The Protective Effect of Prenatal Social Support on Infant Adiposity in the First 18 Months of Life

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Objective To determine whether prenatal social support was associated with infant adiposity in the first 18 months of life in a low-income, Hispanic sample, known to be at high risk of early child obesity.

Study design We performed a longitudinal analysis of 262 low-income, Hispanic mother-infant pairs in the control group of the Starting Early child obesity prevention trial. Prenatal social support was measured using an item from the Maternal Social Support Index. We used multilevel modeling to predict weight-for-length z-score trajectories from birth to age 18 months and logistic regression to predict macrosomia and overweight status at ages 6, 12, and 18 months.

Results High prenatal social support was independently associated with lower infant adiposity trajectories from birth to age 18 months (B = −0.40; 95% CI, −0.63 to −0.16), a lower odds of macrosomia (aOR = 0.35; 95% CI, 0.15-0.80), and a lower odds of overweight at ages 12 (aOR = 0.28; 95% CI, 0.10-0.74) and 18 months (aOR = 0.35; 95% CI, 0.14-0.89). Prenatal social support was not significantly associated with overweight status at age 6 months.

Conclusions Prenatal social support may protect against excessive infant adiposity and overweight in low-income, Hispanic families. Further research is needed to elucidate mechanisms underlying these associations and to inform preventive strategies beginning in pregnancy. *(J Pediatr 2019;209:77-84)*.

Despite decades of preventive efforts across the US, the prevalence of early child obesity remains alarmingly high,[1] particularly in low-income, Hispanic families.[2,3] For many children, the onset of obesity occurs well before school entry, and socioeconomic and ethnic disparities in adiposity begin in infancy and persist over time.[4] This finding underscores the importance of early childhood as a critical period in which growth trajectories are established and rapid increases in infant adiposity are noted.[5] Numerous risk factors for excessive infant adiposity are identifiable in pregnancy, including maternal sociodemographic characteristics (eg, educational attainment), psychosocial factors (eg, depression and stress), and weight- and health-related factors (eg, maternal obesity, excessive gestational weight gain, gestational diabetes mellitus). Although risk factors for early child obesity have been studied extensively, there has been minimal investigation of resilience factors that are protective against the development of obesity in children with risk exposure.[6]

Resilience, a construct originating from the field of developmental psychology, refers to the ability to make positive adaptations in response to adversity by using personal, social, and environmental resources.[7] Social support, the degree to which one's needs are satisfied through social relationships, is a component of resilience that has long been known to lead to positive health outcomes.[8-10] There is emerging evidence that, within low-income communities, adults with more social support have a lower prevalence of obesity.[11,12] Additionally, a large body of evidence documents that social support during pregnancy has positive impacts on aspects of maternal and child health known to improve subsequent child weight outcomes, including prenatal nutrition,[13] maternal depression,[14] birth weight,[15] infant feeding,[16] and parenting.[17] Despite extensive evidence for the role of social support in promoting healthy outcomes generally and in decreasing risks related to obesity, there has been limited study of its direct associations with child weight. Cross-sectional studies have suggested that parents' receipt of social support may be associated with favorable weight outcomes in their children.[18-20] However, there have been no longitudinal

BMI	Body mass index
LR	Likelihood ratio
MLM	Multilevel modeling
RCT	Randomized controlled trial
WFLz	Weight-for-length z-score

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studies of these relations, limiting the ability to make causal inferences. Therefore, we sought to determine whether prenatal social support was associated with infant adiposity in the first 18 months of life in a low-income, Hispanic sample, known to be at high risk of early child obesity. We hypothesized that high prenatal social support would be associated with lower mean adiposity trajectory and lower prevalence of overweight status in the first 18 months of life.

Methods

We performed a longitudinal cohort analysis examining associations between prenatal social support and infant adiposity from birth to age 18 months. This analysis used the control group of a randomized controlled trial (RCT) of the Starting Early Program. Starting Early is a primary-care based child obesity prevention program designed for low-income, Hispanic families, beginning in the third trimester of pregnancy. Participants randomized to the intervention receive individual prenatal and postpartum nutrition and lactation counseling, followed by Nutrition and Parenting Support Groups with a focus on age-appropriate feeding, play, and parenting throughout the first 3 years of life.[21] Participants randomized to the control group receive standard prenatal and pediatric primary care. Standard care consists of approximately 8-10 prenatal visits during the third trimester, and 9 pediatric visits in the first 18 months of life. Because the intervention is delivered in an environment designed to be supportive, the current analysis is limited to the control group of the RCT. Data for the current analyses were collected between July 2012 and September 2016. The RCT was approved by the Institutional Review Board of New York University School of Medicine and the New York City Health and Hospitals and registered on clinicaltrials.gov (NCT01541761).

Sample

Recruitment for Starting Early was conducted in the prenatal clinics of a large, urban, public hospital network. We included women who were ≥18 years old, self-identified as Hispanic, were fluent in English or Spanish, and who had a singleton, uncomplicated pregnancy and intended to receive pediatric care at the study sites. We excluded women with significant medical or psychiatric illness, homelessness, substance abuse, or severe fetal anomalies on ultrasound examination. Women with mild or moderate complications, such as diabetes, depression, or intrauterine growth restriction, were not excluded. All infants included in the study were born at ≥34 weeks of estimated gestational age as per obstetrics clinical documentation during the delivery hospital admission. Obstetrics providers determined the estimated gestational age by last menstrual period or first trimester ultrasound examination, as appropriate for each woman. The analytic sample for the current study included all participants randomized to the control group of the larger RCT who completed the baseline measure of prenatal social support and had ≥1 set of paired infant anthropometric measures (length and weight) in the first 18 months of life.

Measures

Dependent Variables. All anthropometric data for infant subjects were obtained by medical record review of the birth hospitalization and subsequent well child visits. We generated weight-for-length z-scores (WFLz) for each infant at birth and each well child visit using the World Health Organization Anthro macro.[22] Anthropometric data flagged by the Anthro macro[22] as potentially implausible were manually reviewed and kept if deemed plausible within the context of other growth data in the child's medical record and clinical documentation by the provider.[23-25] If these data were inconsistent with other growth data in the medical record or if there were no other data in the record with which to compare, they were removed and coded as missing. We used WFLz over time as our first main outcome. WFLz is frequently used as a measure of adiposity in infants and can be interpreted as degree of adiposity relative to a large, multinational, and multiethnic sample of infants growing in optimal environmental conditions. The ideal and proportional growth for a healthy infant would be represented by a WFLz that remains stable and within 2 SDs of the median throughout the first 2 years of life. Our second set of main outcomes was categorical weight status at 4 time points (birth, 6 months, 12 months, and 18 months of age), based on the World Health Organization definitions and reference standards. Macrosomia was defined as a birth weight of ≥4 kg; overweight at 6, 12, and 18 months of age was defined as a WFLz of >2.[22] Anthropometric measurements used to determine categorical weight status at the 6, 12, and 18 month time points were taken from the medical record of a well child visit within 45 days of the given date. In cases with multiple measurements within the designated 90-day window, the measurement closest in time to the 6-, 12-, or 18-month birthday was used, respectively. Infants were excluded from the age specific analysis if they did not have anthropometric data available within the specified 90-day window of the given age.

Independent Variables. Prenatal social support, sociodemographic, and psychosocial factors were collected during an in-person baseline survey administered by trained, bilingual research assistants during the third trimester of pregnancy.

Primary Predictor. Prenatal social support was assessed using an item from the Maternal Social Support Index,[26] which asks, "How many people can you count on in times of need?" and allows numerical responses. It does not ask for further specification of who provides support, such as a family member, friend, or spouse. This item of the Maternal Social Support Index has been shown to be independently associated with maternal depression[26] and parenting stress[27] in prior studies. This item reflects the perceived availability of social support, a subconstruct of social support that has stronger ties to positive health outcomes than measures of actual or received support.[9] We visually examined the frequency distribution of responses to this item, which revealed a non-normal distribution and right skew. Exploratory analyses demonstrated that the relation between the number of

people to count on and infant adiposity was nonlinear with minimal added effect on the outcome as the number of people to count on increased beyond the lowest quartile of the distribution (0 or 1 person to count on). Dichotomizing the predictor at the lowest quartile resulted in multilevel and logistic regression models with lower values for the Akaike information criterion[28] than models using other cut points for the predictor (quintiles, quartiles, or median split). This finding confirmed that the best model fit was achieved when the predictor was dichotomized at the lowest quartile. Based on these results and prior literature using the same dichotomization,[29-33] we classified women with 0 or 1 person to count on in times of need as having low prenatal social support and those with ≥2 people to count on in times of need as having high prenatal social support.

Sociodemographic Factors. Sociodemographic factors, including maternal age, nativity (US born vs foreign born), education level (less than high school vs high school graduate), and marital status (married or living with partner vs other) were collected during the prenatal assessment.

Psychosocial Factors. Prenatal household food insecurity was measured by the Core Food Security Module from the US Department of Agriculture.[34] Families were classified as food secure if they reported <3 food-insecure conditions and as food insecure if they reported ≥3, as recommended by the US Department of Agriculture. Depressive symptoms were measured prenatally using the Patient Health Questionnaire-9 and defined as present if the score was ≥5.[35]

Maternal Health- and Weight-Related Factors. Maternal prepregnancy height and weight were collected from medical record review from the earliest first trimester prenatal visit. Maternal prepregnancy body mass index (BMI) was calculated using the formula BMI = kg/m^2 and subjects were classified as having prepregnancy overweight or obesity if their BMI was ≥25.[36] Gestational weight gain was calculated by subtracting prepregnancy weight from weight recorded when the participant was admitted for delivery. Gestational weight gain was categorized as inadequate, adequate, or excessive according to the Institute of Medicine definitions.[37] Gestational diabetes was determined by medical record review of prenatal visits and 2-hour oral glucose tolerance test results.[38]

Statistical Analyses

We used descriptive statistics to characterize the sample and frequency distributions of key study variables. We used χ^2 and t tests to examine bivariate associations between maternal sociodemographic, psychosocial, and health-/weight-related factors and prenatal social support. Maternal characteristics associated with prenatal social support ($P < .20$) were included in subsequent multivariable models. Relations between maternal characteristics and WFLz trajectory were examined using multilevel modeling (MLM), and excessive gestational weight gain was the only variable with $P < .20$ that had not already been selected for inclusion in multivariable models based on association with the predictor in the previous set of analyses. Because gestational weight gain reflects a dynamic process and theoretically may be a mechanism by which prenatal social support could influence infant birth weight and subsequent growth trajectory, we did not include it in multivariable models.

We used MLM with random slopes and intercepts (ie, mixed procedure in Stata SE 14; Stata Corp, College Station, Texas) to model the effects of prenatal social support and time on infant WFLz from birth to age 18 months. This method allowed us to test for differences in infant adiposity between those with low and high social support using all available anthropometric data, which were collected at varying time intervals for each infant. We began by specifying an unconditional growth model (WFLz conditioned on time alone) and added unstructured covariance to account for naturally occurring correlations between the intercept (model predicted WFLz at age 0) and slope (model predicted change in WFLz over time). We then added a population-level squared term for age to account for a nonlinear effect of time. We used the Akaike information criterion and the likelihood ratio (LR) test to assess model fit. We fit 2 prespecified MLMs to determine the effects of prenatal social support on infant WFLz. In model 1, infant WFLz was conditioned on time (infant age in months), time-squared, and prenatal social support. Model 2 was the same as model 1 with additional adjustment for significant covariates from the prior bivariate analyses (maternal age, nativity, food insecurity, and prepregnancy weight status). To estimate the effect of prenatal social support on change in WFLz over time, a time by social support interaction term was added to each model in a second step.

For our categorical outcome, we performed separate unadjusted and adjusted logistic regression analyses for each age to determine if prenatal social support was associated with macrosomia and overweight status at ages 6, 12, and 18 months.

Results

Of the 267 participants randomized to the control group of the parent RCT, all gave valid responses to the social support measure and 262 had infants with ≥1 set of anthropometric measures in the first 18 months of life. The 5 women whose infants did not have anthropometric data did not differ on any baseline characteristics from those whose infants did have anthropometric data. **Table I** summarizes baseline characteristics and differences by social support level. The majority of participant mothers were born outside of the US (80%) and 30% had not completed high school. Prepregnancy overweight/obesity was present in 65% of women. Responses to the social support measure ranged from 0 to 30 people to count on in times of need, with a median of 3 and IQR of 2-5. Twenty percent of women reported low social support (<2 people to count on). As shown in **Table I**, this finding was associated with older age, birth outside of the US, food insecurity, and prepregnancy overweight or obese status. Prenatal social support was not associated with education, marital status, depressive symptoms, excessive gestational weight gain, or gestational diabetes mellitus.

Table I. Baseline maternal characteristics and associations with prenatal social support*

	Total sample (n = 262), no. (%)	Low social support (n = 52) no. (%)	High social support (n = 210) no. (%)	*P* value†
Sociodemographic factors				
Age in years, mean (SD)	27.9 (5.8)	29.5 (5.3)	27.5 (5.8)	.03
Born outside of US	211 (80%)	50 (96%)	161 (77%)	<.01
Completed high school	185 (70%)	33 (63%)	152 (72%)	.21
Married or living as married	188 (72%)	40 (77%)	148 (70%)	.35
Psychosocial factors				
Food insecure	87 (33%)	27 (52%)	60 (29%)	<.01
Depressive symptoms	87 (33%)	20 (38%)	67 (32%)	.37
Weight-related factors				
Prepregnancy Overweight/obesity	170 (65%)	42 (81%)	128 (61%)	.01
Excessive gestational weight gain‡	74 (29%)	19 (37%)	55 (27%)	.30
Gestational diabetes mellitus	10 (4%)	2 (4%)	8 (4%)	>.99

*Prenatal social support was measured by maternal response to "How many people can you count on in times of need?" with low social support defined as 0-1 person to count on and high social support defined as ≥2 people to count on.
†*P* values were determined by *t*-tests and χ^2 analyses measuring differences between women with low and high prenatal social support.
‡n = 259 total; Excessive gestational weight gain is defined by the Institute of Medicine as >40 pounds for women with prepregnancy underweight, >35 pounds for women with prepregnancy normal weight, >25 pounds for women with prepregnancy overweight, and >20 pounds for women with prepregnancy obesity.[33]

Anthropometric data for the 262 infants included 2540 sets of paired anthropometric observations (weight and length) with an average of 10 observations per infant (range, 1-19) over the first 18 months of life. The correlation between random intercepts and slopes in the unadjusted and adjusted MLMs was negative and significant, indicating that, on average, infants born smaller grew faster than those born bigger. Model fit was improved by the addition of unstructured covariance that allowed for this correlation (Model 1 independent level and slope effects: Akaike information criterion, 7241; unstructured covariance Akaike information criterion, 7227) and a squared term for time (LR test significant, $\chi^2 = 91.7$; $P < .01$).

The effects of time and prenatal social support on infant WFLz are shown in Table II. Infant age had a significant and positive linear effect on adiposity that was similar in both models (B = 0.16; 95% CI, 0.14-0.18). This finding indicates that the mean WFLz trajectories for the whole sample, regardless of prenatal social support, increased over time. The magnitude of this increase, however, became smaller over time, as indicated by the negative effect of the quadratic term in the model. Prenatal social support had a significant effect on WFLz in unadjusted and adjusted models. Infant adiposity trajectories for those with low and high prenatal social support are depicted in the Figure. Over the first 18 months of life, infants born to mothers with high prenatal social support had mean WFLz 0.4 units lower than infants born to mothers with low social support (Model 1: B = −0.45; 95% CI, −0.67 to −0.22; Model 2, B = −0.40; 95% CI, −0.63 to −0.16). A time by social support interaction term was not significant and did not improve model fit (Model 1: LR $\chi^2 = 0.29$, $P = .59$; Model 2, LR $\chi^2 = 0.28$, $P = .60$), suggesting that the effect of prenatal social support on WFLz did not change significantly over time. A conservative approach to model selection[39] adopts the simpler model and adjusts the inference accordingly. With that approach the differential between low and high prenatal social support remains significant at the 0.05 level.

Prenatal social support was also associated with differences in categorical infant weight status (Table III). Infants born to mothers with high prenatal social support had a lower prevalence of macrosomia than those born to mothers with low prenatal social support (9% vs 25%; $\chi^2 = 9.99$; $P < .01$). Of note, all 4 low birth weight infants in the sample (2%) were in the high social support group, but this was not a statistically significant finding (2% vs 0%; $\chi^2 = 1.00$; $P = .32$) and the overall prevalence of low birth weight was much lower in our sample than national estimates (7% for Hispanics and 8% overall).[40] The prevalence of overweight

Table II. Multilevel models of time and prenatal social support effects on infant WFLz from birth to age 18 months in 262 mother-infant pairs

	Model 1		Model 2*	
	B (SE)	95% CI	B (SE)	95% CI
Intercept	0.002 (0.11)	−0.21 to 0.21	0.09 (0.28)	−0.47 to 0.64
Time (age in months)	0.16 (0.01)	0.14 to 0.18	0.16 (0.01)	0.14 to 0.18
Time squared	−0.006 (0.0006)	−0.007 to −0.005	−0.006 (0.0006)	−0.007 to −0.005
High social support†	−0.45 (0.11)	−0.67 to −0.22	−0.40 (0.12)	−0.63 to −0.16

*Adjusted for maternal age, birth country, food insecurity, and prepregnancy weight status.
†High social support was defined as having ≥2 people to count on in times of need. A time by social support interaction term was not significant and did not improve model fit when added to either model.

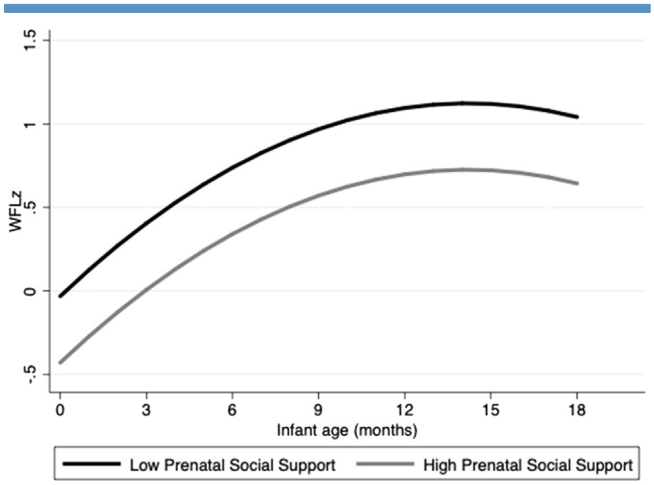

Figure. Predicted mean adiposity trajectories for 262 infants born to mothers with low and high prenatal social support, controlling for maternal age, nativity, prepregnancy weight status, and food insecurity.

was lower at ages 6, 12, and 18 months for infants born to mothers with high social support as compared with low social support. This difference did not reach statistical significance at age 6 months, but was significant at age 12 months (9% vs 27%; $\chi^2 = 8.43$; $P < .01$) and 18 months (13% vs 34%; $\chi^2 = 7.89$; $P < .01$). These differences persisted after adjustment for relevant covariates, with the odds of overweight significantly lower for infants whose mothers had high social support compared with those who had low social support (12 months: aOR = 0.28, 95% CI, 0.10 to 0.74; 18 months: aOR = 0.35; 95% CI, 0.14-0.89).

Discussion

We found that high prenatal social support, a component of resilience, independently predicted lower infant adiposity over the first 18 months of life. Mothers with high prenatal social support were approximately one-third as likely to have a newborn with macrosomia or a 12- or 18-month-old child with overweight. These findings add to the mounting evidence that the prenatal period represents a critical time to target for child obesity prevention and that resilience factors during this period can have significant and lasting effects on child growth trajectories.[41,42]

The role of social support has been well-studied during pregnancy, primarily as it relates to adverse perinatal outcomes (eg, low birth weight, preterm birth, Apgar scores, operative delivery)[15,43,44] and the prenatal behaviors and maternal conditions that affect these outcomes (eg, smoking,[13] diet and physical activity,[45] depression[32]). This body of evidence developed from studies aiming to understand the role of social support in preventing perinatal morbidity and has not previously focused on infant adiposity and child obesity risk. Many of these studies have targeted populations at highest risk of low birth weight and other poor pregnancy outcomes (adolescents, African Americans, women with poor prenatal care, or chronic medical illness),[46] not necessarily populations at high risk of early child obesity. However, low prenatal social support was more than twice as prevalent in our sample of low-income, Hispanic women as compared with other studies using similar categorical measures in other demographic groups.[29,47] There is a strong and well-documented socioeconomic gradient in obesity prevalence in the US,[3] and these findings suggest that prenatal social support, although protective against infant adiposity overall, may be more scarce for the most vulnerable children. In the context of the growing obesity epidemic that disproportionately impacts Hispanic young children,[1] evidence that prenatal social support is protective against adiposity in infancy begins to fill several important gaps in the literature.

Our finding that social support was protective against macrosomia is important because birth weight is known to be associated with subsequent infant growth and macrosomia is highly predictive of early child obesity, particularly in Hispanic children.[48-50] Because the association of birth weight with prenatal social support has been studied almost exclusively in women with a high risk of delivering low birth weight infants, birth weight has most frequently been characterized as low birth weight vs healthy birth weight, without an analysis of its association to high birth weight (ie, macrosomia). In contrast, our sample was limited to relatively healthy, low-risk pregnancies with a high prevalence of prepregnancy overweight and obesity, strong predictors of macrosomia. This differential pattern of risk between our study cohort and that of prior studies likely played a role in the directionality of our birth weight findings, in which prenatal social support significantly protected against macrosomia, but did not significantly alter the odds of low birth weight.

We also found that differences in weight between infants with differential exposure to prenatal social support persisted

Table III. Prenatal social support effect on infant weight status* from birth to age 18 months

Age	n	Full sample, no. (%)	Low social support, no. (%)	High social support, no. (%)	OR†	95% CI	aOR‡	95% CI
Birth	262	32 (12%)	13 (25%)	19 (9%)	0.30	0.14-0.65	0.35	0.15-0.80
6 months	216	15 (7%)	4 (10%)	11 (6%)	0.64	0.19-2.12	0.60	0.16-2.14
12 months	188	23 (12%)	9 (27%)	14 (9%)	0.26	0.10-0.68	0.28	0.10-0.74
18 months	160	28 (18%)	11 (34%)	17 (13%)	0.29	0.12-0.71	0.35	0.14-0.89

*Overweight defined as ≥4 kg at birth (ie, macrosomia) and as a WFLz of ≥2 at subsequent ages, according to World Health Organization reference standards.
†ORs estimated by logistic regression.
‡aORs estimated by multiple logistic regression adjusted for maternal age, birth country, food insecurity, and prepregnancy weight status.

well beyond birth. Infants born to mothers with high social support had less adiposity over the first 18 months of life and a lower odds of overweight status at ages 12 and 18 months. There are a number of possible explanations for these lasting effects, which require empirical testing in future studies. The metabolic and neuroendocrine programming that occur in utero exert strong influence on birth weight,[51,52] and high birth weight is highly associated with early child obesity.[50] Thus, the effects of prenatal social support on postnatal growth may simply be the consequences of its effects on prenatal growth and birth weight. However, there are also numerous postpartum maternal behaviors and environmental conditions known to be associated with prenatal social support that impact mother-infant pairs more broadly and may play a role in supporting healthy growth. Prenatal social support has been associated with lower rates of postpartum depression,[14,53] healthier infant attachment,[53] less parenting stress,[54] and higher rates of breastfeeding[16] and responsive parenting.[17] All of these factors have favorable effects on subsequent child obesity risk in the literature,[55,56] but just as the prenatal social support literature has not focused on child weight outcomes, few studies of child obesity have included measures of prenatal social support. The pathophysiology of child obesity is complex and its developmental origins are multifactorial, so further study of these associations and pathways are needed.

The effects of prenatal social support must be considered in the context of the effects of social support more generally, which may impact maternal health and well-being before pregnancy. Social support has been linked to decreased morbidity and mortality from a broad range of conditions over the entire life course,[10,57,58] and several studies have found that women who feel supported have a lower prevalence of overweight and obesity than those who lack social support. Although this literature has primarily included white and African American samples,[11,12,59,60] prepregnancy maternal obesity is known to be a strong predictor of child obesity regardless of race or ethnicity.[61] Our bivariate results show that overweight/obesity was significantly less prevalent among women with high social support. This finding is important given the high rates of obesity among Hispanic women of childbearing age[36] and the impact this finding has on both their own health and the health and obesity risk of their children.[62]

We found that marital status was not significantly associated with prenatal social support. Moreover, although we did not ascertain who provided social support, of the 16 participants in the larger trial who reported having no one to count on in times of need, 11 were married. This finding highlights an important distinction between structure and function that has often been raised in the social support literature.[9] Structural aspects of social networks and measures of these structural components (eg, marital status, number of people living at home, number of social contacts) are quite different from the functional role of those social networks, which may or may not include the provision of social support.[9,10] Although it is clear that prenatal social support provided by an intimate partner can have positive effects on perinatal outcomes,[44,63,64] simply having a partner does not guarantee the provision of adequate support or the health benefits associated with it.

Our findings should be considered in the context of several limitations. First, although we have longitudinal data for infant adiposity, we only have data for social support at a single point in time. Trajectories of social support over the course of pregnancy and early infancy have not been studied extensively, but it is likely that social support is not static. Therefore, future studies of social support should include repeated measures, particularly when studying outcomes that vary over time. Second, the Maternal Social Support Index item used to measure social support is composed of a single question that does not capture the multidimensional nature of social support, despite its predictive power as an independent measure in prior studies. Further study of the associations between infant weight and the different dimensions of maternal social support measured over time is warranted. Third, our findings may not be generalizable to other populations, because our sample was composed of low-income, Hispanic families. An additional limitation in generalizability stems from the exclusion criteria of the larger trial. Pregnant women with significant medical or psychiatric illness or those who are homeless may be at the highest risk of low social support but were excluded from our study, potentially decreasing the variation of social support in our sample. Future studies should include more vulnerable populations to appropriately capture experiences across the spectrum of social support. Last, social support may exert its effects, at least in part, by moderating or buffering the adverse effects of stress on health.[10] Because our study did not include a measure of maternal stress, we were unable to analyze social support as a moderator in this way, and the inclusion of stress measures is an important consideration for future studies.

Our study showed that pregnant, low-income Hispanic women with high social support had infants with less adiposity over the first 18 months of life and significantly lower odds of macrosomia and overweight at ages 12 and 18 months. Although many prior studies have examined more conventional measures of prenatal mental health (eg, depression, self-efficacy) in relation to infant feeding styles and practices,[65,66] few have considered the role of social support as a distinct construct. Based on our results, it is plausible that the omission of social support may result in unmeasured confounding, and further study of how social support during the prenatal period may protect against infant adiposity is warranted. We believe that the field would benefit from interdisciplinary research to incorporate measurement of prenatal social support in obesity prevention studies, as well as adequate assessment of child growth outcomes in studies of prenatal social support. Adiposity in infancy is one of the strongest predictors of obesity later in childhood, and understanding the factors that protect against excess infant weight gain and obesity is critical to developing effective models of obesity prevention that focus on strength and resilience rather than risk. ■

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