.43	1.13 (1.07-1.21)	<.0001
Completed home visits	-0.30	0.11	7.13	0.74 (0.60-0.92)	.008
Child gender, male vs female	0.67	0.30	4.93	3.85 (1.17-12.64)	.030

The C statistic for the model is 0.81, indicating high goodness of fit for this model. Variables initially entered were type of staff, staff activity type, staff time spent on outreach, maternal demographic variables, and child gender.

typically reported in reports from home visiting programs. In a comprehensive review of 9 high-quality home visiting programs,² only 1 program, the Early Start program in New Zealand, reported similarly high levels of completed primary care visits over 36 months.¹⁰

One unexpected finding from this analysis was 2 age points (15 and 30 months) when the association between completed home visits and well-child care visits dropped. Although program staff encouraged mothers to make and keep these appointments, mothers reported experiencing particular difficulty in making appointments for these visits. The American Academy of Pediatrics (20) recommended a visit at 15 months, although this visit did not include routine immunizations. Although not recommended by the AAP (20), the program included a suggestion for this visit for assuring that children aged 0 to 3 years in early-intervention programs who were approaching the critical 36-month transition to the 3- to 5-year-old program had information on making that transition.²⁰ Mothers reported that the office staff of the health care providers often discouraged them from these visits or simply refused to offer appointments to children at these ages unless they were in ill health.

Limitations of the current study include the use of a single cohort of mothers who were predominantly low-income African

American, from a defined geographic urban East Coast region. These factors may limit the extent that conclusions can be extended to programs serving mothers in other geographic regions or to those serving mothers with a wider race/ethnicity range. However, because others have described low rates of program involvement among urban, low-income, African-American mothers,²¹ the high rates of retention and dosage in this sample are noteworthy. Another limitation is that unequal sample sizes were used in the analyses, which is due to the small sample size overall and to the relatively high rates of maternal involvement within the home-visited intervention group. A related study limitation is the small size of the program and its staff. Programs with a larger number of staff members may have more challenges in keeping staff motivated and persistent in outreach efforts. The relatively small number of staff of the MOM Program does not allow for examination of specific home visitor characteristics that might be related to maternal involvement, such as race or educational background.²² Finally, data on the completion of pediatric office visits were collected only on the home-visited mothers because we did not wish to violate the "control" nature of the initial group assignment and draw more attention to visit completion among those in the control group.

Results from this randomly assigned intervention trial show promise for how home visiting programs can augment pediatric care for children. By timing home visits to occur just before pediatric office visits, mothers can be more motivated to keep appointments and be better equipped to use these visits optimally by understanding what to expect at the visits and to have formulated in advance their questions for their health care provider. Future home visiting programs may further expand partnerships with pediatric care providers by reinforcing patient/family education provided at each visit and supporting mothers in monitoring the health status of their children. By extending the "reach" of pediatric care beyond the office into the community and homes of vulnerable families, pediatric health resources can be optimally deployed. Similarly, by working in partnership with pediatric practices, home visiting programs can increase the likelihood of achieving targeted health outcomes for children.

Although not qualifying for *Maternal, Infant, and Early Childhood Home Visiting* funding as one of its "evidence-based" models,⁶ a replication of the MOM Program is underway in other areas with high rates of poverty in Philadelphia through the Office of the Deputy Mayor for Health and Economic Opportunity, directed by one of the study authors (DFS). The replication program uses revised training materials and an updated manual and reporting system. In establishing this replication, the program gained cooperation from local pediatricians in ways similar to those used in the original program. Presentations about the MOM Program were given to local pediatric groups regarding the importance of child development screening and early education through Grand Rounds presentations and conferences. In addition, written informed consent was obtained from each participant to allow letters documenting the

child's developmental progress to be shared with his or her primary care provider. Finally, observations from the program are shared with pediatric and obstetric staff throughout its duration. Local providers have been appreciative of the program's reinforcement of upcoming procedures

for their patients, such as reviewing lead screening at the 9-month home visit or introducing measles vaccination at the 12-month home visit. Careful planning with the local pediatric community is essential in the development and fine-tuning of collaborative home visiting initiatives.

CONCLUSIONS

Home visiting programs can provide important partnerships with pediatric health care providers. Integrating home visiting services with pediatric care can enhance child health, and warrant expansion.

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