Journal of Family Issues

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Retrospective Reports of Pregnancy Wantedness and Child Well-Being in the United States

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Survey estimates indicate that about one half of all U.S. pregnancies that result in birth are reported as unwanted or mistimed. As a result, there is substantial interest in the association between pregnancy wantedness and infant and child well-being. The objective of this study is to expand our knowledge of the effects of pregnancy wantedness on several measures of child well-being using the National Maternal and Infant Health Survey–Longitudinal Follow-up data. The results indicate that pregnancies retrospectively classified as unwanted or mistimed are associated with overall worse measures of child well-being across all three outcome measures that are employed. These associations are generally weakened, but not eliminated, with controls for a number of biologic and social risk factor control variables. Program interventions that alleviate some of the negative circumstances associated with unwanted and mistimed pregnancies may work to reduce the health and developmental disadvantages experienced by these children.

Keywords: *wantedness; pregnancy; children; well-being*

Despite the widespread availability of effective contraceptive techniques in the United States, almost one half of all pregnancies are unintended (National Center for Health Statistics [NCHS], 1999), and 90% of Americans believe that unplanned pregnancies are at least a "somewhat big problem" (Mauldon & Delbanco, 1997). Consequently, research on unintended pregnancy has received increasing interest in the scientific and popular literatures. For example, a recent issue of *Scientific American* (Holloway, 1999) highlighted the work of two researchers, Steven D. Levitt and John J. Donohue III, who proposed that the legalization of

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abortion served to reduce the number of unwanted children in the United States, which in turn reduced the pool of individuals most likely to become criminals. Likewise, Levine et al. (cited in Holloway, 1999, p. 24) estimated that aborted children, had they been born, "would have been 40% to 60% more likely to live in a single-parent family, to live in poverty, to receive welfare, and to die as an infant."

Although the above, well-publicized studies focus on the impact of legalized abortion, they indirectly suggest that childbearing stemming from unintended pregnancies may also be associated with negative outcomes for children. Other studies also support this possibility. Pregnancy unwantedness has been associated with inadequate prenatal care utilization and maternal alcohol and tobacco use (Kost, Landry, & Darroch, 1998; Miller, 1992; Weller, Eberstein, & Bailey, 1987) and higher risks of low birth weight and infant mortality (Sable et al., 1997; Hummer, Schmertmann, Eberstein, & Kelly, 1995; Marsiglio & Mott, 1988). Indeed, a well-publicized report published by the Institute of Medicine (1995) concluded that women who did not intend to become pregnant were more likely to expose their fetus to harmful substances and that these infants were at greater risk of poor birth outcomes, such as low birth weight.

Only recently have researchers begun to examine the effects of pregnancy wantedness on children's health past infancy or on developmental outcomes, such as their cognitive, emotional, and academic development (Barber, Axinn, & Thorton, 1999; Baydar, 1995; Joyce, Kaestner, & Korenman, 2000). The objective of this study is to expand our knowledge of the effects of pregnancy wantedness on the well-being of preschool-aged children. This entails looking at both developmental and health outcomes.

LITERATURE REVIEW

CONCEPTUAL ISSUES RELATED TO PREGNANCY WANTEDNESS

A review of the literature reveals that the terms "unwanted," "unintended," and "mistimed" were once used synonymously, but changes in social norms regarding pregnancy have modified the use of these terms over the years. Prior to the 1960s, all pregnancies within marriage were generally considered wanted and all pregnancies occurring outside of marriage were generally deemed unwanted. During the 1970s, however, unwanted marital fertility became more openly acknowledged, as did

wanted pregnancy outside of marriage. It is thought that the legalization of abortion provided the impetus for these attitudinal shifts (Petersen & Moos, 1997).

Nevertheless, *wantedness* is conceptually different from *intendedness*. As one of the first researchers to grapple with this dissimilarity, Miller (1974) defined intendedness as a woman's desire for conception, whereas wantedness refers to a woman's feelings about her pregnancy subsequent to conception. This article examines child health and development outcomes associated with wantedness. Barber et al. (1999) further distinguished between "unwanted pregnancy" and "unwanted childbearing," explaining that "the consequences of becoming *pregnant* without wanting to do so are likely to be quite different from the consequences of actually *giving birth* to a child resulting from an unwanted pregnancy" (p. 233). In this study, wantedness refers to pregnancy rather than childbearing because the classification of the pregnancy as unwanted refers to the mothers' assessment while thinking back to the time just prior to conception.

Another issue in the measurement of pregnancy wantedness concerns the timing of the assessment. Women's feelings about pregnancy may change over time and in response to changing conditions. For example, improved socioeconomic conditions or the newfound joy of caring for a child may influence a mother's evaluation of a specific pregnancy so that some children born from an unwanted pregnancy are wanted by the time of their birth and afterwards. This change in feelings is referred to as "ex post" rationalization (Lloyd & Montgomery, 1996). Contrariwise, strained relations with the child's father and/or the negative reactions of family and friends to the pregnancy could influence a woman to evaluate the pregnancy as unwanted despite the fact that the pregnancy was considered wanted at the time of conception (Barber et al., 1999). In fact, research shows that pregnancy intentions sometimes vary by partner and may also be particularly unstable among unmarried women (see Zabin, Huggins, Emerson, & Cullins, 2000).

This study uses a measure of pregnancy wantedness established from maternal reports when her child was approximately 16 months to 18 months old. Although this may be a limitation because the mother's feelings may have changed over time, Lloyd and Montgomery (1996) argued that this time lag is more likely to result in mothers reporting that the child was the product of a wanted pregnancy. Similar to Kost et al. (1998), we expect, then, that some mothers misclassified unwanted pregnancies as wanted. As a result, estimates of the relationship between wantedness and child well-being are likely to be conservative (also see Weller et al., 1987).

PREGNANCY WANTEDNESS AND CHILD OUTCOMES

A number of studies have linked pregnancy wantedness with the risk of adverse birth outcomes and infant survival. Using the Missouri Maternal and Infant Health Survey, Sable et al. (1997) indicated that women who categorized their pregnancies as unwanted or mistimed during an early prenatal visit were more than 2 times as likely to have children who died within the first 28 days of life. Other studies, however, show a more modest effect of pregnancy wantedness. Using data from the National Longitudinal Survey of Youth, Marsiglio and Mott (1988) found that retrospectively reported unwantedness is modestly related to the risk of low birth weight, by working through delayed prenatal care and lower maternal weight gain. Similarly, using the 1980 National Natality Survey, Weller et al. (1987) found that women who classified their pregnancies as unwanted or mistimed received less timely prenatal care than women who classified their pregnancies as wanted. These women were also less likely to quit smoking during pregnancy. Hummer et al. (1995), using the data from the National Maternal and Infant Health Survey (NMIHS) (the same baseline data set used in the present analysis), also found a moderate association between pregnancy wantedness and the risk of low birth weight. Their analysis also found that controls for maternal background factors (e.g., race/ethnicity, household income, father's residence in the household) sharply reduced this association, suggesting that the social background characteristics of women "are of even greater significance than more proximate maternal attitudes and behaviors" in influencing birth outcomes (p. 416).

The association between pregnancy wantedness and children's later health and development has received far less attention. A longitudinal study of births in Czechoslovakia to women who were denied a request for an abortion (by both the district and regional abortion commissions) revealed that these children tended to experience behavioral problems in early childhood and had lower levels of school achievement in later years (David & Matejcek, 1981). The authors suggested that differences in the development of unwanted children and wanted children are evident long into adolescence and therefore concluded that unwantedness during early pregnancy incurs certain adverse consequences for many years. Similarly, Baydar (1995) hypothesized that unwantedness may effect children's cognitive, behavioral, and emotional development. One reason for this association might be that a mother may be more likely to classify her child as unwanted if she considers her social and economic circumstances as pre-

carious. Empirical results provide some support for this possibility. Baydar (1995) found that mistimed and unwanted children are more likely to be developmentally disadvantaged than children who were wanted, and they also scored significantly lower on a scale measuring opportunity for skill development.

A recent study by Joyce et al. (2000), using the National Longitudinal Survey of Youth, investigated the association of unwanted pregnancy with infant and child health and development, taking into account the fact that the association between pregnancy wantedness and child development is sensitive to controls for maternal characteristics and family background. The study revealed that controlling for family background factors greatly reduces the relationship of unwanted pregnancy with maternal behaviors related to infant health (e.g., prenatal care utilization, smoking) and with child development measures. The authors do concede, however, that the inclusion of such a comprehensive set of family background factors may in fact mask the effects of pregnancy wantedness, in that many of these variables may serve as the "mechanisms through which unintended pregnancy affects child outcomes" (p. 93). Nonetheless, even in models that adjust for fewer controls but take into account family background, the authors found a weak relationship between unwanted pregnancy and child-development outcomes. Consequently, they "challenge the notion that unwanted pregnancy harms infant health and child development" (p. 93).

Other research suggests that unwanted pregnancy is associated with lasting tension between parents and their children. This finding is particularly salient, given that this tension serves to threaten a relationship that can "improve other aspects of [the child's] well-being" (Barber et al., 1999, p. 231). Indeed, they find that mothers with unwanted births have lower quality relationships with their children that appear to persist into adulthood. For example, these children spend less leisure time outside the home with their mothers.

Overall, most studies suggest that there are negative child outcomes associated with unwanted pregnancy and childbearing, but other research finds little evidence of a net relationship, especially after taking into account the social background characteristics of women. The purpose of this research is to further examine and expound on the association between pregnancy wantedness and child outcomes, specifically early childhood health and development. We investigate the associations between retrospectively reported pregnancy wantedness and three global indicators of child well-being: maternal reports of child health, activity level, and overall development. We expect that unwanted pregnancies will be associated with the poorest indicators of child well-being, although this relationship

may, at least in part, be due to the social and demographic background characteristics that are associated with both reports of pregnancy wantedness and child outcomes (e.g., Hummer et al., 1995; Joyce et al., 2000).

DATA AND METHODS

DATA

We use the 1988 NMIHS and its 1991 Longitudinal Follow-up (NMIHS-LF), administered by the NCHS, as the data source. The 1988 NMIHS, a mail-out–mail-back survey, was undertaken to study factors related to poor pregnancy outcomes, such as maternal health behaviors (e.g., smoking), maternal attitudes (e.g., pregnancy wantedness), and pregnancy and delivery complications (NCHS, 1991). The 1988 NMIHS is a nationally representative sample of births that occurred in the United States in 1988. From the 3,898,922 live births to women between 15 and 49 years of age, a sample of 9,953 was drawn from the vital records of 48 states and the District of Columbia, with Black and low-birth-weight infants oversampled. Thus, shortly after (i.e., 16-18 months) the birth of the infant, the 9,953 mothers answered a series of questions about their pregnancy, the birth of the infant, and the infant's health. Many of the predictor variables in this analysis, including pregnancy wantedness, are taken from the 1988 NMIHS.

The 1991 NMIHS-LF includes all mothers from the 1988 NMIHS birth sample who were successfully followed up and whose child was alive at the time of the 1991 reinterview ($N = 8,285$). The NMIHS-LF, also a mail-out–mail-back survey, contains a large set of health and development outcome measures that are intended to gauge the overall well-being of the 1988 birth cohort at the age of 3 (NCHS, 1995). The 1991 NMIHS-LF also contains social and economic variables (e.g., household income, marital status) that may have changed from the baseline survey. Thus, our analysis uses the two-wave NMIHS and NMIHS-LF data set, with most predictor variables taken from the 1988 NMIHS and all outcome measures taken from the 1991 NMIHS-LF.

Because birth outcomes are an important control variable in the analysis, we exclude children whose birth weights were reported to be less than 500 grams (g), with the assumption being that a majority of these cases are misclassified stillbirths or misreports of birth weight. Similarly, only those births that occurred at more than 22 weeks and less than 50 weeks of gestation were included. This is because reports of gestational age outside

of this range are also implausible. Children with severe congenital limitations (e.g., Down's syndrome, spina bifida, cerebral palsy) are also excluded because these health conditions, although unrelated to pregnancy wantedness, most likely directly influence women's assessments of their children's health and development. In addition, a number of cases were dropped from the analysis because the mother's questionnaire was missing or incomplete in 1988 and/or 1991. Likewise, race/ethnic groups other than non-Hispanic Whites, non-Hispanic Blacks, and Mexican Americans were deleted from the sample because of their very small sample sizes. This resulted in 6,971 cases selected for analysis.

MEASURES

Pregnancy wantedness. In the 1988 NMIHS, wantedness is captured by a single question that was asked of women about 16 to 18 months after the birth of the target child: "Thinking back, just before you became pregnant, did you want to become pregnant at that time?" (NCHS, 1991). Response categories were as follows: (a) "I wanted this pregnancy at an earlier time, as well as that time"; (b) "I wanted to become pregnant at that time"; (c) "I did not want to become pregnant at that time, but I wanted another child sometime in the future"; and (d) "I did not want to become pregnant at that time, or at any time in the future." For ease of presentation, we refer to these four responses as *delayed*, *well-timed*, *mistimed*, and *unwanted*. The distribution in Table 1 shows that about 37% of the women said that their pregnancies were wanted at the time of conception (i.e., well-timed), whereas another 36% of the women retrospectively classified their pregnancies as mistimed (i.e., they indicated that they wanted to become pregnant but sometime in the future). In addition, 20.5% of the women classified their pregnancies as delayed, and 6.7% of the women said that at the time of conception, they did not want to get pregnant then or anytime in the future.

Child outcomes. We employ three global measures of child well-being from the NMIHS-LF, including a maternal report of overall child health, a measure of child activity level, and a short version of the Denver Development ment Scale, which measures overall child development.

The health indicator consists of a single 5-point measure that ranges from *poor* to *excellent*. The utility of using such a measure in making estimates of the health of national populations and sociodemographic subgroups of the population has been recognized in many studies. Indeed,

self-assessed health status among adults is highly correlated with clinically evaluated health status, the use of health care services, and subsequent mortality risk (Idler & Benyamini, 1997). Others have used parental reports of child health to examine differentials across income, race/ethnic, and marital status groups (e.g., Montgomery, Kiely, & Pappas, 1996). Here, maternal reports of child health (collected in the 1991 reinterview) are recoded into three categories: (a) poor/fair, (b) good, and (c) very good/excellent. The fair and poor categories were combined because of the very small number of children in the poor category. The excellent and very good categories were also combined because preliminary results showed no significant differences between these two categories. However, a mother's evaluation of her child's health as good rather than as very good or excellent implies that there may be some health condition(s) dissuading her from rating the child as being at or near optimum health. Hence, good stands as a separate category in this analysis, which we consider to be less than optimum. The categories were converted into a series of dummy variables, where the very good/excellent category serves as the reference. The distribution (see Table 1) reveals that more than 80% of mothers consider their children to be in very good or excellent health, 12.8% report that their children are in good health, and 3.1% report that their children are in fair or poor health.

Child's activity level is our second outcome measure. Inactivity in children is associated with poorer health, although children who are classified as overactive or too active are likely to be identified as having behavioral problems (Newacheck, 1994). The 1991 NMIHS-LF asked mothers whether their child was very inactive, not very active, moderately active, very active, or too active, with the too active response meaning that the child "won't sit still for meals or at other times for more than five minutes" (NCHS, 1995). We recoded this variable into four categories by grouping together those children who are reported to be very inactive or not very active. The distribution shows that 2.3% of the children in the sample fall into this group, whereas 25.4% are moderately active, 64.1% are very active, and 8.1% are reported to be too active.

The Denver Development Screening Test is used to assess child development on a 16-point scale that captures personal-social, fine-motor, language, and gross-motor skills. Although the original intent of the test was to screen for mental retardation in children, the test is now widely used to identify biologically and environmentally vulnerable children (Frankenburg, Dodds, Archer, Shapioro, & Bresnick, 1992). The NMIHS-LF asked mothers whether their child had ever performed 14 specific activities (e.g., did a somersault, named three colors) and whether they knew their

own age and their own sex. The responses, yes = 1 and no = 0, were summed to create the Denver Developmental Score (DDS), with a mean score of about 12 in the sample (NCHS, 1995). To create categories of the DDS for analysis, the distribution was divided into three groups, roughly approximating the top and bottom quintiles and the middle 60%. Because of heaped scores at points along the scale, the top and bottom groups do not each contain exactly 20% of the distribution (see Table 1).

Control variables. Child demographic characteristics include age, sex, and race/ethnicity. Child's age is measured as a continuous variable, in months. In the 1991 NMIHS-LF, the mean age of children is 34.9 months. Child's sex is measured as a dichotomous variable, where female serves as the reference category. Race/ethnicity refers to the self-reported race/ethnicity of the mother. The operationalization of race/ethnicity in this manner is consistent with the literature on young child outcomes (see Rogers, 1989). Race/ethnicity is specified in three categories, where Mexican Americans are distinguished from non-Hispanic Blacks and non-Hispanic Whites.

We also control for biological characteristics of the child: birth outcome and birth order. The literature on pregnancy wantedness suggests that birth outcome is one mechanism that may link pregnancy wantedness to child health and development. Here, birth outcome is measured by the five-category Yerushalmy (1967) scheme. The Yerushalmy categorization distinguishes very low birth weight (< 1500 g) infants from those of moderately low weight (1500-2499 g), and normal (+2500 g) weights. Moderately low weight infants are further subdivided into either a growth-retarded (37+-week gestation) or premature (≤ 36-week gestation) category. The scheme distinguishes between premature and full-term normal weight infants, which have significantly different rates of infant mortality and morbidity. The 2500+ g, > 37 weeks category is considered to be the optimal category and is used as the reference group in the regression models. Furthermore, birth order is coded into three categories: (a) first births, (b) second births, and (c) third or higher order births. Second births serve as the reference category.

Social risk factors that may influence child health and development measures include maternal education, maternal age, marital change, and an index of poverty status. Maternal education consists of years of school completed and is captured in a series of dummy variables that classify the respondents into three groups: those with less than a high school education, those with a high school education, and those with any college experience or more. The high-school-plus group serves as the reference

TABLE 1
Descriptive Statistics for Pregnancy Wantedness,
Outcome Measures, and Control Variables

Item	% Distribution
Pregnancy wantedness	
Well-timed	36.8
Delayed	20.5
Mistimed	36.0
Unwanted	6.7
Child well-being outcome measures	
Maternal report of child health	
Very good/excellent	84.1
Good	12.8
Fair/poor	3.1
Maternal report of child activity level	
Very active	64.1
Overactive	8.1
Moderately active	25.4
Very inactive/not very active	2.3
Denver Development Score	
Top 20%	25.1
20% to 80%	59.6
Bottom 20%	15.3
Child demographic characteristics	
Sex	
Female	48.0
Male	52.0
Child's age (mean and standard deviation in months)	34.9 (4.4)
Race/ethnicity	
Non-Hispanic White	74.7
Non-Hispanic Black	17.2
Mexican American	8.1
Biologic characteristics	
Birth outcomes	
Normal (+2500 g, +37 weeks)	88.7
< 1500 g	1.0
1500 g to 2499 g, < 37 weeks	2.8
1500 g to 2499 g, 37+ weeks	2.6
2500+ g, < 37 weeks	4.9
Birth order	
First	34.6
Second	31.1
Third or higher order	34.3
Social risk factors	
Mother's age	
< 20 years	12.2

TABLE 1 (continued)

Item	% Distribution
20 to 29 years	59.0
30+ years	28.8
Mother's education	
< 12 years	16.6
12 years	40.4
13+ years	43.0
Marital change	
Married to same person both times	65.7
Never married	15.4
Married to different person at Time 2	6.3
Married Time 1, widowed/divorced/separated Time 2	5.9
Widowed/divorced/separated Time 1, widowed/divorced/separated Time 2	4.0
Other	2.7
Poverty index	
Poverty neither time period	61.6
Poverty Time 1 only	11.3
Poverty Time 2 only	9.8
Poverty at both times	17.2

SOURCES: 1988 National Maternal and Infant Health Survey (NCHS, 1991) and the 1991 Longitudinal Follow-up (NCHS, 1995).
NOTE: $N = 6,971$.

category. Maternal age is measured by the respondent's age in years when the child was born. Respondents were then classified into three categories, 15 to 19, 20 to 29, and 30+, which were then converted to dummy variables. The 30+ category serves as the reference group. The marital change variable captures transitions in marital status between the time of the first (1988 NMIHS) and second (1991 NMIHS-LF) interviews. Controlling for marital status change is important because it may have influences on both child health and development (Zabin et al., 2000). Respondents were separated into six categories: (a) married to the same person at both times, (b) never married at either time, (c) married to someone different at Time 2, (d) married at Time 1 but widowed, divorced, or separated by Time 2, (e) widowed, divorced, or separated at both Time 1 and Time 2, and (f) other rare marital status changes. These categories were then converted to dummy variables, where married to the same person at both times is the reference category. The poverty index captures household economic status. This measure takes into account household income relative to family size and compares it to the government definition of poverty. Respondents

were then classified as being at poverty at Time 1 only, being in poverty at Time 2 only, being in poverty at both times, or never being in poverty, which serves as the reference category.

METHOD

We estimate child well-being measures as functions of pregnancy wantedness and control variables with multinomial logistic regression models that take into account the categorical operationalizations of the dependent variables (Powers & Xie, 2000). We begin with models of child well-being that include only the pregnancy wantedness variable. We then add the child demographic factors, birth outcome measures, and social risk factors to the baseline models, one set at a time. The pregnancy wantedness coefficients are compared to the previous regression models so that we may discern whether differences in the control variables account for any of the association between pregnancy wantedness and child well-being. Coefficients are reported in the form of odds ratios. All analyses are weighted to adjust for sampling probabilities, but the standard errors are based on actual sample sizes.

RESULTS

Child health. Table 2 presents odds ratios depicting the relationship between pregnancy wantedness and maternal reports of child health. The omitted category for the child health outcome is very good/excellent. Thus, odds ratios above 1 indicate poorer health. In the initial model, pregnancy wantedness is associated with maternal reports of child health in expected directions. That is, children whose mothers described their pregnancies as unwanted appear to be faring less positively than children whose mothers retrospectively reported that their pregnancies were well-timed. The mistimed category also exhibited higher odds of being in fair or poor health (odds ratio = 1.38), as well as higher odds of being in good health (odds ratio = 1.39), compared to children whose pregnancies were described as well-timed.

Subsequent models of Table 2 present odds ratios for the relationship of wantedness with maternal reports of child health, controlling for child demographic, birth outcome, and social risk factors. Model 2 also reveals that children whose mothers reported that their pregnancies were unwanted appear to be faring less positively than children whose mothers reported that their pregnancies were well-timed, net of demographic

TABLE 2

Odds Ratios for the Relationship Between Pregnancy Wantedness and Maternal Reports of Child Health

	Model 1		Model 2		Model 3		Model 4	
	Fair/Poor	*Good*	*Fair/Poor*	*Good*	*Fair/Poor*	*Good*	*Fair/Poor*	*Good*
Pregnancy wantedness (well-timed)								
Delayed	1.37	0.97	1.42	1.00	1.39	1.00	1.43	1.01
Mistimed	1.38*	1.39*	1.26	1.28*	1.22	1.27*	1.03	1.15
Unwanted	2.01*	1.58*	1.70*	1.38*	1.49	1.35*	1.22	1.22
Child demographic characteristics								
Sex (female)								
Male			1.10	1.26*	1.13	1.27*	1.10	1.27*
Child's age, continuous in months			1.01	0.99	1.01	0.99	0.98	0.98*
Race/ethnicity (non-Hispanic White)								
Mexican American			2.33*	2.82*	2.29*	2.80*	1.54	2.19*
Non-Hispanic Black			1.81*	1.74*	1.63*	1.69*	1.41	1.28*
Biologic characteristics								
Birth outcomes (2500+ g, 37+ weeks)								
< 1500 g					3.61*	1.90*	3.57*	1.84*
1500 g to 2499 g, < 37 weeks					1.92*	1.20	1.83	1.12
1500 g to 2499 g, 37+ weeks					1.95	1.50*	1.67	1.37
2500+ g, < 37 weeks					1.26	1.06	1.10	1.04
Birth order (second)								
First					0.67*	1.02	0.71	1.03
Third or higher order					1.15	1.03	0.96	1.00
Social risk factors								

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Mother's age (30+ years)								
< 20 years							0.67	0.75
20 to 29 years							1.04	0.97
Mother's education (13+ years)								
< 12							3.02*	1.44*
12							1.62*	1.17
Marital change (married to same person)								
Never married							0.71	1.44*
Married to different person at Time 2							0.76	1.32
Married Time 1, widowed/divorced/separated Time 2							1.85*	1.77*
Widowed/divorced/separated Time 1, widowed/divorced/separated Time 2							1.29	1.23
Other							0.35	1.05
Poverty index (never in poverty)								
Poverty Time 1 only							1.95*	1.15
Poverty Time 2 only							1.75*	1.21
Poverty at both times							2.16*	1.45*
Intercept	−3.53*	−2.04*	−4.17*	−2.15*	−4.15*	−2.18*	−3.60*	−1.93*

SOURCES: 1988 National Maternal and Infant Health Survey (NCHS, 1991) and 1991 Longitudinal Follow-up (NCHS, 1995).
NOTE: Model 1, N = 6,933; Model 2, N = 6,932; Model 3, N = 6,913; Model 4, N = 6,799. Reference categories for predictor variables are in parentheses.
*$p \leq .05$.

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controls. However, further controlling for birth outcomes in Model 3 reduces the magnitude of the relationship between pregnancy wantedness and maternal reports of child health. In part, these reductions in magnitude are because pregnancy wantedness works partially through birth outcomes to influence later child health (e.g., Hummer et al., 1995; Marsiglio & Mott, 1988). However, even net of birth outcomes, children of mothers who reported that their pregnancies were mistimed or unwanted are still more likely to be in good (i.e., less-than-optimum) health compared to children whose mothers described their pregnancies as well-timed (odds ratios of 1.27 and 1.35, respectively).

Once the social risk factors are added in Model 4, the relationship between wantedness and maternal reports of child health is reduced to nonsignificance, although the general patterns observed in the previous models remain. Thus, at least for this one outcome variable, we find no association between pregnancy wantedness and child well-being once the full set of controls are included. Among the control variables, Mexican American mothers and Black mothers are much more likely to report that their children are in less-than-optimum health compared to non-Hispanic White mothers, as are mothers of boys. Mothers of children who are born at the very lowest weights (< 1500 g) are far more apt to report that their children are in fair or poor health across the models. Of the social risk factors, having 12 years or less of schooling or being in poverty at either Time 1, Time 2, or both times are strongly predictive of less-than-optimum child health. Furthermore, being married at Time 1 and not at Time 2 is also strongly associated with higher odds of a child being in less-than-optimum health.

Activity level. Table 3 presents odds ratios depicting the relationship of wantedness with maternal reports of child activity level. Note that the category very active is omitted, which is considered the optimal category. Children of mothers who described their pregnancies as unwanted are more likely to be described as too active compared to children of mothers who described their pregnancies as well-timed, even net of child demographic factors, birth outcomes, and social risk factors (odds ratio = 1.45 in Model 4). In contrast, mothers who described their pregnancies as delayed are less likely to report that their children are moderately active or too active across all four models compared to mothers who described their pregnancies as well-timed. Thus, in terms of child activity, pregnancies described as unwanted are associated with less desirable outcomes, whereas pregnancies described as delayed are associated with the most favorable outcomes.

TABLE 3
Odds Ratios for the Relationship Between Pregnancy Wantedness and Maternal Reports of Child Activity Level

	Model 1			Model 2			Model 3			Model 4		
	Inactive/ Not Very Active	*Moderately Active*	*Too Active*	*Inactive/ Not Very Active*	*Moderately Active*	*Too Active*	*Inactive/ Not Very Active*	*Moderately Active*	*Too Active*	*Inactive/ Not Very Active*	*Moderately Active*	*Too Active*
Pregnancy wantedness (well-timed)												
Delayed	0.69	0.81*	0.68*	0.73	0.78*	0.72*	0.72	0.77*	0.72*	0.76	0.74*	0.71*
Mistimed	1.17	0.69*	1.47*	1.02	0.73*	1.28*	0.99	0.72*	1.27*	1.01	0.80*	1.00
Unwanted	1.29	0.81	2.35*	1.04	0.95	1.76*	0.91	0.87	1.77*	0.93	0.93	1.45*
Child demographic characteristics												
Sex (female)												
Male				0.70*	0.74*	1.18	0.70*	0.74*	1.18	0.69*	0.74*	1.22*
Child's age, continuous in months				1.07*	0.99	1.02	1.07*	0.99	1.02	1.06*	1.00	1.00
Race/ethnicity (non-Hispanic White)												
Mexican American				2.18*	0.90	1.73*	2.08*	0.89	1.76*	1.61	1.05	1.18
Non-Hispanic Black				1.86*	0.51*	2.49*	1.74*	0.50*	2.50*	1.76	0.61*	1.97*

(continued)

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TABLE 3 (continued)

	Model 1			Model 2			Model 3			Model 4		
	Inactive/ Not Very Active	Moderately Active	Too Active	Inactive/ Not Very Active	Moderately Active	Too Active	Inactive/ Not Very Active	Moderately Active	Too Active	Inactive/ Not Very Active	Moderately Active	Too Active
Biologic characteristics												
Birth outcomes												
(2500+ g, 37+ weeks)												
< 1500 g							1.21	0.81	1.19	1.27	0.87	1.15
1500 g to 2499 g, < 37 weeks							1.38	1.12	1.47	1.29	1.12	1.33
1500 g to 2499 g, 37+ weeks							1.34	1.04	1.40	1.29	1.08	1.29
2500+ g, < 37 weeks							1.33	0.86	0.85	1.07	1.09	0.99
Birth order (second)												
First							0.83	0.88	1.01	0.88	0.94	1.02
Third or higher order							1.33	1.17*	0.94	1.31	1.14	0.84
Social risk factors												
Mother's age (30+ years)												
< 20 years										1.31	0.85	1.03
20 to 29 years										1.48	0.81*	1.26
Mother's education (13+ years)												
< 12 years										1.85*	0.66*	2.40*
12 years										1.08	0.77*	1.46*

Marital change (married to same person)											
Never married									0.49*	0.67*	1.04
Married to different person at Time 2									0.71	0.79	1.40
Married Time 1, widowed/divorced/separated Time 2									1.01	0.69*	1.32
Widowed/divorced/separated Time 1, widowed/divorced/separated Time 2									0.53	0.96	1.82*
Other									0.17	0.98	1.61
Poverty index (never in poverty)											
Poverty Time 1 only									1.42	1.10	1.27
Poverty Time 2 only									1.09	1.04	1.73*
Poverty at both times								1.59	1.01	1.68*	
Intercept	−3.32*	−0.74*	−2.24*	−5.88*	−0.30	−3.08*	−5.91*	−0.32	−3.11*	−0.26	−3.09*

SOURCES: 1988 National Maternal and Infant Health Survey (NCHS, 1991) and 1991 Longitudinal Follow-up (NCHS, 1995).

NOTE: Model 1, $N = 6{,}938$; Model 2, $N = 6{,}937$; Model 3, $N = 6{,}919$; Model 4, $N = 6{,}800$. Reference categories for independent variables are in parentheses.

*$p \leq .05$.

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Similar to the findings for child health, there are some marked differentials in child activity across social and demographic groups. As might be expected, mothers of boys are more likely to report that their sons are too active in the most comprehensive model but less likely to report that they are moderately active or inactive/not very active. Both Mexican American mothers and Black mothers are more likely to report that their children are too active or inactive/not very active as compared to non-Hispanic White mothers. However, only Black mothers are more likely to report that their children are too active once the social risk factors are taken into account. Furthermore, mothers with less than 12 years of schooling and who were in poverty at both times are more likely to report less desirable activity outcomes for their children.

DDS. Table 4 presents odds ratios depicting the relationships between pregnancy wantedness and the DDS, with the top 20% of children in the DDS serving as the reference group in the regression analysis. Children whose mothers described their pregnancies as unwanted are more likely to score in the middle and bottom levels of the DDS compared to children whose mothers described their pregnancies as well-timed, although these effects are diminished once the complete set of control variables are added to the model. As with the child health outcome, there is some indication that birth outcome is acting as a mechanism between pregnancy unwantedness and child development. Indeed, in comparing Model 3 to Model 2, the odds ratio for unwanted is decreased for the bottom 20% outcome category with the inclusion of birth outcome that, in turn, exhibits a very strong relationship with child development (Schendel et al., 1997). Children whose mothers described their pregnancies as mistimed are also somewhat more likely to score in the middle and bottom percentiles, even net of the controls. Thus, similar to the results seen for activity level above, wantedness—especially pregnancies described as unwanted or mistimed—is related to child well-being, although the effects diminish with the introduction of the birth outcome and social risk factor controls. Of further note, both Mexican American children and Black children are more likely to be in the bottom quintile, once all of the risk factors are taken into account. Such findings exhibit the continuing disadvantaged circumstances experienced by U.S. minority groups of children, even net of standard demographic and health controls (Padilla, Boardman, Hummer, & Espitia, 2002). Low maternal education and consistent childhood poverty are also strongly associated with less-than-optimum development scores among children, which also indicate the disadvantaged situations

TABLE 4
Odds Ratios for the Relationship Between Pregnancy Wantedness and Denver Development Score

	Model 1		Model 2		Model 3		Model 4	
	Bottom 20%	Middle 60%	Bottom 20%	Middle 60%	Bottom 20%	Middle 60%	Bottom 20%	Middle 60%
Pregnancy wantedness (well-timed)								
Delayed	1.02	1.23*	1.07	1.24*	1.04	1.23*	1.07	1.25*
Mistimed	1.40*	1.21*	1.36*	1.20*	1.34*	1.20*	1.22*	1.17*
Unwanted	2.09*	1.42*	1.89*	1.38*	1.61*	1.32*	1.31	1.21
Child demographic characteristics								
Sex (female)								
Male			2.87*	1.69*	2.95*	1.71*	3.15*	1.73*
Child's age, continuous in months			0.97*	0.97*	0.97*	0.97*	0.95*	0.96*
Race/ethnicity (non-Hispanic White)								
Mexican American			1.63*	1.25*	2.76*	1.44*	2.01*	1.27
Non-Hispanic Black			2.80*	1.44*	1.48*	1.21*	1.32*	1.15
Biologic characteristics								
Birth outcomes (2500+ g, 37+ weeks)								
<1500 g					4.79*	1.62	4.74*	1.59
1500 g to 2499 g, < 37 weeks					2.10*	1.33	2.00*	1.30
1500 g to 2499 g, 37+ weeks					1.96	1.40	1.71*	1.32
2500+ g, < 37 weeks					1.18	1.04	1.07	0.98
Birth order (second)								
First					0.60*	0.76*	0.58*	0.75*
Third or higher order					1.17	0.97	1.02	0.93

(continued)

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TABLE 4 (continued)

	Model 1		Model 2		Model 3		Model 4	
	Bottom 20%	*Middle 60%*	*Bottom 20%*	*Middle 60%*	*Bottom 20%*	*Middle 60%*	*Bottom 20%*	*Middle 60%*
Social risk factors								
Mother's age (30+ years)								
< 20 years							0.80	1.03
20 to 29 years							0.73*	0.92
Mother's education (13+ years)								
< 12 years							2.81*	1.67*
12 years							1.28*	1.14*
Marital change (married to same person)								
Never married							0.70*	0.85
Married to different person							0.86	0.98
Married Time 1, widowed/divorced/ separated Time 2							1.11	0.91
Widowed/divorced/separated Time 1, widowed/divorced/separated Time 2							0.92	1.06
Other							0.61	0.83
Poverty index (never in poverty)								
Poverty Time 1 only							1.62*	0.82*
Poverty Time 2 only							1.07	0.84
Poverty at both times							2.09*	1.36*
Intercept	−0.68*	0.73*	−0.36	1.60*	−0.29	1.68*	0.23	1.78*

SOURCES: 1988 National Maternal and Infant Health Survey (NCHS, 1991) and 1991 Longitudinal Follow-up (NCHS, 1995).
NOTE: Model 1, $N = 6,971$; Model 2, $N = 6,964$; Model 3, $N = 6,945$; Model 4, $N = 6,804$. Reference categories for predictor variables are in parentheses.
$*p \le .05$.

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that children in low socioeconomic status (SES) families face (Guo & Harris, 2000).

DISCUSSION AND CONCLUSION

The purpose of this article was to detail the association of maternal pregnancy wantedness with a number of measures of child well-being. Multinomial logistic regression analyses were conducted using data from the National Maternal and Infant Health Survey and its Longitudinal Follow-up to model these associations. Importantly, our models control for a comprehensive measure of adverse birth outcomes to best determine the net effect of wantedness during early childhood. Furthermore, we control for a number of social risk factors that can influence both reports of wantedness and child well-being.

Our findings indicate that pregnancy wantedness is associated with child well-being in expected directions for all three outcome measures. That is, children whose mothers described their pregnancies as unwanted or mistimed fare less well than children whose mothers described their pregnancies as well-timed in most of the models specified. These associations generally decreased in magnitude as the sets of control variables were taken into account, especially with the addition of the birth outcome and social risk-factor controls. In contrast, children of mothers who reported that their pregnancies were delayed generally did not fare worse— with one exception for the child health outcome measure—than children of mothers who reported that their pregnancies were well-timed. Indeed, the pregnancies that are described as delayed may be even "more wanted" than those that are well-timed.

Understanding the association between wantedness and developmental and health outcomes among children is important in formulating policy. Baydar (1995) related that an awareness of the consequences of wantedness is essential to the evaluation of intervention programs, including issues related to contraception use and access to abortion. Moreover, Miller (1992) related that the association between unwanted childbearing and participation in health-promoting programs is important, in that the "motivational factors associated with reluctant parenthood surely play a role contributing to low utilization rates" (p. 342). Thus, program interventions that alleviate some of the negative circumstances associated with unwanted pregnancies may work to reduce the health and developmental disadvantages experienced by these children.

Similar to Joyce et al. (2000), our multivariate results indicate that controlling for social risk factors generally weakens the relationship between pregnancy wantedness and child well-being. A possible reason for this is that poverty, maternal education, and race/ethnicity are important in determining both child well-being outcomes and reports of pregnancy wantedness. Indeed, the generally strong relationships we found between social risk factors—such as race/ethnicity, maternal education, and consistent poverty—and most of our measures of child well-being again demonstrates the importance that social inequalities have in shaping life chances. Again, recall that these social risk factors operated net of adverse birth outcomes—meaning that these effects were operating largely net of the health of the children at birth. Thus, it is important that concern over the attitudes parents have—for example, maternal reports of pregnancy wantedness—and the behavioral choices parents make, although important, should not eclipse a recognition of the social and economic inequalities that help drive both health outcomes and the behavioral and attitudinal factors that influence child health. Clearly, addressing these social inequalities should remain at the heart of the national health and policy agendas.

Finally, we note several methodological issues associated with this study that may have influenced the findings. Perhaps the greatest concern involves the outcome variables used in the analysis—which are all maternal reports. The fact that these measures are not wholly objective does not diminish the utility of these constructs but instead suggests an alternative that physician or other medical reports should also be analyzed. The fact that reports of pregnancy wantedness are retrospective is also a cause for some concern, given that these women report their feelings about the pregnancy after the outcome of the pregnancy and the health and development trajectory of the child is known. Clearly, future studies of this type would benefit from having multiple reports of wantedness throughout pregnancy and into childhood.

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