

## **Effect of pregnancy intention on child well-being and development: Combining retrospective reports of attitude and contraceptive use**

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**Abstract.** Prior research has documented a relationship between unintended pregnancy and negative consequences for infants and children. Much of this research is based on retrospective reports of intention, but this method has been critiqued as subject to biases in recall and reporting. Non-retrospective measures have also been employed, but these are less widely available and tend to be hindered by limited samples. Using the 1988 National Maternal and Infant Health Survey and its 1991 Longitudinal Follow-Up, a composite measure of reported pregnancy intention and birth control use is constructed to attempt to overcome some limitations of the use of retrospective reports of intention. This composite measure is compared to more conventional measures through analyses predicting the effects of pregnancy intention on child health, activity, and development. Across the different constructions of the pregnancy intention measure, children from unintended pregnancies have poorer outcomes. They are more likely to have less than excellent health, undesirable activity levels, and below median scores on a development assessment. The composite measure predicts similarly to the more conventional measures of intention, but provides an additional dimension that helps address some of the concerns about bias in retrospective reporting, while maintaining the benefit of application in existing large and representative samples. Researchers and policy makers need to continue their concern about the effects of unintended pregnancies, and need widely available measures to understand determinants, consequences, and prevention strategies.

**Keywords:** Contraception, Family planning, Pregnancy intention

### **Introduction**

Unintended pregnancy is a widespread phenomenon in the United States, and research has linked it to a host of problems for both mothers and the children of these pregnancies. However, there have also been critiques of this research, largely related to the measurement of pregnancy intention. The vast majority of studies rely on data from large-scale national surveys that employ retrospective measures of the mother's attitude about the wantedness or timing of the pregnancy. Retrospective measures have been critiqued due

to potential problems with recall bias and rationalization (e.g., Sable 1999). The response to these critiques includes attempts to demonstrate the validity of the retrospective reports, as well as employing alternative measures of pregnancy intention such as prospective reports and assessing outcomes of pregnancies that mothers wanted to terminate. Although these alternative measures have been used successfully, they have limitations as well, most notably in availability, and in restricting both sample size and generalizability to a wider population. Therefore, the retrospective measures are still desirable for researchers and policymakers, particularly because they are included in many large-scale nationally representative data sets.

### **Background**

Despite the wide availability and use of effective contraception, women continue to have pregnancies when they do not want them (Piccinino & Peterson 1999). The prevalence of unintended pregnancies has declined over the last few decades, but estimates from the mid-1990s find that only about half of all pregnancies occur to women who wanted to get pregnant at the time of conception (O'Brien 2004; Colley et al. 2000; Henshaw 1998; Peterson & Moos 1997; Brown & Eisenberg 1995). The high prevalence of unintended pregnancy concerns researchers and policymakers as research consistently finds an association with poorer maternal pregnancy behavior, birth outcomes, and postpartum behavior (Kost et al. 1998a, 1998b; Dye et al. 1997; Hummer et al. 1995; Brown & Eisenberg 1995; Bustan & Coker 1994; Joyce & Grossman 1990; Weller et al. 1987). Although there is less evidence and consistency about the longer-term effects, research has examined the consequences of pregnancy intention on child outcomes such as development, health, school performance, social skills, parental interactions, and activity (Hummer et al. 2004; Joyce et al. 2000; Baydar 1995; David et al. 1988; David 1986; David & Matejcek 1981; Dytrych et al. 1975). The general consensus of this literature is that the well-being of children from unintended pregnancies is somewhat compromised compared to that of children from intended pregnancies. Reducing the prevalence of unintended pregnancy has therefore become a focus for policymakers interested in improving the health of the American population (O'Brien 2004; Colley et al. 2000; Henshaw 1998; Brown & Eisenberg 1995).

Concern about pregnancy intention has contributed to a considerable body of research directed at measuring both the prevalence and consequences of unintended pregnancy, but this research has also been subject to critiques about the measurement of intention. Attitudes about pregnancy and pregnancy timing have been addressed since the early 20th century, but considerable variation has occurred in both conceptualization and measurement of these beliefs (Campbell & Mosher 2000). Creating a unified definition of feelings about the timing of pregnancy is complicated due to historical variation and differences across social groups and between partners, but a broad definition of an intended pregnancy is that the woman was actively trying to get pregnant (Brown & Eisenberg 1995). Hummer et al. (2004) discuss Miller's notion that intention refers to desire that occurs prior to conception. Wantedness refers to the attitude towards the pregnancy after conception. Although a pregnancy may be unintended, the mother can still desire to have the child, which would make it wanted. The term "mistimed" refers to not intending to get pregnant at the time of conception, but wanting to at some other time, frequently in the future. These mistimed births are often collapsed under the umbrella heading of "unintended" (Lloyd & Montgomery 1996; Brown & Eisenberg 1995). Apart from these concepts of wantedness and intention, Piccinino and Peterson (1999) address the possibility of ambivalence towards pregnancy, with the woman neither wanting nor not wanting to have the birth.

Intention involves both this attitudinal aspect and a behavioral component when use of contraception is considered (Piccinino & Peterson 1999). Many women who say that they do not wish to become pregnant are not using contraception (Brown & Eisenberg 1995). This may reflect apathy or ambivalence about pregnancy, and since financial and medical barriers to contraceptive use exist, one cannot assume that non-use of birth control is the same thing as wanting to become pregnant (Piccinino & Peterson 1999; Zabin 1999; Brown & Eisenberg 1995). Nevertheless, it is reasonable to assume that those using birth control are the most invested in preventing pregnancy. Although not all unintended pregnancies are contraceptive failures, Trussell et al. (1999) argue that contraceptive failures are all unintended pregnancies.

The differences in conceptualizations of wanted and intended pregnancies vary by the data and measures available. The most frequently used measures in recent decades are retrospective responses to questions asking women during or after their pregnancies to recall their

feelings about desiring a pregnancy either before or when they conceived (Campbell & Mosher 2000). These retrospective reports are subject to recall biases, as well as to what Lloyd and Montgomery (1996) term *ex post* rationalization. This rationalization clouds original feelings about pregnancy as women may report their pregnancies as either more or less wanted depending on their current situations. Despite these problems, traditional retrospective reports are most frequently used in analyses of pregnancy intention because they are available in several large-scale data sets, such as the National Survey of Family Growth (NSFG), the Pregnancy Risk Assessment Monitoring System (PRAMS), and the National Maternal and Infant Health Survey (NMIHS).

Researchers have also used alternative assessments of unintended pregnancies. The 1995 NSFG included a section asking more detailed questions on feelings about the pregnancy apart from just the timing, and this has been used to explore the complexities of the concept of intention (Piccinino & Peterson 1999; Trussell et al. 1999; Abma et al. 1997). This research suggests that there are much less discrete categories of intention than exist with the traditional measures, including ambivalence and apathy towards pregnancy (Piccinino & Peterson 1999). Furthermore, Pulley et al. (2002) explored the extent of pregnancy mistiming, and found variation in the consequences of the level of mistiming for maternal behavior, suggesting that the concept of mistiming is not unitary. Apart from retrospective reports, Williams et al. (1999) measured prospective attitudes and compared them to future fertility behavior, finding that many of the characteristics that are associated with retrospective reports of unintended pregnancy are also correlated with unintended pregnancies from the prospective reports. An additional body of research addresses pregnancy intention using births occurring to women denied abortions in Prague (David et al. 1988; David 1986; David & Matejcek 1981; Dytrych et al. 1975).

There continues to be a push for new measures of pregnancy intention, while exploration of the validity of retrospective measures continues. While the retrospective measures are likely to be measured with some error, prospective reports of pregnancy intention are highly predictive of fertility behavior, suggesting that there is considerable alliance between stated attitudes and actual behavior regarding pregnancy (Joyce et al. 2000; Schoen et al. 1999; Williams et al. 1999). Bachrach and Newcomer (1999) also support the use of the traditional measures, despite their criticism that constructing discrete categories of intention is limiting. They urge researchers to seek improvement in measurement

of intention, and suggest using measures “that combine distinct but related dimensions,” including dimensions of intention with planning and affective elements (Bachrach & Newcomer 1999:252).

Despite the consistency of findings from different methods that intention is related to child well-being, the validity of overall conclusions about these effects is still questioned. Results from retrospective reports are criticized due to recall and response biases, while alternative measurement is available only in limited sources, or tends to be based on small and likely non-representative samples. This paper seeks to address these criticisms by assessing the effect of pregnancy intention on child well-being using an alternate operationalization of pregnancy intention from retrospective reports. This measure includes both behavioral and attitudinal elements, which can help to alleviate some of the bias of a single measure, as well as reveal finer distinctions in conceptualization.

## **Data and methods**

### *Data*

This study uses data from the 1988 National Maternal and Infant Health Survey (NMIHS) and its 1991 Longitudinal Follow-up (NMIHS-LF) conducted by the National Center for Health Statistics. This data set was designed to improve understanding of negative pregnancy outcomes, and included data on socioeconomic and demographic characteristics, prenatal care, pregnancy history, mother and child health status, and medical care received. Both waves of the survey were mail-out/mail-back, with the first wave completed when the child was approximately 16–18-months-old. The data are derived from a nationally representative sample of births that occurred in the United States in 1988. The sample is drawn from the 48 contiguous states and the District of Columbia, and includes oversamples of black and low birth weight infants. While these data are older than other national data sets that address pregnancy intention, the specific focus on maternal and child health provides more detailed information on a host of important child outcomes that have been previously unaddressed.

The original sample includes live births, plus fetal and infant deaths, with deaths excluded in this analysis. The initial unweighted sample of live births from the 1988 wave is 9,953 (NCHS 1991). The

1991 NMIHS-LF includes mothers from the 1988 NMIHS live birth sample whose children were still alive in 1991. The purpose of the follow-up is to obtain data on health and development issues affecting children, including effects of low birth weight, pediatric care, child safety and injury, and illness. There were 8,285 completed surveys (NCHS 1995). This analysis uses both waves, with the primary independent variables of intention and contraception from the 1988 NMIHS, and outcome measures from the 1991 NMIHS-LF. Most control variables are from the 1988 survey, although additional measures from the 1991 follow-up are used, particularly to assess the effect of changes in social and demographic characteristics.

Additional cases were dropped from analyses due to several factors. First, only those from racial/ethnic backgrounds of non-Hispanic white, non-Hispanic black, and Mexican origin were included, as all other groups were very small. Cases were also excluded for excessive omissions, including those that had missing values for pregnancy intention, birth control use, and the outcome variables. Consistent with Hummer et al.'s (2004) analyses, cases with severe genetic or developmental problems (such as spina bifida and cerebral palsy) unrelated to pregnancy intention were also removed, as these problems would likely result in worse outcomes on the dependent variables. Finally, since birth outcomes are highly related to child development, cases with extreme values on the birth weight and gestational age reports (birth weight less than 500 g, gestational age less than 22 weeks) were removed from analyses, as those outside that range likely represent misclassification or misreporting. The final sample used in analyses is 6,640.

### *Measures*

#### *Pregnancy intention*

I compare four separate ways to operationalize pregnancy intention, all constructed from two variables in the 1988 NMIHS. Mothers were asked two questions, one about their desire for, and timing of, the pregnancy, and one about their contraceptive use. The affective question asks: "Thinking back just before you became pregnant, did you want to become pregnant at that time?" (NCHS 1991). The response categories were: (1) I wanted this pregnancy at an earlier time, as well as that time; (2) I wanted to become pregnant at that time; (3) I did not want to become pregnant at that time, but I wanted another child sometime in the future; (4) I did not want to become pregnant at that

time, or at any time in the future (NCHS 1991). The second item asks: "During the month before you become pregnant, were you using any kind of birth control?" (NCHS 1991). The response categories were yes or no. Although not a direct measure of intention, this second question addresses the issue of contraceptive failure. However, the question was asked about use the month before conception, so some respondents may have ceased contraception to become pregnant in the month they conceived, and use at time of conception itself is unknown. At a minimum, it reflects a history of contraceptive usage that suggests usage at the time of conception.

The first of the four measures of pregnancy intention is the dichotomous classification, which is the traditional operationalization. Using the affective question about intention, responses have been collapsed, with the first two responses as "intended" and the second two responses as "unintended." The second measure, *wantedness<sub>2</sub>*, also uses the affective question, but has three classifications that take into account the timing of the pregnancy. As with the intention classification, the first two responses are grouped together and termed "wanted." Rather than group the remaining responses, this classification terms the third response category "mistimed," and the last category "unwanted." The birth control measure is also dichotomous as used or not used.

The final measure is the proposed pregnancy intention composite, and uses both the dichotomous affective measure of intention and the contraception question. Although both variables independently have limitations, I use them together in order to provide a more complete measure of intention that assesses both attitudinal and behavioral elements. The two variables are significantly related, indicating an overlap of attitude and behavior (see Table 1). Combining these two variables creates a four-category independent variable with the following categories: intended/no birth control used, intended/birth control used, unintended/no birth control used, and unintended/birth control

Table 1. Weighted cross-tabulation of pregnancy intention by birth control use

Birth control	% Intended	% Unintended
Yes	17.1	45.3
No	82.9	54.7
<i>N</i>	3,807	2,833

Source: 1988 National Maternal and Infant Health Survey.  
Chi-Square = 628.33/1 ( $p < 0.0001$ ),  $\Phi = -0.31$ .

used. In analyses not shown, wantedness was included to create a six-category variable. However, sample size was restricted due to the small number of unwanted pregnancies, and the patterns were very similar for the unwanted and mistimed classifications within birth control categories. Overall, the four-category composite provides distinct conceptual groupings that the consideration of wantedness did not improve on.

The categories can be considered conceptually as follows: the first and last categories indicate consistency between attitude and behavior, while the middle two categories are inconsistent. Respondents who intended to become pregnant and were not using birth control can be thought of conceptually as actively trying to get pregnant. Births from those who were using birth control and said the pregnancy was unintended are contraceptive failures. The other groups are more difficult to conceptualize, and highlight the problems with using the conventional measure. Those who report intending the pregnancy and using birth control may demonstrate problems with recall or rationalization. Another explanation may be the temporal differences in the questions as the respondent may have used birth control the month prior to pregnancy, and discontinued specifically to become pregnant. The respondents who stated the pregnancy was unintended and were not using birth control may either have a lack of control over pregnancy, such as no access to birth control, or may have ambivalent or discordant feelings about being pregnant (Piccinino & Peterson 1999). These categories may be ranked loosely from most intended (intended/no birth control) to least intended (unintended/birth control). In analyses using all four of the intention classifications, the most intended category is the reference category. The distributions of these intention variables and all dependent and control variables are presented in Table 2.

#### *Dependent variables*

This paper uses three dependent variables as indicators of child well-being: maternal report of child health, activity level, and development. All reference categories are the most desirable outcome for each measure. The health variable is a single question with a five-point scale of level of overall health ranging from poor to excellent. This variable has been collapsed into two categories: "excellent," and all other categories collapsed as "less than excellent," with excellent as the reference. The activity variable is the second outcome measure associated with child well-being. Previous literature suggests that extremely high



Table 2. Weighted percentage distribution of variables used in analyses

Variables	Percentage distribution
<i>Intention classifications</i>	
Dichotomous	
Intended	57.3
Unintended	42.7
Wantedness	
Wanted	57.3
Mistimed	36.1
Unwanted	6.6
Birth control	
Used	29.1
Not used	70.9
Composite variable	
Intended + no birth control	47.6
Intended + birth control	9.8
Unintended + no birth control	23.3
Unintended + birth control	19.3
<i>Dependent variables</i>	
Health	
Excellent	54.2
Less than excellent	45.8
Activity	
Too active or very inactive	10.1
Moderate to very active	89.9
Denver Developmental Score	
Above median	50.0
Below median	50.0
<i>Control variables</i>	
Child's sex	
Male	52.3
Female	47.7
Child's age (mean and SD in months)	34.46 (4.46)
Race/ethnic background	
Non-Hispanic white	74.7
Non-Hispanic black	17.1
Mexican origin	8.2
Birth weight	
2,500 + g	94.5
<2,500 g	5.5

Table 2. Continued.

Variables	Percentage distribution
Gestational age	
37+ weeks	92.0
< 37 weeks	8.0
Parity	
First birth	42.7
Low parity	44.1
High parity	13.2
Mother's age at birth	
20+ years	87.6
< 20 years	12.4
Mother's education	
12+ years	83.2
< 12 years	16.8
Marital status	
Married to same person both times	65.9
Never married	15.2
Other	18.9
Poverty status	
Poverty at neither time	65.3
Poverty at both times	14.8
Poverty at one time only	19.9
Weighted <i>N</i>	6,640

Source: 1988 National Maternal and Infant Health Survey, and 1991 Longitudinal Follow-up.

or low activity is a sign of poorer health and development (Newacheck et al. 1994). Those who are overactive may be labeled as having behavioral problems, while inactivity is associated with worse health. The NMIHS-LF asked mothers to report their children's activity levels, with responses of: very inactive, not very active, moderately active, very active, or too active (NCHS 1995). These responses were also collapsed into two categories: not very, moderately, and very active are collapsed to represent a normal range of activity for the reference category, versus inactive or too active. The final dependent variable is an assessment of child development using a short version of the Denver Developmental Scale (DDS). The scale assesses fine and gross motor skills, language, and personal/social skills, and is used as a way to identify children who are vulnerable to developmental problems

(Frankenberg & Dodds 1967). The scale has 16 questions to which mothers provided dichotomous yes/no answers about whether their children could perform certain tasks, and knew their own age and sex (NCHS 1995). The answers are summed and adjusted for the age of the child. I divide the scores at the median, and have a dichotomous outcome variable of above the median as the reference versus below the median.

#### *Control variables*

To parcel out the effect of pregnancy intention on child well-being and development, I control for several child and maternal factors that are associated with pregnancy intention and child outcomes. Controls for child demographics of age and sex are used (although age is not included in the Denver Development Score models since the measure is age-standardized), as children develop differently based on these characteristics. Race/ethnic background is linked to both child outcomes and to unintended pregnancy as well, and is controlled for using the following categories: non-Hispanic whites, non-Hispanic blacks, and Mexican origin (Henshaw 1998; Sable et al. 1997; Kost & Forrest 1995).

Biomedical characteristics are also controlled for, including birth outcome and parity. Birth weight is used as a dichotomous variable, with those under 2,500 g classified as low birth weight, and those of 2,500 g or more classified as normal birth weight, with normal as the reference category. Gestational age is also treated as a dichotomous variable, with those under 37 weeks classified as premature, and those of 37 weeks or more as normal gestational age, with normal as the reference category. Parity is defined using the Kleinman–Kessel method including both maternal age and number of births (Kleinman & Kessel 1987); first births, low parity, and high parity constitute the categories, with first birth as the reference category. These biomedical outcomes influence child development, and have been shown empirically to be related to pregnancy intention (Kost et al. 1998a; Hummer et al. 1995).

In addition to child characteristics, controls for maternal characteristics are included. Age at child's birth is controlled for, categorized as teenager versus age 20 or over. Educational attainment is categorized as fewer than 12 years (less than high school education) versus 12 years or more (high school graduate or post high school education). Marital status is measured at both response times. The categories are a series of dummy variables with married to the same person at both times as the reference, versus never married, and an "other" category

including several combinations with a small number of cases. Poverty status reflects the household economic position, and is measured at both response times. This measure takes into account both household income and household size, and is compared to the federal government's definition of poverty in each respective year. This was converted to a series of dummy variables: poverty at neither time, poverty at both times, poverty at time 1 or time 2 only, with poverty at neither time as the reference. These characteristics have been identified as predictors of both child outcomes and pregnancy intention (Sable et al. 1997; Kost & Forrest 1995; Newacheck et al. 1994).

### *Methods*

I use logistic regression for all analyses because of the dichotomous categorization of the dependent variables. I regress each of the three outcome variables on each of the four measures of pregnancy intention, and include all control variables described above. Coefficients are reported in the form of odds ratios, with those above one indicating increased risk for the outcome compared to the reference category. The data are weighted to account for the sampling design, although estimates are based on actual sample size.

## **Results**

### *Health*

Table 3 presents results of the logistic regression of maternal reports of child health on the four different measures of intention. The model presents odds ratios of reports of less than excellent health compared to the reference category of excellent health. Across all versions of the intention measure, all categories had higher risk for less than optimal health compared with the reference category of most intended. In the first column, the model uses the dichotomous classification of intention. Children from unintended pregnancies have 18% higher odds of a less than excellent health rating compared to those from intended pregnancies. The second column uses the measure that divides this unintended category into mistimed and unwanted, with wanted as the reference category. Those from mistimed pregnancies are significantly more likely to have suboptimal health, with 17% higher odds of being classified as in less than excellent health. Children from unwanted

Table 3. Odds ratios for pregnancy intention and child health

	Less than excellent health [reference = excellent]			
	Dichotomous	Wantedness	Birth control	Composite control
<i>Intention classifications</i>				
Dichotomous				
Intended [ref]				
Unintended	1.18*	na	na	na
Wantedness				
Wanted [ref]				
Mistimed	na	1.17*	na	na
Unwanted	na	1.25 <sup>§</sup>	na	na
Birth control				
Not used [ref]				
Used	na	na	1.07	na
Composite				
Intended + no birth control [ref]				
Intended + birth control	na	na	na	1.07
Unintended + no birth control	na	na	na	1.21*
Unintended + birth control	na	na	na	1.19 <sup>§</sup>
<i>Control variables</i>				
Child's sex				
Female	0.86*	0.86*	0.86*	0.86*
Child's age				
	0.99	0.99	0.99	0.99
Race/ethnic background				
Non-Hispanic white [ref]				
Non-Hispanic black	1.16*	1.16 <sup>§</sup>	1.18 <sup>§</sup>	1.17*
Mexican origin	1.75**	1.75**	1.75**	1.75**
Birth weight				
<2,500 g	1.35**	1.35**	1.36**	1.35**
Gestational age				
<37 weeks	1.10	1.10	1.11	1.10
Parity				
First birth [ref]				
Low parity	1.20*	1.20*	1.22**	1.20*
High parity	1.13	1.12	1.17	1.13
Mother's age at birth				
<20 years	0.93	0.94	0.97	0.93
Mother's education				
<12 years	1.23 <sup>§</sup>	1.22 <sup>§</sup>	1.23 <sup>§</sup>	1.23 <sup>§</sup>

Table 3. Continued.

	Less than excellent health [reference = excellent]			
	Dichotomous	Wantedness	Birth control	Composite
<i>Marital status</i>				
Married to same both times [ref]				
Never married	1.21 <sup>§</sup>	1.21 <sup>§</sup>	1.26*	1.21 <sup>§</sup>
Other	1.15	1.15	1.19 <sup>§</sup>	1.15
<i>Poverty status</i>				
Poverty at neither time [ref]				
Poverty at both times	1.22 <sup>§</sup>	1.22 <sup>§</sup>	1.24 <sup>§</sup>	1.22 <sup>§</sup>
Poverty at one time only	1.21 <sup>§</sup>	1.21 <sup>§</sup>	1.22 <sup>§</sup>	1.21 <sup>§</sup>
Pseudo $R^2$	0.0201	0.0202	0.0193	0.0202
$N$	6,640	6,640	6,640	6,640

Source: 1988 National Maternal and Infant Health Survey and 1991 Longitudinal Follow-up.

<sup>§</sup> $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ .

pregnancies have 25% higher odds, but this is only marginally significant. The third column is for contraception, and results reveal no significant effect for birth control use on children's health. The results presented in the final column show that pregnancies reported as unintended are associated with higher risk, with children from unintended pregnancies where no birth control was used having significantly higher risks of less than excellent health compared with children from intended pregnancies where no birth control was used (odds ratio = 1.21). The effect of an unintended pregnancy with birth control is marginally significant, with 19% higher odds for rating in the less than excellent category. Results from control variables are generally in the expected direction, with those from non-white backgrounds, with poor birth outcomes, low socioeconomic status, or from never-married mothers having increased odds of ratings in the less than excellent categories.

#### *Activity*

Table 4 presents odds ratios from the logistic regression of child activity level on the different measures of pregnancy intention. As with health outcome, all categories of pregnancy intention have higher risks for extreme level of activity, compared with the intended

Table 4. Odds ratios for pregnancy intention and child activity

	Too active/inactive [reference = moderate to very active]			
	Dichotomous	Wantedness	Birth control	Composite
<i>Intention classifications</i>				
Dichotomous				
Intended [ref]				
Unintended	1.22 <sup>§</sup>	na	na	na
Wantedness				
Wanted [ref]				
Mistimed	na	1.18	na	na
Unwanted	na	1.46*	na	na
Birth control				
Not used [ref]				
Used	na	na	1.19	na
Composite				
Intended + no birth control [ref]				
Intended + birth control	na	na	na	1.20
Unintended + no birth control	na	na	na	1.21
Unintended + birth control	na	na	na	1.34*
<i>Control variables</i>				
Child's sex				
Female	0.86	0.86	0.86	0.86
Child's age				
	1.01	1.01	1.01	1.01
Race/ethnic background				
Non-Hispanic white [ref]				
Non-Hispanic black	2.16**	2.15**	2.21**	2.17**
Mexican origin	1.21	1.23	1.22	1.21
Birth weight				
<2,500 g	1.31 <sup>§</sup>	1.31 <sup>§</sup>	1.32 <sup>§</sup>	1.32 <sup>§</sup>
Gestational age				
<37 weeks	0.91	0.91	0.92	0.91
Parity				
First birth [ref]				
Low parity	0.89	0.89	0.89	0.88
High parity	0.88	0.86	0.89	0.86
Mother's age at birth				
<20 years	0.90	0.91	0.93	0.90

Table 4. Continued.

	Too active/inactive [reference = moderate to very active]			
	Dichotomous	Wantedness	Birth control	Composite control
Mother's education				
<12 years	1.94**	1.92**	1.95**	1.95**
Marital status				
Married to same both times [ref]				
Never married	1.04	1.04	1.08	1.04
Other	1.47*	1.48*	1.51**	1.46*
Poverty status				
Poverty at neither time [ref]				
Poverty at both times	1.69**	1.69**	1.73**	1.70**
Poverty at one time only	1.58**	1.59**	1.61**	1.60**
Pseudo $R^2$	0.0702	0.0707	0.0699	0.0707
$N$	6,640	6,640	6,640	6,640

Source: 1988 National Maternal and Infant Health Survey and 1991 Longitudinal Follow-up.

$^{\S}p < 0.10$ ,  $*p < 0.05$ ,  $**p < 0.01$ .

reference categories. For the dichotomous classification, the effect of an unintended pregnancy is marginally significant and associated with 22% higher odds of rating in either the too active or inactive category. For the wantedness classification, both odds ratios were higher for the unwanted and mistimed categories, but only the odds ratio of 1.46 for unwanted births was significant. Again for contraceptive use, the elevated risk for children conceived because of contraceptive failures was not significant for activity. For the composite variable, all categories had higher risks compared to the most intended reference category, but only one was significant, as an unintended pregnancy with birth control is associated with 34% higher odds of extreme activity. For the control variables, although there was no significant difference between white and Mexican-origin children, there was a very powerful effect for African-Americans, such that those children were over two times more likely to be rated as having extreme activity compared with whites. In addition, infants with low birth weight or those from low socioeconomic status mothers had higher risk. Although being never married was not significantly associated with



poor activity ratings, being from an “other” family structure was significantly associated with higher risk.

### *Development*

Table 5 presents odds ratios for scoring below the median on the DDS, compared with scoring above the median, for all four measures of pregnancy intention. The only indicator of intention that had significant coefficients was the composite measure. In this analysis, the odds ratio for unintended and birth control was below 1 but non-significant. The effect of an intended pregnancy with birth control was only marginally significant, and associated with 24% higher odds for scoring below the median. Children from unintended pregnancies without birth control were significantly different from those from intended pregnancies without birth control, and had 29% higher odds of scoring below the median. Control variables were largely in the expected direction, with those who are non-white, not first-born, or low birth weight having increased odds of scoring below the median. In addition, those with persistent poverty or mothers with less than high school educations also had higher risks. Female children scored much better on the developmental assessment, and were only half as likely to be below the median compared to males.

### **Discussion and conclusions**

These findings suggest several things, both substantively about the effects of pregnancy intention on child well-being and methodologically about the measurement of intention. Overall, unintended pregnancy is associated with worse outcomes for children. Across each of the dependent variables, at least one of the measures was significantly associated with a negative outcome. In no case was a less intended category of the independent variable significantly associated with a more positive outcome. In addition to substantively similar conclusions, the fits of the models are similar, with those using the composite measures having pseudo  $R^2$  values at least as large, and in many cases slightly larger, than the pseudo  $R^2$  values of other models.

Despite the consistency of the overall findings, taken individually these different measures paint varying pictures of the relationship between intention and child well-being. The birth control measure alone was not significantly associated with any of the outcome variables.

Table 5. Odds ratios for pregnancy intention and Denver Development Score

	Below median on DDS [reference = above median]			
	Dichotomous	Wantedness	Birth control	Composite
<i>Intention classifications</i>				
Dichotomous				
Intended [ref]				
Unintended	1.06	na	na	na
Wantedness				
Wanted [ref]				
Mistimed	na	1.04	na	na
Unwanted	na	1.13	na	na
Birth control				
Not used [ref]				
Used	na	na	0.94	na
Composite				
Intended + no birth control [ref]				
Intended + birth control	na	na	na	1.24 <sup>§</sup>
Unintended + no birth control	na	na	na	1.29**
Unintended + birth control	na	na	na	0.93
<i>Control variables</i>				
Child's sex				
Female	0.51**	0.51**	0.51**	0.52**
Race/ethnic background				
Non-Hispanic white [ref]				
Non-Hispanic black	1.22*	1.31*	1.22*	1.20*
Mexican origin	1.89**	1.89**	1.89**	1.90**
Birth weight				
<2,500 g	1.41**	1.41**	1.41**	1.42**
Gestational age				
<37 weeks	0.95	0.95	0.95	0.95
Parity				
First birth [ref]				
Low parity	1.32**	1.32**	1.34**	1.32**
High parity	1.52**	1.50**	1.55**	1.53**
Mother's age at birth				
<20 years	1.11	1.11	1.12	1.08
Mother's education				
<12 years	1.47**	1.46**	1.46**	1.45**

Table 5. Continued

	Below median on DDS [reference = above median]			
	Dichotomous	Wantedness	Birth control	Composite
Marital status				
Married to same both times [ref]				
Never married	0.99	1.00	1.02	0.98
Other	1.09	1.09	1.11	1.08
Poverty status				
Poverty at neither time [ref]				
Poverty at both times	1.45**	1.46**	1.45**	1.42**
Poverty at one time only	1.15	1.15	1.15	1.14
Pseudo $R^2$	0.0705	0.0706	0.0705	0.0729
$N$	6,640	6,640	6,640	6,640

Source: 1988 National Maternal and Infant Health Survey and 1991 Longitudinal Follow-up.

$^{\S}p < 0.10$ ,  $*p < 0.05$ ,  $**p < 0.01$ .

This is likely because contraceptive use is potentially linked to other factors that may be positively associated with child well-being, such as access to health care or positive health behavior. So while the unintended pregnancy aspect of a contraceptive failure may have negative consequences, the positive effects that contraceptive use has may act as a buffer. That is, these effects offset each other, and there is no net effect of contraceptive failure on child outcomes.

The two affective measures and the composite measure were significantly associated with the dependent variables (although only the composite measure was significantly associated with development). The dichotomous measure provides the most simplistic results, while the wantedness classification reveals a more complex relationship. Although being from an unintended pregnancy is associated with higher risk, being from an unwanted (rather than a mistimed) pregnancy has the most negative consequences. The composite measure provides even further refinement of the concept of intention. For health and activity, the categories of the composite measure that are least intended have the worst consequences. However, for development, it is the two middle categories that have significantly worse consequences. Mothers experiencing contraceptive failures who report their pregnancies were unintended have children whose development is not

significantly different from children from intended pregnancies without birth control. As with birth control alone, this finding could be perhaps due to the association between contraceptive use and factors that would benefit development. However, the intended and birth control use group does have marginally significant differences across outcomes. This weak finding is perhaps best explained by recognizing that this group is potentially engaging in *ex post* rationalization, for example, the child was actually unintended at the time of conception, but the mother reports later that it was intended. Perhaps part of this rationalization results from having a child with developmental difficulties. Therefore, the direction of causation would be reversed such that having a child who is struggling developmentally may alter reports about the desire to become pregnant or the use of contraception. Neither of the purely affective measures can make this distinction within the intended or wanted category, so the results are not significant. However, including the behavioral element of birth control suggests that this rationalization may be occurring.

The findings of this paper support the continued study of the effects of pregnancy intention on children. In addition, these findings demonstrate the general consistency of the results from different measures, at least that overall these variables predicted outcomes largely in the same direction. However, the differences in these findings do suggest that previous measurement of pregnancy intention has been somewhat limited. Although the composite measure presented here cannot eliminate all the problems that retrospective measures have been criticized for, it does provide a more nuanced picture of pregnancy intention. For instance, both intention and contraception questions are subject to recall and rationalization biases, but using the composite can potentially identify cases where these problems are occurring. The mismatch between reported attitude and behavior may also help to identify women who are ambivalent about pregnancy. Furthermore, the consideration of several outcomes of child well-being adds to the relatively limited research on the longer-term consequences of pregnancy intention in the United States. Despite limitations with each outcome, together the consistent findings across each measure help to confirm prior research that children from intended pregnancies tend to fare better on a number of dimensions.

Critics have charged that better measures of intention need to be developed, and I have presented just one possible improvement for the analysis of existing national survey data. The research based on the new measures in the 1995 NSFG is promising, as it contributes to

the literature about the wide-scale measurement of intention (Pulley et al. 2002; Trussell et al. 1999; Piccinino & Peterson 1999; Abma et al. 1997). The consistent finding in this and other studies that unintended pregnancy has negative consequences indicates that this is an important issue, and that more careful consideration of conceptualization and measurement is needed. Use of this composite measure may help researchers continue to explore the consequences of unintended pregnancies, and aid policymakers in developing prevention strategies and in finding ways to buffer negative consequences.

### Acknowledgments

This research was supported in part by a grant from the National Institute of Child Health and Human Development (R01-HD32330). The author wishes to thank Parker Frisbie, Bob Hummer, and Chris Ellison for their comments and suggestions. A previous version of this paper was presented at the annual meeting of the Southern Demographic Association, Austin, Texas, October 2002.

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