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## A Community-Based Home Visitation Program's Impact on Birth Outcomes

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### Abstract

**Background**—MOMS Orange County is a coordinated home visitation program in which trained paraprofessional home visitors work under the close supervision of registered nurses. This model was developed to address health disparities in birth outcomes in a Hispanic community in Orange County.

**Purpose**—The primary objective was to test the impact of MOMS Orange County on birth outcomes. The second objective was to examine the breadth of prenatal health education topics as a mediator of the relationship between home visits and birth outcomes.

**Methods**—A retrospective cohort design was used. Paraprofessional home visitors collected prenatal and postnatal data during home visits. Only those whose birth outcomes were obtained were included in the analysis (N = 2,027 participants). Regression models were conducted to test the associations between prenatal home visits and birth outcomes, adjusting for 10 covariates.

**Results**—Number of prenatal home visits predicted higher birth weight and greater gestational age at birth. Breadth of health education topics partially mediated the associations between home visits and birth weight. The same mediation was revealed with gestational age at birth.

**Clinical Implications**—The MOMS Orange County prenatal home visitation program may be a promising approach to decrease adverse birth outcomes in disadvantaged communities. Rigorously designed studies are needed to further test this model.

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#### Conflicts of Interest

With help from an award by University of California Irvine's (UCI) Campus-Community Research Incubator (CCRI), MOMS Orange County and the UCI Program in Nursing Science established a community-based participatory research partnership. Inherent in this process is collaboration between academic researchers and community members at all stages of the research, including publication. These findings are of interest to the stakeholders who are from MOMS Orange County, but it is important to emphasize that consensus was reached to objectively meet criteria for deriving objective results and applying the scientific process to this rich data set.

## Keywords

premature birth; low birth weight; healthcare disparities; care coordination model

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There is cumulative evidence supporting the positive effect of home visitation programs on healthcare disparities in selected underserved communities. These programs have resulted in improved infant, child, and adolescent development (Eckenrode et al., 2010; Kitzman et al., 2010; Lowell, Cater, Godoy, Paulicin, & Briggs-Gowan, 2011). However, regarding birth outcomes, two recent systematic reviews and one meta-analysis identified inconclusive and inconsistent findings of the likelihood that prenatal home visitation programs would reduce adverse birth outcomes at gestation (Issel, Forrestal, Slaughter, Wiencrot, & Handler, 2011; Hodnett, Fredericks, & Weston, 2010; Hollowell, Oakley, Kurinczuk, Brocklehurst, & Gray, 2011). Key factors may well be the home visit delivery approach and the dosage of topics covered during these home visits (Issel et al., 2011).

## Delivery Approach of Home Visitation: Registered Nurses versus Paraprofessionals

There is little evidence supporting positive improvements in birth outcomes from home visitation programs by registered nurses (RNs). Van Dijk, Anderko and Stetzer (2011) evaluated the impact of a home visitation program designed to serve Medicaid women, on birth outcomes and found participants had fewer low birth weight and preterm births and women who received 6 or more hours of service were less likely to give birth to babies with poor outcomes.

Evidence of the impact of paraprofessionals has been mostly derived from studies of child developmental outcomes. A meta-analysis evaluating paraprofessional home visitation programs, found paraprofessional home visitors had a relatively consistent effect on improving psychomotor and cognitive development and reducing child behavior problems, but no effect on language development, physical health, and hospitalizations (Peacock, Konrad, Watson, Nickel, & Muhajarine, 2013). Little is known about the effect of paraprofessional home visitation programs on birth outcomes.

## Dosage of Home Visitation

In an effort to improve understanding of the reasons for the inconsistent results of home visitation programs on birth outcomes, Slaughter et al. (2013) defined dosage of prenatal case management (PCM) as the duration of enrollment, breadth of interventions, and amount of contact time spent with the case manager during interventions. Slaughter et al. (2013) compared the predictive effect of PCM dosage and dichotomous PCM exposure measure on birth outcomes and found that PCM dosage was a more sensitive measure capturing the impact of home visitation on birth outcomes. Dosage of home visitation may be a significant predictor of program outcome and is critical to consider in studies of the impact of home visitation programs and birth outcomes.

## MOMS Orange County

In the early 1990's in Orange County California numerous at-risk pregnant women were unable to be served by RN-only home visitors because of the County's financial constraints. MOMS Orange County (MOMS) was founded as a nonprofit organization in 1992, developing an adaptive model as a response to the prenatal care crisis in that county. The mission is to help underserved mothers and their families have healthy babies by providing health coordination, education and access to community resources. The program provides prenatal and postnatal services to an annual estimated 3,800 at-risk pregnant women in Orange County, California.

The coordination model between paraprofessionals and RNs is the unique feature of this community-based home visitation program. Paraprofessional home visitors, who are culturally and linguistically familiar with this community, make up this category of service providers. They are bilingual in spoken and written English-Spanish or English-Vietnamese, they have either a high school diploma or bachelor degree (in early education, psychology or social work), and have a broad range of experience. All newly hired home visitors complete a 6-month orientation including didactic training and shadowing experience before being assigned to a caseload. These trained paraprofessionals make home visits monthly during pregnancy and through the infant's first birthday. A home visit is composed of three aspects: 1) conducting assessments of ecological factors related to pregnancy and infant development; 2) delivering health education to increase access to care, promoting women's health, enhancing parenting skills; and 3) making referrals to public health nurses, other healthcare providers, and/or specialized community services. Registered nurses are the case managers and work closely with these paraprofessionals. Specifically, the RN case managers: 1) respond promptly to paraprofessional home visitors who ask for support and clinical or psychosocial information during home visit; 2) review standard assessments for accuracy after paraprofessionals complete monthly home visit for each client; 3) develop and revise the individual care plans which are implemented by paraprofessionals; and 4) refer clients who need immediate medical attention reported by paraprofessionals, coordinate resources and services.

### Purpose

The objectives of this study were to test the impact of MOMS's home visitation program on birth outcomes and examine the breadth of prenatal health education topics as a mediator of the relationship between home visits and birth outcomes in a sample of largely Hispanic families at risk.

### Hypotheses

There were two hypotheses: 1) greater numbers of prenatal home visits will be associated with increased birth weight and an increased gestational age at birth and 2) prediction of impact of prenatal home visits and improved birth outcomes will be mediated through breadth of home visitation prenatal education.

## Methods

### Design and Procedure

After obtaining IRB approval at the academic institution, the secondary analysis data were extracted from the de-identified data from MOMS. Only pregnant women who were enrolled in the MOMS Orange County program and had a singleton birth baby in 2009 and 2010 were included. Exclusion criteria were pregnant women who were enrolled, but dropped from the program or had a twin birth during 2009 and 2010. The MOMS paraprofessionals collected data reported by women in the program during their home visits. These data were: demographics, prior and current physical and psychological health, pregnancy history, current pregnancy symptoms, and birth outcomes from this pregnancy.

### Variables and Measures

**Dependent variables**—Birth weight and gestational age at birth (obtained by women's last menstrual period or expected date of birth) were the dependent variables and evidence of birth outcomes. Of the 2,709 women who participated in the MOMS program and delivered a single child, data on 2,027 (74.8%) of the infants were usable for analysis. There were no significant differences between those mothers from whom birth outcomes were obtained and those without birth outcome data in terms of age, education, marital status, or monthly income.

**Independent variable**—The number of prenatal home visits was defined as the independent variable to predict birth outcomes.

**Covariate variables**—Of the demographic and prenatal data, 10 variables, which are found to be associated with birth outcomes in previous research (Heaman et al., 2013; Panaretto et al., 2006) were selected as covariates in this present study. The covariates included maternal age, maternal ethnicity, level of maternal education, marital status, monthly income, gestational age at entry into the study, gender of their newborn, and pre-pregnancy medical history, current pregnancy medical condition, and pregnancy symptoms. Both the pre-pregnancy and current pregnancy medical history data were collected using a 40-item checklist. Pregnancy symptom data was entered on a 20-item checklist.

**Mediator variable**—Prenatal health education topics are covered by paraprofessionals over the course of the prenatal visits. The concept of breadth of health education was operationalized as the number of prenatal health education topics covered by the paraprofessionals and received by these women from intake to birth of child. Paraprofessional home visitors used a standard checklist to record topics covered in each visit. A home visit is, however, not limited to these topics. Instead, a paraprofessional home visitor is flexible and responds to a client's issues as identified during a home visit. Ten prenatal health education topics are included in the program: pregnancy-induced hypertension warning signs, enrolling in MediCal, facilitating clients to communicate with healthcare providers, selecting a primary care provider, birth plan review, childbirth preparation, self-care after birth, postpartum depression, domestic violence, and car seat

requirements. A count variable was created to indicate the breadth of health education with a Cohen's *kappa* reliability of .93.

## Data Analyses

There were three phases of the data analysis; preliminary analyses were conducted to obtain descriptive statistics, regression models were used to examine the relationship of prenatal home visits and birth outcomes controlling for 10 covariate variables, and the variable breadth of prenatal health education topics was added to the above regression models as the final step to examine its mediating effect on birth outcomes (Baron & Kenny, 1986). In those models in which breadth of prenatal health education topics was significantly associated with the birth outcomes, Sobel tests were conducted to determine if the mediating effects were statistically significant. Specifically, the mediation effect is hypothesized when a third variable influences the relationship between independent variable and dependent variable by reducing the effect of independent variable. The Sobel test is a test to examine the reduction in significance (MacKinnon & Dwyer, 1993; Sobel, 1982).

## Results

### Preliminary Analysis

Table 1 shows characteristics of study sample. Predictor and mediator variables were significantly but weakly correlated with birth outcomes ranging from Pearson coefficients of .05 to .14. Significant correlations of covariates ranged from  $-.06$  to  $.30$ . There were significant differences in the categorical covariates. Male newborns were significantly heavier than female newborns,  $t(2026) = 5.77, p < .001$ . There were ethnic differences in prenatal health education lessons,  $F(5, 2021) = 6.45, p < .001$  and birth weight,  $F(5, 2021) = 5.87, p < .001$ . Specifically, Vietnamese mothers received fewer prenatal health education lessons than did Latina mothers, Games-Howell  $t = 3.83, p < .01$ , and had lower birth weight newborns than did Latina, Games-Howell  $t = 5.56, p < .001$ , or Caucasian mothers, Games-Howell  $t = 3.82, p < .01$ . These findings showed the importance of controlling covariates in the regression analyses.

### Association of Prenatal Home Visits and Birth Outcomes

Number of prenatal home visits significantly predicted an increase in both birth weight, (Table 2) and gestational age at birth after adjusting for covariates (see Table 3). Each prenatal visit was associated with approximately 62 grams increase in birth weight, and approximately .38 weeks (2.66 days) increase in gestational age at birth.

### Breadth of Prenatal Health Education Topics as a Mediator of Birth Outcomes

After prenatal health education was added to the above regression models, the strength of independent variable (number of prenatal home visits) remained significant but had diminished effects on birth outcomes. Otherwise, the number of prenatal home visits continued to have a direct effect on both birth weight and gestational age at birth 1) but a reduced effect when the mediator was added to the model. The breadth of prenatal health education topics partially and positively mediated prenatal home visits in relationship to

birth weight, Sobel  $t = 3.80$ ,  $p < .001$  (see Table 2), and also to gestational age at birth, Sobel  $t = 4.53$   $p < .001$  (see Table 3).

## Discussion

The first objective of this study was to examine the impact of MOMS prenatal home visits on birth outcomes. Results supported the hypothesis that more prenatal home visits were associated with an increase in birth weight and gestational age at birth controlling for the 10 covariates. These findings are similar to a prior randomized controlled trial in which paraprofessionals made home visits. Lee et al. (2009) found that the Healthy Families New York prenatal home visitation program significantly reduced low-birth-weight births in at-risk women (45% Black and 22% Hispanic). Our results suggest at-risk women who receive greater numbers of MOMS prenatal home visits are less likely to have preterm and low-birth-weight infants in this sample of largely Hispanic mothers and newborns.

The second objective was to investigate the mediating effects of breadth of health education topics on the relationship between MOMS home visits and the birth outcomes. The results supported the hypothesis that the strength of association between the number of prenatal visits and birth weight was partially mediated by breadth of prenatal health education topics. The same pattern was found with the gestational age at birth. These findings suggest that the wide breadth of health education topics received by women in the MOMS home visit program over the prenatal period may be a critical factor leading to decreases in LBW and premature births. Birth outcomes partially mediated by health education topics suggest that there may be other factors which contribute to birth outcomes including relationship between clients and home visitors and cultural competency of home visitors.

Our study provides preliminary evidence about the effect of the MOMS Orange County program on birth outcomes using a relatively large sample size, controlling for important confounding factors. The contribution of this study is to reveal that the breadth of health education may be one of mechanisms explaining the relationship between prenatal home visits and birth outcomes. To our knowledge, such an analysis has not been reported in studies of the effect of prenatal visitation programs on birth outcomes in a community-based home visitation program serving a largely Hispanic population. The MOMS home visitation model shows promise to improve birth outcomes in an at-risk population.

## Limitations and Future Research

There are three notable limitations in this study. First, the associations were correlational. Because there was no experimental manipulation, a causal conclusion is not possible with the present findings. The positive relationship of the MOMS program with birth outcomes indicates that the MOMS model has the potential to generate better birth outcomes in a disadvantaged community. Second, although ten covariates were controlled in the present study, other factors, which influence birth outcomes, were not adjusted in the study (e.g., maternal depression, social support). Lastly, the generalization of the results is limited to Orange County participants with low to moderate psychosocial risks, which are the focus of the MOMS program; more high-risk clients (who have intensive medical conditions or teen

pregnancy) are referred to public health nurses. Therefore, future studies are needed to be conducted with the emphasis on including a comparison group, using a multi-informant approach to collect rigorous data, evaluating the longitudinal effects on infant development, and replicating this model in different communities.

## Clinical Nursing Implications

Our study suggests that the MOMS coordination care model, may provide a novel approach to improve birth outcomes. The model extends a nurse's traditional role in home visitation from direct delivery of home health visits to close supervision of home visit assessment and health education conducted by paraprofessionals. Nurses in the MOMS home visitation model are positioned as the case manager between paraprofessionals and clients ensuring comprehensive, consistent and coordinated education. According to a recent Census report, the Hispanic population (17.1%) is the fastest growing ethnicity group in United States.; by 2060, the Hispanic population is projected to double (United States Census Bureau, 2013). This community-based home visitation program could be a potential cost-effective model not only improving women's health, but birth outcomes as well in vulnerable populations. In order to best serve these vulnerable populations with documented barriers to healthcare, current nursing education needs to emphasize community-based case management. Nursing education must prepare nurse leaders able to coordinate care across teams of community health workers, paraprofessionals, and public health nurses—MOMS provides a promising, efficient and effective model.

## Acknowledgments

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## References

- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 1986; 51(6):1173–1182. [PubMed: 3806354]
- Eckenrode J, Campa M, Luckey DW, Kenderson CR Jr, Cole R, Kitzman H, Olds D. Long-term effects of prenatal and infancy nurse home visitation on the life course of youths: 19-year follow-up of a randomized trial. *Archives of Pediatrics & Adolescent Medicine*. 2010; 164(1):9–15. [PubMed: 20048236]
- Heaman M, Kingston D, Chalmers B, Sauve R, Lee L, Young D. Risk factors for preterm birth and small-for-gestational-age births among Canadian women. *Paediatric and Perinatal Epidemiology*. 2013; 27(1):54–61. [PubMed: 23215712]
- Hodnett ED, Fredericks S, Weston J. Support during pregnancy for women at increased risk of low birthweight babies. *The Cochrane Database of Systematic Reviews*. 2010; 16(6)
- Hollowell J, Oakley L, Kurinczuk JJ, Brocklehurst P, Gray R. The effectiveness of antenatal care programmes to reduce infant mortality and preterm birth in socially disadvantaged and vulnerable women in high-income countries: A systematic review. *BMC Pregnancy and Childbirth*. 2011; 11(13)

- Issel LM, Forrestal SG, Slaughter J, Wiencrot A, Handler A. A review of prenatal home-visiting effectiveness for improving birth outcomes. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*. 2011; 40(2):157–165.
- Kitzman HJ, Olds DL, Cole RE, Hanks CA, Anson EA, Arcoleo KJ, Holmberg JR. Enduring effects of prenatal and infancy home visiting by nurses on children: Follow-up of a randomized trial among children at age 12 years. *Archives of Pediatrics & Adolescent Medicine*. 2010; 164(5):412–418. [PubMed: 20439791]
- Lee E, Mitchell-Herzfeld SD, Lowenfels AA, Greene R, Dorabawila V, DuMont KA. Reducing low birth weight through home visitation: A randomized controlled trial. *American Journal of Preventive Medicine*. 2009; 36(2):154–160. [PubMed: 19135906]
- Lowell DI, Carter AS, Godoy L, Paulicin B, Briggs-Gowan MJ. A randomized controlled trial of Child FIRST: A comprehensive home-based intervention translating research into early childhood practice. *Child Development*. 2011; 82:193–208. [PubMed: 21291437]
- MacKinnon DP, Dwyer JH. Estimating mediated effects in prevention studies. *Evaluation Review*. 1993; 17:144–158.
- Panaretto K, Lee H, Mitchell M, Larkins S, Manassis V, Buettner P, Watson D. Risk factors for preterm, low birth weight and small for gestational age birth in urban Aboriginal and Torres Strait Islander women in Townsville. *Australian and New Zealand Journal of Public Health*. 2006; 30(2): 163–170. [PubMed: 16681339]
- Peacock S, Konrad S, Watson E, Nickel D, Muhajarine N. Effectiveness of home visiting programs on child outcomes: A systematic review. *BMC Public Health*. 2013; 13(17)
- Slaughter JC, Issel LM, Handler AS, Rosenberg D, Kane DJ, Stayner LT. Measuring dosage: a key factor when assessing the relationship between prenatal case management and birth outcomes. *Maternal and Child Health Journal*. 2013; 17(8):1414–1423. [PubMed: 23010864]
- Sobel, ME. Asymptotic intervals for indirect effects in structural equations models. In: Leinhardt, S., editor. *Sociological methodology*. San Francisco: Jossey-Bass; 1982. 1982. p. 290-312.
- U.S. Census Bureau. State and county Quickfacts: USA. 2013. Retrieved from <http://quickfacts.census.gov/qfd/states/00000.html>
- Van Dijk JW, Anderko L, Stetzer F. The impact of Prenatal Care Coordination on birth outcomes. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*. 2011; 40(1):98–108.



**Callouts**

- MOMS Orange County is a home visitation program based on a coordination care model implemented by registered nurse case managers and paraprofessionals in an underserved community.
- Implementation of the MOMS Orange County home visitation model may increase birth weight and gestational age among newborns in a disadvantaged largely Hispanic community.
- The breadth of health education provided during prenatal home visits may explain in part why home visits are associated with positive birth outcomes.
- The MOMS Orange County community-based coordination care model may be cost-effective if it demonstrates improved clinical outcomes, reduced health disparities, and cost savings.
- The role of the registered nurse case manager can be expanded to include supervision of paraprofessionals in implementing the home visitation program.

### Clinical Implications Box

- Programs like MOMS Orange County may reduce adverse birth outcomes in a disadvantaged largely Hispanic community.
- Breadth of health education topics covered during prenatal home visits may be one of the mechanisms explaining why home visits are associated with improved birth outcomes.
- The MOMS coordination care model may be an exemplar for an improved national health care system with a new focus on patient-centered teamwork, disease prevention, and cost reduction highlighted in the Patient Protection and Affordable Care Act of 2010.

**Table 1**Descriptive Characteristics of Study Sample ADD ( $N=2,027$  subjects)

Characteristics	<i>n</i> (%)		<i>n</i> (%) or <i>M</i> ( <i>SD</i> )
<b>Ethnicity</b>		<b>Country of Birth</b>	
Hispanic	1,561 (77%)	Born in U.S.	689 (34%)
Vietnamese	243 (12%)	Born outside U.S.	1,338 (66%)
Non-Hispanic White	122 (6%)	<b>Continuous variables</b>	
Other	101 (5%)	Maternal age in years	27.83 (6.60)
<b>Education</b>		Monthly income	\$1,252 (929)
< High school graduate	892 (44%)	Birth weight	3293.72 (507.96)
High school graduate	649 (32%)	Gestational age at birth	38.72 (1.58)
At least some college	486 (24%)	Gestational age at entry	19.00 (8.76)
<b>Marital status</b>		Pre-pregnancy <sup>a</sup>	.45 (.84)
Married	811 (40%)	Current pregnancy <sup>b</sup>	.39 (.69)
Living with partner	649 (32%)	Pregnancy symptoms	7.54 (4.38)
Single	466 (23%)	Prenatal visits	3.40 (2.0)
Other	101 (5%)	Breadth of prenatal health education topics	5.92 (3.76)
<b>Baby gender</b>			
Male	1,074 (53%)		
Female	953 (47%)		

Note:

<sup>a</sup>Pre-pregnancy = Pre-pregnancy medical history.

<sup>b</sup>Current pregnancy= Current pregnancy medical condition.

**Table 2**

**Hierarchical Regressions of Birth Weight**

Variables	Birth Weight					
	Model 1			Model 2		
	B	SE	$\beta$	B	SE	$\beta$
Age	5.21	1.88	.07**	4.71	1.86	.06*
Monthly income	.01	.01	.03	.02	.01	.03
Education level	-5.21	8.78	-.01	-7.48	8.76	-.02
Ethnicity <sup>d</sup>						
Vietnamese	-187.04	37.64	-.12***	-179.01	37.52	-.12***
White	83.94	54.34	.03	71.60	54.17	.03
Other/mixed	-43.57	42.88	-.02	-52.65	42.74	-.03
Marital Status <sup>b</sup>						
Living together	1.59	26.97	.00	-5.84	26.90	-.01
Single	-63.55	31.50	-.05	-69.08	31.39	-.06*
Other	-101.81	69.51	-.03	-100.51	69.82	-.03
Pre-pregnancy medical history	1.03	13.46	.00	1.61	13.40	.00
Current pregnancy medical condition	1.13	15.73	.00	.00	15.66	.00
Pregnancy symptoms	5.59	2.87	.05	4.20	2.88	.05
Gestational age at entry	14.16	2.41	.25***	13.70	2.40	.24***
Gender of newborn <sup>c</sup>	113.24	22.08	.11***	112.16	21.98	.11***
$R^2$			.04***			.04***
MOMS prenatal visits	62.20	11.09	.24***	53.97	11.21	.21***
$R^2$			.02***			.02***
Breadth of prenatal health education topics				14.01	3.23	.10***
$R^2$						.01***
Adj. $R^2$			.05***			.06***
F	8.09***			8.83***		

Note: Unstandardized and standardized regression weights are from the final model (with all variables in the model).

<sup>a</sup>Reference group = Latina.

<sup>b</sup>Reference group = Married.

<sup>c</sup>Reference group = Female.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$

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**Table 3**

Hierarchical Regressions of Gestational Age at Birth

Variables	Gestational Age at Delivery					
	Model 1			Model 2		
	B	SE	$\beta$	B	SE	$\beta$
Age	-.01	.01	-.06*	-.01	.01	-.06*
Monthly income	.00	.00	.03	.00	.00	.03
Education level	.06	.03	.05*	.05	.03	.04
Ethnicity <sup>a</sup>						
Vietnamese	-.13	.12	-.03	-.10	.11	-.02
White	.02	.17	.00	-.03	.17	-.00
Other/mixed	-.17	.13	-.03	-.20	.13	-.03
Marital Status <sup>b</sup>						
Living together	.02	.08	.01	-.01	.08	-.00
Single	-.05	.10	-.01	-.08	.10	-.02
Other	-.34	.21	-.04	-.34	.21	-.04
Pre-pregnancy medical history	-.03	.04	-.02	-.03	.04	-.02
Current pregnancy medical condition	-.11	.05	-.05*	-.12	.05	-.05*
Pregnancy symptoms	.01	.01	.02	.00	.01	.00
Gestational age at entry	.09	.01	.52***	.09	.01	.51***
Gender of newborn <sup>c</sup>	-.04	.07	-.02	-.04	.07	-.01
$R^2$			.03***			.03***
MOMS prenatal visits	.38	.03	.47***	.35	.03	.43***
$R^2$			.06***			.06***
Breath of prenatal health education topics			.06			.01
$R^2$			.08***			.09***
Adj. $R^2$						
F	12.80***			14.11***		

Note: Unstandardized and standardized regression weights are from the final model (with all variables in the model).

<sup>a</sup>Reference group = Latina.

<sup>b</sup>Reference group = Married.

<sup>c</sup>Reference group = Female.

\*  $p < .05$ .

\*\*  $p < .01$ ;

\*\*\*  $p < .001$