



## Low Birthweight: Do Unwed Fathers Help?

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Previous studies have revealed that marital status is an important predictor of birth outcomes, with unmarried mothers having a higher probability than married mothers of delivering low birthweight babies. However, research on the impact of different mother-father relationships *among unwed parents* is virtually non-existent and little is known about whether and how father involvement affects birth outcomes. In this study, we use the sample of unwed parents in the 7-cities baseline Fragile Families and Child Wellbeing data to examine the effects of parents' relationship status and support provided by the baby's father during pregnancy on the likelihood of delivering a low birthweight baby, and to examine whether father involvement explains racial and ethnic disparities in low birthweight. We include several variables that past studies have suggested may be important in explaining birth outcomes but generally have not been able to include, such as mother's social support, her attitudes and values, and her religiosity. We find that having received monetary support from the baby's father has a negative effect on the likelihood of low birthweight and that mothers who are in a non-cohabiting romantic relationship with the father have significantly higher odds of low birthweight compared to mothers who cohabit with the father of their baby. Finally, racial and ethnic differences in birth outcomes within this population appear to be invariant to the level of father involvement. A major contribution of the study is that it uses rich new data to examine birth outcomes in a population at high risk—unmarried mothers—and incorporates

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measures such as parents' relationship status and father's financial support, along with an extensive set of demographic, social, and behavioral risk factors.

Birthweight is one of the earliest indicators of child wellbeing. Low birthweight increases the risk of infant mortality, health problems in the first years of life, and developmental problems at later ages (Hack, Klein, & Taylor, 1995). Previous studies have revealed that marital status is an important predictor of birth outcomes (Jones & Bond, 1999; Starfield, Shapiro, Weiss, Liang, Ra, Paige, & Wang, 1992), with unmarried mothers having a higher probability than married mothers of delivering low birthweight babies. According to the Centers for Disease Control (Ventura, 1995), the rate of low birthweight among unmarried mothers in 1992 in the US was 10.4% compared to 5.7% among married mothers. Marriage is associated with higher socioeconomic status and is negatively associated with engagement in risky behavior (Sheehan, 1998). For example, relative to women who have never been married, married women are less likely to smoke or drink alcohol (Sheehan, 1998), and among Hispanics, married women and women living with the father of their child have greater rates of prenatal care utilization (Albrecht & Miller, 1996; Albrecht, Miller, & Clarke, 1994). The effects of family structure on prenatal care use are less clear for black and white women, however (Albrecht & Miller, 1996; Albrecht, Miller, & Clarke, 1994).

Although marital status is strongly associated with birth outcomes, research on the impact of different mother-father relationships *among unwed parents* is virtually non-existent. Specifically, little is known about whether and how father involvement affects birth outcomes. One study of recent Mexican immigrant women in Los Angeles considered current living arrangements (including marriage and cohabitation) as well as how often the mother saw the father, and found that increased frequency of contact with the baby's father was associated with the mother's greater use of prenatal care (Zambrana, Dunkel-Schetter, & Scrimshaw, 1991). In this study, we examine the effect on birth outcomes of parents' relationship status and support provided by the baby's father during pregnancy *among a group of unmarried parents*. We characterize the mother's relationship with the father as cohabiting, not cohabiting but romantically involved, or other. We also examine the effects of the father's financial contribution to the mother during pregnancy and whether the father had suggested that the mother have an abortion.

We also are interested in the extent to which father involvement explains racial and ethnic disparities in birth outcomes. Past research shows

significant differences in the birth outcomes of whites, blacks, and Mexican Americans (Cramer, 1995; Hummer, Biegler, deTurk, Forbes, Frisbie, Hon, & Pullum, 1999). One would expect that both Mexican American and black mothers are more likely than non-Hispanic white mothers to have adverse birth outcomes because of their low socioeconomic status and traditionally poor use of prenatal care. However, numerous studies have shown that the birth outcomes of Mexican Americans are far more favorable than those of blacks and are comparable to those of non-Hispanic whites, even when controlling for numerous variables related to socioeconomic status and prenatal care use (Cervantes, Keith, & Wyshak, 1999; Scribner, 1996; Singh & Yu, 1996). It has been suggested in the literature that both support from extended family and more frequent presence of the baby's father (even when the parents are not married) among Mexican Americans may explain this particular paradox (Mason, 1991).

We use data from the new Fragile Families and Child Wellbeing survey of new parents and incorporate a rich array of variables that past studies have suggested may be important in explaining birth outcomes but generally have not been able to include, such as measures of mother's social support, her attitudes and values, and the father's involvement. We use incremental multivariate models to explain low birthweight through sets of intervening variables, including race/ethnicity, socioeconomic characteristics and health behaviors, social support and attitudes, and father involvement. A major contribution of the study is that it uses rich new data to examine birth outcomes in a population at high risk—unmarried mothers—and incorporates measures such as parents' relationship status and father's financial support, along with an extensive set of demographic, social, and behavioral risk factors. The results will contribute to the process of explaining the disadvantaged birth outcomes of unmarried mothers and will reveal whether racial and ethnic differences in birth outcomes can be explained by these additional measures.

### **Current Knowledge on the Predictors of Low Birthweight**

#### *Race, Ethnicity, and Immigrant Status*

Birth outcomes have improved dramatically over the past decade, owing largely to advances in neonatal care technology. However, a growing body of research has revealed that glaring racial and ethnic disparities per-

sist. Black women have continued to be twice as likely as white women to have low birthweight babies and to lose their babies in the first year of life (Kleinman and Kessel 1987, Kleinman and Rowley 1992, Paneth 1995). As a broad group, Hispanic women have rates of low birthweight and infant mortality on par with those of non-Hispanic whites, but a closer examination reveals substantial variation in birth outcomes across Hispanic subgroups.<sup>1</sup>

Cuban and Mexican women have low rates of low birthweight, while Puerto Ricans have rates that are quite high (Becerra, Hogue, and Perez, 1991, Mendoza, Ventura, Valdez, Castillo, Saldivar, Baisden, and Martorell, 1991, Reichman and Kenney 1997, Reichman and Kenney 1998). The rates for Cuban and Puerto Rican women are consistent with the relative socioeconomic statuses of these groups. Cubans tend to have high socioeconomic status, while Puerto Ricans may be the poorest ethnic group in the United States (Lemann, 1991). The favorable birth outcomes among Mexican American women despite their relatively poor usage of prenatal care and the adverse social and economic conditions they face have remained an unexplained "paradox." Adding to this puzzle is the fact that Mexican immigrant mothers have much lower rates of low birthweight than their US-born ethnic counterparts (Balcazar, Peterson, & Krull, 1997; Scribner & Dwyer, 1989; Guendelman, Gould, Hudes, & Eskenazi, 1990).

The relative birthweight advantage of Mexican women frequently has been attributed to "differences in culture," but few specifics are known about what factors actually underlie cultural differences. A few qualitative studies have examined the role of specific cultural practices and values, such as the involvement of the baby's maternal grandmother and other sources of social support, and have suggested that such factors may be important in explaining the "Mexican paradox" (see, for example, Sherraden & Barrera 1995, 1996a). The quantitative studies addressing this issue generally have relied on samples from one city, county, or state, or from one or more clinics or hospitals (see, for example, Rumbaut & Weeks, 1996; Guendelman & English, 1995; Balcazar, Peterson, & Krull, 1997). There

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<sup>1</sup>There has been some suggestion in the literature that mean birthweight varies among ancestral and cultural groups because of differences in factors such as maternal height and nutrition (see, for example, Rooth, 1980). However, many racial and ethnic differentials appear to persist even when much lower cutoffs for separating healthy and unhealthy newborns are used (see, for example, Reichman, & Kenney 1998). Moreover, as the literature has evolved, an increasing number of social factors associated with racial/ethnic differences in birth outcomes have been identified, suggesting that there is more work to be done in this area.

has been scant empirical analysis on broader geographic areas since few data sets contain information on birth outcomes and also disaggregate Hispanics into different subgroups. Two major exceptions are the National Vital Statistics system and the Hispanic Health and Nutrition Examination Surveys (HHANES) conducted from 1982 to 1984, but even these data sets contain very limited information on factors that may be related to culture. Consequently, there has been virtually no generalizable empirical validation of the findings from qualitative studies in this area. The upshot is that there is a lot of work to be done in identifying the roles that cultural and other protective factors play in the process leading to birth outcomes.

### *Socioeconomic Characteristics and Health Behaviors*

Socioeconomic context and behavioral factors have been identified in past research as key determinants of low birthweight (Kallan, 1993; Cramer, 1995). It is widely recognized that socioeconomic status influences birth outcomes net of racial and ethnic background (Rowley & Tosteson, 1993). Several comparative analyses of blacks and non-Hispanic whites have found that women with a high school education or less, who are under 19 years of age, and who are unmarried are all at increased risk for delivering low birthweight babies, and that living in poverty produces a stronger effect than race in predicting low birthweight (Collins & David, 1990; Collins, Herman, & David, 1997; Edwards, 1994; Roberts, 1997; Ocampo, Xue, Wang, & Caughy, 1997; Shiono, Rauh, Park, Lederman, & Zuskar, 1997; Starfield et al., 1992).

Often associated with economic well-being, life style factors—primarily health (and risky) behaviors—also are linked to birth outcomes. Many researchers have hypothesized that cultural factors may influence Mexican American mothers to engage in fewer risky behaviors and thereby they have more favorable birth outcomes than women belonging to other economically disadvantaged groups. Several studies comparing Mexican immigrant and US-born Mexican-origin women have indicated that less acculturated mothers do indeed engage in fewer risky behaviors, suggesting that culture has an indirect effect on low birthweight independent of economic well-being (Balcazar, Peterson, & Cobas, 1996; Zambrana, Scrimshaw, Collins, & Dunkell-Schetter, 1997; Cobas, Balcazar, Benin, Keith, & Chong, 1996). A few studies examining the dietary and smoking behaviors of Hispanics in comparison to non-Hispanic whites have found that Hispanics in general, and Mexican immigrants in particular, indeed do engage in

less risky behavior during pregnancy (Guendelman & Abrams, 1995; Frisbie, Forbes, & Hummer, 1998). Interestingly, Frisbie, Forbes, and Hummer found that when controlling for smoking, Hispanics (not just Mexicans) are actually more likely than non-Hispanic whites to have adverse birth outcomes.

### *Social Support and Attitudes*

Low socioeconomic status can have negative effects on birth outcomes through increased exposure to environmental stressors such as poor housing conditions and overcrowding (Shiono, Rauh, Park, Lederman, & Zuskar, 1997; Collins, Herman, & David, 1997, Roberts, 1997, Edwards, 1994).<sup>2</sup> On the other hand, qualitative studies of Mexican American mothers (Sheraden & Barrera, 1995 and 1996a) have suggested that protective factors such as family support can attenuate the negative effects of living in poverty. Collectively, these studies indicate that it may not be socioeconomic status alone that negatively influences birth outcomes, but rather the relative life circumstances of mothers, including factors that either exacerbate or counteract the effects of socioeconomic status. Although the role of social support has been studied far less among blacks, a recent randomized clinical trial showed that social support intervention was effective in reducing the rate of low birthweight among black women (Norbeck, DeJoseph, and Smith, 1996).

Research on the effects of maternal attitudes and values on birth outcomes has been limited and has generally focused on measures of ethnic self-identification, such as the language used by the mother, the ethnic background of the circle with whom she associates, and the pride she has in her ethnic background (Cobas, Balcazar, Benin, Keith, & Chong, 1996; Wolff, & Portis, 1996). Magaña and Clark (1995) suggested that religiosity may confer birth outcome advantages to Mexican-American women, but few other specific attitudes and values that may have an effect have been identified.

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<sup>2</sup> It also is possible that such factors may have direct effects above and beyond socioeconomic status.

### **Empirical Framework**

Our approach takes into account the complex nature of the process leading to birth outcomes. We begin with a simple model showing baseline differences by race/ethnicity and immigrant status. We compare birth outcomes of Mexican Americans to those of non-Hispanic blacks and non-Hispanic whites, controlling for immigrant status. Based on past studies (for example, Singh & Yu, 1996), we expect that Mexican American mothers and immigrant mothers will have lower probabilities than their non-Mexican and native-born counterparts of delivering low birthweight babies.

Next we incorporate standard factors generally included in models predicting low birthweight. The focus is on socioeconomic and health characteristics, including health behaviors. Young and old maternal ages are associated with worse birth outcomes, but Reichman and Pagnini (1997) found that the effect for teens becomes insignificant when controlling for important demographic characteristics. We expect that mothers of higher socioeconomic status and favorable health characteristics will have better birth outcomes. Furthermore, in light of past research, we expect that measures of socioeconomic status will not fully explain the gap in low birthweight between blacks and Mexican Americans.

In the third model we add new measures of community support, family support, and mothers' attitudes and values. Although different types of life stressors may derive from the detrimental effects of low socioeconomic status, past research has suggested that the mother's social support and her beliefs, values, and attitudes can be protective factors that ameliorate the negative effects of racial and economic disadvantage. Social support can come from both the family and the community in which the mother resides. Mothers living in neighborhoods they consider safe and those who reside in the same neighborhood for a number of years may interact more often with, and thereby derive support from, members of their communities. Both greater religiosity and traditional attitudes about marriage and gender roles may be markers of community support through religious and social institutions. We hypothesize that the existence of various forms of social support, greater religiosity, and more traditional attitudes about marriage and gender roles lead to improved birth outcomes and may partially explain the more advantaged birth outcomes of Mexican Americans relative to blacks.

Next we consider the effects of father involvement on birth outcomes of unmarried mothers, above and beyond the factors discussed earlier. We are

interested in the role of father involvement at two levels: First, given the positive effects on birth outcomes related to being married, we expect that unmarried mothers who lived with or received a high level of financial support from the fathers will have more favorable birth outcomes than those who did not. Second, father involvement is hypothesized to explain at least part of the differential in the probability of low birthweight between Mexican Americans and blacks.

### Data and Methods

The sample is restricted to mothers in the 7-cities baseline Fragile Families data who had single births and identified themselves as Mexican American, non-Hispanic black, non-Hispanic white, or other Hispanic (other racial and ethnic groups are not included), for a total of 2174 respondents. The multivariate analysis is further restricted to unmarried mothers, of whom 185 are Mexican American, 1206 are non-Hispanic black, 139 are non-Hispanic white, and 148 are other Hispanic. The mean age of the unmarried mothers is 24 years old. The sample is composed primarily of mothers age 18 and over (5 % of the unmarried mothers were under 18 years of age at the time of the baseline interview).<sup>3</sup> All of the variables for this analysis are obtained from the mother's survey responses.

Stepwise logistic regression analysis is used to model the probability of low birthweight using the sample of unmarried mothers. The analysis is divided into five incremental models designed to assess the marginal effects of each of four distinct sets of variables. Model 1 estimates the probability of low birthweight as a function of race/ethnicity and immigration status. Model 2 incorporates a set of variables measuring socioeconomic status and health characteristics. In Model 3, we add several measures representing the mother's values and attitudes, and sources of social support. Finally, Models 4 and 5 add parents' relationship status and other measures of father involvement, respectively. The first objective of the analyses is to estimate the effects of father involvement on the probability of low birthweight. The second objective is to examine whether the addition of different sets of variables reduces the racial and ethnic disparity in low birthweight between Mexican Americans and non-Hispanic blacks.

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<sup>3</sup>Approximately two thirds of the hospitals did not permit us to interview parents under 18, and this affects the age distribution of our sample.

**Table 1**  
**Definition of Variables**

<b>Variable</b>	<b>Definition</b>
<b>Dependent Variable</b>	
Low birthweight	Baby low birthweight (< 2500 grams) = 1, otherwise = 0
<b>Mother's SES Characteristics and Health Behaviors</b>	
Race/Ethnicity (reference: Non-Hispanic black)	
Mexican	Mexican = 1, otherwise = 0
Non-Hispanic white	Non-Hispanic white = 1, otherwise = 0
Other Hispanic	Other Hispanic = 1, otherwise = 0
Immigrant	Mother not born in the United States = 1, otherwise = 0
Age (reference: Between 21 and 29 years)	
20 or under	Mother is age 20 or under = 1, otherwise = 0
30 or over	Mother is age 30 or over = 1, otherwise = 0
Education (reference: Less than H.S.)	
High school graduate	Completed high school = 1, otherwise = 0
Some college	Attended some college = 1, otherwise = 0
College graduate	Graduated from college = 1, otherwise = 0
Has one or more other children	Mother has at least one other child = 1, otherwise = 0
Late or no prenatal care	Mother received prenatal care in the second trimester or later or received no prenatal care = 1, otherwise = 0
Smoked	Smoked any during pregnancy = 1, otherwise = 0
Used drugs or drank alcohol	Drank alcohol several times a week or more during pregnancy OR used drugs several times a week or more during pregnancy OR drug/alcohol use interfered with job or personal relationships = 1, otherwise = 0
Health (reference: Fair or poor health)	
Excellent	Mother rates her health as excellent = 1, otherwise = 0
Very good	Mother rates her health as very good = 1, otherwise = 0
Good	Mother rates her health as good = 1, otherwise = 0

(Continued)

*(Continued)*

<b>Variable</b>	<b>Definition</b>
<b><i>Mother's Social Support and Attitudes</i></b>	
Neighborhood Context (reference: Unsafe or very unsafe)	
Very safe	Considers her neighborhood very safe = 1, otherwise = 0
Safe	Considers her neighborhood safe = 1, otherwise = 0
No. of years in neighborhood	Continuous variable indicating the number of years mother has lived in the present neighborhood
Religious Service Attendance (reference: Never attends religious services)	
Once a week or more	Once a week or more = 1, otherwise = 0
Several times a month	Several times a month = 1, otherwise = 0
Several times a year	Several times a year = 1, otherwise = 0
Hardly ever	Hardly ever = 1, otherwise = 0
High perceived family support	In the next year mother feels she can count on someone in her family for a loan (\$200), a place to live, or child care = 1, otherwise = 0
Mother lived with parents at age 15	Mother lived with both biological parents at 15 = 1, otherwise = 0
Traditional marriage values	Continuous score indicating level of agreement with three measures: a single mother cannot bring up her child as well as a married couple, it is better for a couple to get married than to just live together, and it's better for children if their parents are married (score range 1-12)
Traditional gender values	Continuous score indicating level of agreement with two measures: the important decisions in the family should be made by the man of the house, and it is better for everyone if the man earns the main living and the woman stays home and takes care of the home and the family (score range 1-8)
Considered an abortion	Mother considered having an abortion = 1, otherwise = 0
<b><i>Father Involvement</i></b>	
Mother's Relationship With Father (reference: Cohabiting)	
Romantic	Romantically involved, not cohabiting = 1, otherwise = 0
Other	Other (friends or do not talk to each other) = 1, otherwise = 0
Father suggested an abortion	Father suggested that mother get an abortion = 1, otherwise = 0
Received money from father	Received money from baby's father or father purchased items for the baby during pregnancy = 1, otherwise = 0

Table 1 provides definitions of the variables used in the analysis. The dependent variable is whether the baby was low birthweight, defined as less than 2500 grams (approximately 5.5 pounds). The first set of independent variables includes the mother's socioeconomic and health characteristics. Respondents are categorized as Mexican American, other Hispanic, non-Hispanic black, and non-Hispanic white, based on self-identification. Mothers who reported that they were born outside of the United States are classified as immigrants. Other variables representing the mother's socioeconomic status include age (20 years and under, between 21 and 29 years, and 30 years and over) education, (less than high school, high school graduate, some college, and college graduate), and whether the mother has any other children.

Mother's health characteristics included are: the timing of prenatal care initiation, her engagement in risky health practices, and her overall health. Prenatal care is categorized according to whether it was initiated during the first trimester, versus whether it was initiated any time later than that or not at all. We include two measures of risky behavior: whether the mother smoked at all during pregnancy and whether she drank alcohol or used drugs several times a week or reported that the use of drugs or alcohol interfered with her job or personal relationships. Finally, the mother's general health is assessed from her self-rating.

Community support is measured using three variables: mother's perception of the safety of her neighborhood, the number of years she has lived in her present neighborhood, and frequency with which she attends church or another religious institution. We include two measures of family support: the mother's perception of whether in the next year she can count on someone in her family for a loan, a place to live, or child care, and whether she lived with both of her biological parents at age 15. We include three measures of maternal attitudes: the extent to which she adheres to traditional marriage values, the extent to which she adheres to traditional gender values, and whether she considered an abortion during the pregnancy.

We include three measures of father involvement. First, we categorize the unmarried mother's relationship with the father as cohabiting, romantically involved (but not cohabiting), or other. Second, we include information on whether the mother indicated that she received financial support from the father (includes items the father purchased for the baby) during the pregnancy. Third, we include whether the mother indicated that the baby's father suggested that she have an abortion when she was pregnant.

## Results

### *Descriptive Analysis*

Table 2 lists the distributions of the variables used in the analysis by mother's relationship with the baby's father: first for all unmarried mothers, and then separately for those that were cohabiting, romantically involved, and had other or no relationship with the baby's father. For the sake of comparison, distributions for the small sample of married women in the 7-cities Fragile Families baseline data are also included.

The rate of low birthweight for this sample of unmarried mothers is 14 percent, a rate considerably higher than that for the married mothers (8 percent). Among the unmarried mothers, low birthweight varies by the mother's relationship to the baby's father. Lower rates are found among cohabiting mothers than among those who did not cohabit. However, among mothers who did not cohabit, mothers who were romantically involved have a higher rate of low birthweight than mothers in other relationships. We also find considerable variation in birth outcomes by race/ethnicity (results not shown). Specifically, the rate of low birthweight among the unwed Mexican American mothers is only 7 percent, which as expected, is less than half of the corresponding rate for blacks (15 percent). However, the rate of low birthweight among unmarried whites in this sample (14 percent) is on par with that of blacks rather than Mexican Americans.

Socioeconomic status and health characteristics, social support and attitudes, and father involvement are significantly related to parents' relationship status. In most cases, married mothers are advantaged, and among unmarried mothers, a stronger relationship with the father also tends to confer advantages. Mother's age and educational attainment are strikingly different between the unmarried and married groups, but vary little across the unmarried groups. Thirty four percent of unmarried mothers were 20 years of age or younger compared to only 7 percent of the married mothers. Over 40 percent of all unmarried mothers had less than a high school education compared to 22 percent of the married mothers.

**Table 2**  
**Descriptive Statistics by Mother's Relationship Status (Means)**

Variable	Full Sample of Mothers (N=2174)*				
	All Unwed	Cohabiting	Romantic	Other	Married
	N=1678	N=753	N=623	N=298	N=496
<b>Dependent Variable</b>					
Low birthweight	0.14	0.12	0.17	0.11	0.08
<b>Mother's SES Characteristics and Health Behaviors</b>					
<b>Race/Ethnicity</b>					
Non-Hispanic black	0.72	0.62	0.83	0.71	0.38
Mexican	0.11	0.16	0.05	0.11	0.17
Non-Hispanic white	0.08	0.11	0.04	0.11	0.35
Other Hispanic	0.09	0.11	0.07	0.07	0.11
Immigrant	0.12	0.16	0.06	0.12	0.27
<b>Age</b>					
20 or under	0.34	0.31	0.39	0.33	0.07
21-29 years	0.50	0.53	0.46	0.51	0.51
30 or over	0.16	0.16	0.15	0.16	0.43
<b>Education<sup>b</sup></b>					
Less than high school	0.41	0.41	0.43	0.39	0.22
High school graduate	0.37	0.35	0.38	0.36	0.23
Some college	0.20	0.20	0.17	0.23	0.26
College graduate	0.03	0.04	0.03	0.02	0.28
Has one or more other children <sup>a</sup>	0.64	0.68	0.62	0.56	0.68
Late or no prenatal care	0.27	0.25	0.30	0.31	0.10
Smoked <sup>b</sup>	0.23	0.23	0.23	0.25	0.08
Used drugs or drank alcohol	0.06	0.05	0.06	0.10	0.02
<b>Health<sup>b,c</sup></b>					
Fair or poor health	0.08	0.09	0.08	0.07	0.05
Good	0.28	0.28	0.27	0.3	0.25
Very good	0.31	0.30	0.32	0.33	0.34
Excellent	0.32	0.33	0.32	0.31	0.36
<b>Mother's Social Support and Attitudes</b>					
<b>Neighborhood Context<sup>b</sup></b>					
Unsafe or very unsafe	0.23	0.24	0.23	0.23	0.18
Safe	0.59	0.57	0.61	0.59	0.52
Very safe	0.18	0.19	0.17	0.18	0.31
Number of years in neighborhood	4.53	4.62	7.53	6.72	6.07

(Continued)

(Table 2 Continued)

	All Unwed	Cohabiting	Romantic	Other	Married
<b>Religious Service Attendance</b>					
Never attends religious services	0.16	0.16	0.16	0.18	0.08
Hardly ever	0.29	0.32	0.26	0.24	0.16
Several times a year	0.20	0.20	0.21	0.19	0.23
Several times a month	0.16	0.16	0.17	0.15	0.19
Once a week or more	0.18	0.15	0.19	0.25	0.35
High perceived family support <sup>b</sup>	0.96	0.95	0.97	0.95	0.98
Mother lived with parents at age 15	0.34	0.37	0.30	0.34	0.60
Traditional marriage values	0.07	0.07	0.07	0.07	0.08
Traditional gender values <sup>b</sup>	0.04	0.04	0.04	0.04	0.04
Considered an abortion	0.37	0.31	0.41	0.47	0.12
<b>Father Involvement</b>					
Father suggested an abortion	0.15	0.09	0.14	0.32	0.04
Received money from father <sup>d</sup>	0.81	0.95	0.84	0.39	-

\*The sample in this study is restricted to mothers who had single births and who are non-Hispanic white, non-Hispanic black, Mexican American, or other Hispanic.

Note: All mean comparisons between the unwed and married mothers, between the subgroups of the unwed mothers, and between all the subgroups of the full sample of mothers are statistically significant at the .05 level (using the Pearson  $\chi^2$  test) except as noted below:

<sup>a</sup>Mean comparison between unwed and married not significant.

<sup>b</sup>Mean comparison between cohabiting, romantic, and other not significant.

<sup>c</sup>Mean comparison between cohabiting, romantic, other, and married not significant.

<sup>d</sup>Survey question asked only of unmarried mothers.

The proportion of mothers who received late or no prenatal care is nearly three times higher among unmarried mothers than among married mothers. Within the unmarried sample, both the rate of late or no prenatal care and the rates of smoking and drug or alcohol use increase as the connection with the father in terms of relationship status becomes more casual. Unmarried mothers are about three times as likely to have smoked or to have used drugs or alcohol during pregnancy than married mothers, but significant differences across unmarried subgroups exist only for smoking behavior. Unmarried mothers tend to be somewhat less healthy than married mothers, but the differences across unmarried groups are not significant.

Neighborhood safety and regular attendance at religious services are generally worse and lower, respectively, for unmarried mothers, regardless

of their relationship with the father, than for married mothers. Perceived family support is very high for all groups. However, only 34 percent of unmarried mothers had lived with their parents at age 15 compared to 60 percent of married mothers. The percentages holding traditional attitudes toward marriage and gender did not vary by parents' relationship status. The probability that a mother considered an abortion was lowest if she was married and increased dramatically and successively for cohabiting parents, parents in a romantic relationship but not cohabiting, and parents with other or no relationships.

The more "marriage-like" the relationship between the parents, the greater was the father involvement in other areas. Over 95 percent of cohabiting mothers received financial support from the father in terms of monetary help or purchases for the baby, compared to 84 percent of those who were romantically involved (but not cohabiting) with the father and only 40 percent among the other unmarried mothers. In addition, cohabiting fathers were much less likely than non-cohabiting fathers to have suggested an abortion.

### *Logistic Regression Analysis*

The results of the stepwise logistic regression analyses of the non-marital sample are presented in Table 3. Model 1 estimates the probability of having a low birthweight baby as a function of race/ethnicity and immigrant status. We find that Mexican American mothers are about half as likely as black mothers to have a low birthweight baby. Although the probabilities of low birthweight for both whites and other Hispanics are also lower than that for blacks, these effects are not significant in this sample. Being an immigrant decreases the odds of low birthweight, but again, the relationship is not statistically significant.

Table 3  
 Logistic Regression of Risk Factors Associated with Low Birthweight<sup>a</sup>

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
	<i>Race/Ethnicity &amp; Immigration</i>	<i>SES &amp; Health Behaviors</i>	<i>Support &amp; Attitudes</i>	<i>Mother's Relationship to Father</i>	<i>Father Involvement</i>
<b>Mother's SES Characteristics and Health Behaviors</b>					
<b>Race/Ethnicity</b>					
Mexican (Non-Hispanic black)	.48 ** (-2.15)	.46** (-2.10)	.44** (-2.19)	.48* (-1.94)	.43** (-2.19)
Non-Hispanic white	.92 (-.33)	.70 (-1.26)	.67 (-1.32)	.74 (-.98)	.65 (-1.43)
Other Hispanic	.78 (-.80)	.72 (-.99)	.65 (-1.26)	.65 (-1.22)	.59 (-1.43)
Immigrant	.65 (-1.26)	.80 (-.62)	.81 (-.56)	.85 (-.43)	.82 (-.51)
<b>Age</b>					
20 or under (21-29 years)		1.14 (.69)	1.15 (.69)	1.13 (.61)	1.19 (.88)
30 or over		1.45 * (1.76)	1.32 (1.23)	1.31 (1.21)	1.32 (1.24)
<b>Education</b>					
High school graduate (Less than HS)		.97 (-.14)	1.01 (.64)	1.03 (.16)	1.01 (.03)
Some college		.74 (-1.28)	.76 (-1.09)	.80 (-.87)	.76 (-1.08)
College graduate		1.88 (1.53)	1.99 (1.63)	2.07 * (1.71)	2.08 * (1.72)
Has 1 or more other children		.61 *** (-2.71)	.59*** (-2.80)	.58 ** (-.00)	.59** (-2.72)
Late or no prenatal care		1.59 *** (2.84)	1.51 ** (2.42)	1.50 ** (2.36)	1.40 * (1.92)
Smoked		2.16 *** (4.28)	2.19 *** (4.22)	2.22 *** (4.27)	2.17 *** (4.11)
Used drugs or drank alcohol		2.42 *** (3.51)	2.44 *** (3.41)	2.67 *** (3.69)	2.64 *** (3.6)
<b>Health</b>					
Excellent (Fair or poor)		.84 (-.60)	.78 (-.85)	.80 (-.74)	.80 (-.73)
Very good		.71 (-.28)	.70 (-1.18)	.72 (-1.12)	.71 (-1.12)
Good		.92 (-.28)	.90 (-.34)	.93 (-.23)	.91 (-.30)

(Table 3 Continued)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
	<i>Race/Ethnicity &amp; Immigra- tion</i>	<i>SES &amp; Health Behaviors</i>	<i>Support &amp; Attitudes</i>	<i>Mother's Relationship to Father</i>	<i>Father Involve- ment</i>
<b>Mother's Social Support and Attitudes</b>					
<b>Neighborhood Context</b>					
Very safe (Unsafe or very unsafe)			.95 (-.20)	.95 (-.20)	.96 (-.18)
Safe			.85 (-.82)	.84 (-.93)	.92 (-.42)
Number of years in neighborhood			1.01 (1.36)	1.01 (1.22)	1.01 (1.15)
<b>Religious Service Attendance</b>					
Once a week or more (Never)			.76 (-1.00)	.75 (-1.03)	.73 (-1.12)
Several times a month			1.00 (.01)	.98 (-.07)	.97 (-.10)
Several times a year			.9 (-.42)	.89 (-.45)	.93 (-.26)
Hardly ever			.84 (-.75)	.84 (-.75)	.86 (-.64)
High perceived family support			1.07 (.16)	1.03 (.07)	1.04 (.10)
Mother lived with parents at age 15			1.14 (.78)	1.15 (.81)	1.22 (1.14)
Traditional marriage values			1.02 (.42)	1.01 (.26)	1.03 (.58)
Traditional gender values			1.09 (1.30)	1.11 (1.45)	1.09 (1.30)
Considered an abortion			1.16 (.90)	1.20 (1.08)	1.15 (.82)
<b>Mother's Relationship with Father</b>					
Romantic (Cohabiting)				1.42 ** (2.0)	
Other				.71 (-1.39)	
Father suggested an abortion					.68 (-1.60)
Received money from father					.67 ** (-2.08)
Number of observations	1637	1583	1527	1527	1490
Degrees of freedom	4	16	28	30	30

(Continued)

(Table 3 continued)

chi2	14.26	84.57	91.49	101.39	95.12
Prob > chi2	.00	.00	.00	.00	.00
Pseudo R2	.01	.07	.08	.08	.08
Model Comparison Test <sup>b</sup>					
Degrees of freedom		12	12	2	2
chi2		68.69	8.49	9.55	5.87
Prob > chi2		0.00	.75	.01	.05

\*p < .10 \*\*p < .05 \*\*\*p < .01 (Z-scores in parentheses)

<sup>a</sup> The odds ratio represents the effect of the independent variable relative to the reference category (in the case of dichotomous variables) and the effects of a one unit increase in the independent variable (in the case of continuous variables).

<sup>b</sup> Compares the explanatory power of each incremental model (with the new set of variables) to the previous nested model (without the new set of variables) and indicates whether the new set of variables significantly increases the explanatory power of the model. Note that models 4 and 5 are each compared to model 3.

In Model 2, we add several controls for socioeconomic<sup>4</sup> and health characteristics. It is important to note that based on cross-tabulations by race and ethnicity (not shown here), the Mexican American and black unmarried mothers were quite similar in terms of socioeconomic status and prenatal care use but differed markedly in terms of risky health behaviors. The vast majority of both Mexican Americans and blacks had very low educational attainment. Nearly 90% of Mexican Americans and 76% of blacks had a high school education or less. The rates of late or no prenatal care for both groups, although slightly higher for Mexican Americans, was over 25 percent. In contrast, Mexican American mothers were much less likely to smoke and to use drugs or alcohol during pregnancy than non-Hispanic black mothers.

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<sup>4</sup>In the models presented in Table 3, we did not control for income. Although income is a theoretically important determinant of birth outcomes, it is known to be correlated with parents' relationship status and therefore was expected to bias the estimated effect of the latter variable (in Models 4 and 5). Indeed, 43% of the cohabiting parents were on public assistance compared to 49% of those who were romantically involved but not cohabiting. In separate regressions not shown here, we included a variable for whether or not the mother was on public assistance (a crude proxy for income level), and found the results to be invariant to the inclusion of this measure, probably because the difference in public assistance rates was fairly modest between cohabiting and non-cohabiting romantically involved couples in this sample.

The results from Model 2 show that independent of race/ethnicity and immigrant status, mother's education does not have a significant effect on the probability of low birthweight. Unmarried mothers who are 30 or older are almost 50% more likely to have a low birthweight baby than are mothers between the ages of 21 and 29. Mothers who have at least one other child are 40% less likely to have a low birthweight baby than mothers who have no other children. The results from Model 2 also show that risky health practices have large effects in the hypothesized directions on low birthweight. Obtaining prenatal care late in the pregnancy or not at all, smoking during pregnancy, and using drugs or alcohol during pregnancy, all dramatically increase the probability of low birthweight.

Although the addition of the second set of variables increases the explanatory power of the model (see note b in Table 2), we find when comparing Model 2 to Model 1 that the low birthweight advantage of Mexican Americans remains even when controlling for socioeconomic and health characteristics. That is, controlling for socioeconomic status and health characteristics does not narrow the low birthweight gap between Mexican American and black mothers in this sample.

Model 3 incorporates a set of variables measuring mother's social support and her values and attitudes. We find these variables have virtually no effect on the relative probability of low birthweight of Mexican Americans. However, the age effect for mothers 30 and over found in Model 2 decreases with the inclusion of this new set of variables, indicating that older mothers have more social support than mothers age 20 or under. All of these new variables are insignificant, however. Moreover, they sometimes are inconsistent, and in certain cases are opposite in sign to what was expected. For example, both extremely low and extremely high rates of religious service attendance (versus no attendance) decrease the likelihood of low birthweight, and a high level of perceived family support, having lived with both biological parents at age 15, and traditional values all increase the probability of low birthweight. Finally, this set of additional variables does not significantly improve the explanatory power of the model.

The effects of father involvement on low birthweight, the major focus of this paper, are examined in Models 4 and 5. Model 4 incorporates the parents' relationship status, and Model 5 instead incorporates father's financial contributions during pregnancy and whether the father suggested that the mother have an abortion. Parent's relationship status and father's financial support were not included together in the same model because 95% of the cohabiting mothers received financial support, and thus it was

impossible to disentangle the two effects. We are interested in both the estimated effects of father involvement and whether these measures 'explain' the racial/ethnic differences in low birthweight. Indeed, we find that father involvement is strongly related to low birthweight. From Model 4, we see that mothers who are romantically involved with the father but who do not cohabit have almost a 1½ times greater likelihood of delivering a low birthweight baby than do mothers who cohabit. Paradoxically, however, mothers who have little or no relationship with the baby's father are not at risk for low birthweight compared to mothers who are cohabiting, suggesting that the most volatile mother-father relationships may be among couples who are romantically involved but not cohabiting.<sup>5</sup> In Model 5, we find that having received financial support from the baby's father has a negative effect on the likelihood of low birthweight, again suggesting beneficial effects of father involvement. Mothers who received money (or purchased items) from the baby's father during pregnancy are 2/3 as likely to deliver a low birthweight baby as those who did not (although the coefficient is only marginally significant). Finally, we find that the inclusion of relationship status or the other measures of father involvement does little to explain the "Mexican paradox," although both do significantly increase the explanatory power of the model.

### Discussion

This study extends the research on factors influencing birth outcomes by examining the effects of father involvement on the probability of low birthweight for a population that is particularly vulnerable to poor birth outcomes—unmarried mothers. The descriptive analysis showed that unmarried mothers are at a real disadvantage relative to married mothers in terms of many risk factors for low birthweight. They have lower education, engage in more risky behavior, and have less social support than their married counterparts. The analysis underscores that unmarried mothers are not a homogeneous group and that many risk factors for low birthweight, such as prenatal care use and risky health practices, vary by the relationship status of these parents. In addition, the more "marriage-like" the relationship between unmarried parents, the higher the levels of father involvement in

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<sup>5</sup>The difference in the likelihood of low birthweight between the "romantic but not cohabiting" group and the "other" group in Model 4 is highly significant.

terms of material support provided during pregnancy and his support for not terminating the pregnancy.

This paper has shown that *among romantically involved unmarried couples*, those who are cohabiting have a birthweight advantage compared to those who do not cohabit, and that for all unmarried couples the father's financial contributions are linked to lower rates of low birthweight. These effects appear not to operate through prenatal care,<sup>6</sup> but may operate through the mother's health or other behaviors. As pointed out by Teitler (2001), however, one must be careful about making causal inferences based on these results since father involvement is likely endogenous to low birthweight. In other words, a poor expected birth outcome may affect the parents' living arrangements or the father's financial contributions during pregnancy. Thus, it may be incorrect to conclude that parents' father involvement *affects* low birthweight. Moreover, there may be important omitted variables that are correlated with father involvement that also may affect low birthweight, such as the father's desire to have the child. In this particular case, we controlled for whether the father had suggested that the mother have an abortion, which may control for father's wantedness. However, there remains the possibility that there are other important omitted variables that confound the estimated effects of father involvement.

This study also explored whether father involvement and other forms of social support explain racial and ethnic disparities in birth outcomes, particularly between Mexican Americans and blacks. Consistent with national figures, we find that the rate of low birthweight among black unmarried mothers in our sample (16 percent) is more than twice that of the Mexican American unmarried mothers (7 percent). In the US as a whole, the rate of low birthweight among unmarried black mothers was 14.5% in 1992 (Ventura, 1995). Statistics on Mexican Americans by marital status are not available, but the rate of low birthweight in our sample of unmarried Mexican mothers is similar to that in the overall US population of Mexican Americans, which was 5.9% in 1996 (Ventura, Martin, Curtin, Matthews & Park, 2000). All in all, however, the multivariate analyses indicated that although age, father involvement, and health practices are significant predictors of low birthweight, these variables do not explain racial and ethnic differences between Mexican Americans and blacks in our sample of high-risk mothers.

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<sup>6</sup>When Models 4 and 5 were run without prenatal care (results not shown), the effects of parents' living arrangements were unchanged and the positive effect of father's financial support increased by 5 percentage points in Model 5 (i.e., the odds ratio for father's financial support went from .67 to .62 by excluding prenatal care).

Surprisingly, we find no significant difference in the likelihood of low birthweight between whites and blacks. In fact, the rate of low birthweight in our sample of white unmarried mothers (15 percent) differs considerably from the most current national figure of 7.9 percent (Ventura, 1995) and is even higher than the corresponding national figure for blacks (14.5%). It is thus clear that our urban sample of non-Hispanic white mothers is not representative, at least in terms of birth outcomes, of the population of non-Hispanic white mothers in the US as a whole. Higher than average rates of low birthweight among whites in extremely economically disadvantaged areas is not unique to these data. For example, Reichman and Pagnini (1998) found much narrower racial disparities in Camden than in the 5 other largest cities in New Jersey, mainly because the rate of low birthweight among non-Hispanic whites was very high in that city. Another study using national data (Starfield et al., 1992) revealed that although there is a significant difference in the average birthweight of babies born to white and black women, there is no such difference among women who are very poor.

In the same vein, many demographic and social factors expected to influence low birthweight, such as immigrant status, education, and social support, did not have significant effects on the birth outcomes of unmarried mothers in this sample. Indeed, our findings support a growing body of research on birth outcomes among high-risk populations that suggests that traditional risk factors operate differently for certain high-risk groups than they do in the general population. Protective factors commonly associated with better birth outcomes do not seem to work for this population. In a study of blacks and whites in Chicago, Collins and David (1990) found that among blacks with very low incomes, maternal age, education, and marital status played very weak roles in predicting low birthweight. Similarly, a study by Sherraden and Barrera (1996b) of Mexican immigrant women in Chicago showed that although family support does improve birth outcomes, it does not protect women living in extreme poverty. In sum, future research on low birthweight should focus on the unique dynamics that may explain the poor outcomes among high-risk populations.

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