

The Extent of Pregnancy Mistiming and Its Association With Maternal Characteristics and Behaviors And Pregnancy Outcomes

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CONTEXT: The National Survey of Family Growth (NSFG) classifies pregnancies as intended, mistimed or unwanted. However, these categories could be too broad, as a woman's feelings about a pregnancy, her health behaviors during pregnancy and thus her pregnancy outcomes may vary according to whether her pregnancy is moderately or seriously mistimed. These relationships have not yet been explored.

METHODS: Data from the 1995 NSFG were examined to assess associations between pregnancy mistiming and maternal characteristics. Descriptive and multivariate analyses were conducted of the extent of mistiming for each maternal characteristic. Chi-square and F-tests were used to examine the associations between a pregnancy's intendedness—according to a four-category classification—and maternal characteristics, maternal happiness ratings, maternal behaviors and pregnancy outcomes.

RESULTS: Fifty-five percent of mistimed pregnancies were mistimed by 24 months or less, 32% were mistimed by 25–60 months and 13% were mistimed by more than 60 months. According to multivariate analyses, pregnancies among younger women, never-married women and black women were mistimed by significantly more months than those among other women. The distribution of moderately mistimed pregnancies differed significantly from those of both seriously mistimed and unwanted pregnancies according to most maternal characteristics; there were few differences between intended and moderately mistimed pregnancies, and between seriously mistimed and unwanted pregnancies.

CONCLUSIONS: Mistiming is not a unitary construct. Its extent is associated with maternal characteristics and behaviors. Future research on pregnancy intention should examine the extent of mistiming and consider alternatives to traditional definitions of intendedness.

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Over the last several decades, researchers and policymakers have devoted considerable attention to women's pregnancy intentions. Interest in the issue originated in concerns about declining, and later increasing, fertility and the need to predict population trends. However, more recently, researchers have used measures of pregnancy intention for two primary purposes: to determine the unmet need for family planning services¹ and to provide insights into women's health behaviors, such as whether they seek prenatal care, and pregnancy outcomes, such as birth weight.*²

Most analyses of pregnancy intention use the classification devised by the National Survey of Family Growth (NSFG), which divides pregnancies into three categories—intended, mistimed and unwanted—on the basis of women's answers to a series of questions about their feelings at the time they became pregnant. The questions ask women to report on all live births in the five years preceding the interview, and do not explicitly use the words “intended,” “mistimed” and “unwanted.” If a woman reports that a pregnancy was unwanted when it occurred and that she had not ever wanted to have any other children, the pregnancy is classified as unwanted. A pregnancy is classified as mistimed if the woman did not want it at the time it oc-

curred, but might have wanted it at some later time. Intended pregnancies are those that were wanted at the time that they occurred and those that were wanted earlier.³

The 1995 NSFG also included a 10-point scale measuring happiness about a pregnancy, which made it possible to determine whether women experienced unintended pregnancies negatively, as would be expected. The happiness measures correlated well with the traditional intendedness measures—women who experienced wanted pregnancies scored higher on the happiness scale than those experiencing mistimed pregnancies, who in turn scored higher than those experiencing unwanted pregnancies.⁴

Although the Institute of Medicine has endorsed the concept of pregnancy intendedness as policy-relevant⁵ and many studies support the usefulness of the NSFG measures,⁶ the concept of pregnancy intendedness has been criticized. For example, researchers, many of whom have used a prospective approach to examine women's feelings about a pregnancy, have found that use of prenatal care and low birth weight are more strongly related to whether a woman is happy or in denial about a pregnancy than to the

*For a history of the development of the concept of intendedness, see reference 12. For a summary of this material, see reference 5.

NSFG's measure of intendedness. Investigators have also concluded that the NSFG intendedness measures do not accurately tap women's feelings about pregnancy, particularly when women's attitude about pregnancy is ambivalent, which is often the case.⁷ A comparison of two measures of intendedness—women's reports of contraceptive failure and the NSFG measures—with each other and with the happiness scale found that almost one-third of pregnancies among women who reported contraceptive failure were classified as intended. Moreover, one-quarter of women who reported contraceptive failure and whose pregnancies were classified as unintended reported feeling happy or very happy about their pregnancy.⁸

These studies and others⁹ have led many researchers to question the meaning of intendedness as measured in the NSFG and to recommend additional investigation into the issue to increase the usefulness of this concept for research and program purposes.¹⁰ Consequently, the National Center for Health Statistics (NCHS), which conducts the NSFG, has added questions to clarify the concept of intendedness in Cycle Six of the survey, which will be fielded in 2002.¹¹

In this research note, we examine mistiming of pregnancy in the context of rethinking the concept of pregnancy intendedness. It is generally assumed that intended, mistimed and unwanted pregnancies represent a continuum of intendedness, and researchers therefore collapse these categories into two groups—intended and unintended, the latter including mistimed and unwanted pregnancies.¹² Combining the two types of unintended pregnancies makes analyses possible that might otherwise be difficult because of the small number of unwanted pregnancies. In addition, because both mistimed and unwanted pregnancies are believed to reflect the need for improved family planning, examining them together can help in identifying ways to address this issue.

However, there is little empirical evidence to support combining mistimed and unwanted pregnancies in analyses of demographic characteristics or pregnancy outcomes. Although mistimed pregnancies represent about one in five of all pregnancies ending in a live birth,¹³ few analyses of these pregnancies have been conducted. This research note examines the characteristics of women experiencing mistimed pregnancies and the association between mistimed pregnancies and maternal behaviors and pregnancy outcomes.

DATA AND METHODS

An SAS¹⁴ data file was developed to include all pregnancies reported in the 1995 NSFG ending in a live birth in the five years prior to the woman's interview. The 1995 version of the intendedness questions was used, including a verification question, which changed the classification of about 1% of pregnancies from unwanted to mistimed.¹⁵ If women reported that their pregnancy was mistimed, they were asked how much sooner than they had wanted to they had become pregnant. All women were asked how happy they were when they learned they were pregnant.¹⁶ We

extracted data on pregnancy intendedness, the number of months the pregnancy was mistimed, maternal characteristics (age and marital status at birth, race, educational level and poverty level at the time of interview, and parity), happiness ratings (on a 10-point scale, with 10 being happiest), maternal behaviors (initiation of prenatal care and breastfeeding) and pregnancy outcomes (birth weight and gestational age at delivery). The data were weighted to reflect national averages.¹⁷ Because of the NSFG's complex sampling design, we used SUDAAN to estimate variance.¹⁸

We conducted four analyses. First, we classified mistimed pregnancies into seven groups by the number of months they were mistimed, using six-month increments for 1–12 months, 12-month increments for 13–60 months and a final category of more than 60 months. We then cross-tabulated these seven groups with six maternal characteristics. These descriptive statistics allow for easy comparisons of our results with the NSFG tables reporting maternal characteristics by the standard categories of intended, mistimed and unwanted.¹⁹

Second, using mistiming as a continuous variable, we conducted a multivariate analysis of the extent of mistiming in months too soon for each demographic variable to determine the mean number of months of mistiming by maternal characteristics.*

Third, after eliminating multiple births (because of their potentially confounding effect on maternal behaviors and pregnancy outcomes), we classified all pregnancies ending in live births into four groups—intended, moderately mistimed (24 or fewer months), seriously mistimed (more than 24 months) and unwanted. We compared the distributions of each group with those of the other three groups, for a total of six pairwise comparisons for each of six maternal characteristics, two maternal behaviors and two pregnancy outcomes. Dichotomizing mistiming at 24 months allowed us to approximate a median split. To simplify comparisons across the four intendedness categories, we also recoded maternal characteristics into dichotomous variables (for example, never-married vs. ever-married). We used the Wald chi-square test for these pairwise comparisons. Finally, we used the Wald F-test to compare mean happiness scores across the four categories of intendedness. Because of the large number of comparisons in our last two sets of analyses, we considered differences to be significant at $p < .005$.

In the first and third analyses, poverty level and educational level at time of interview were restricted to women aged 22 and older.[†] In the second analysis, we included this information for the entire sample, to avoid losing younger women.

*We used PROC REGRESS in SUDAAN (equivalent to general linear modeling in SAS, or analysis of variance) for this analysis.

†The NCHS recommends excluding data on poverty level and educational level for younger women, because it is likely that many of these women are not yet financially independent and do not know their family income, and they have not completed their education.

TABLE 1. Number (in 000s) and percentage distribution of mistimed pregnancies ending in live births, by the extent of mistiming, according to maternal characteristics

Characteristic	N	Extent of mistiming (no. of mos. early)							Total
		1-6	7-12	13-24	25-36	37-48	49-60	>60	
All	4,120	8.5	21.4	24.7	15.1	6.6	10.5	13.2	100.0
Age at birth									
<20	1,207	2.8	6.2	17.6	17.4	10.6	17.5	27.8	100.0
20-24	1,567	5.8	21.1	30.9	15.4	6.6	10.7	9.5	100.0
25-29	748	15.6	32.6	25.7	13.3	4.9	4.1	3.7	100.0
30-44	598	18.6	38.8	21.4	11.9	0.3	3.7	5.3	100.0
Marital status at birth									
Never-married	1,849	3.2	9.2	22.6	18.2	9.6	15.1	21.9	100.0
Married	2,032	13.5	32.9	25.2	12.4	4.0	5.8	6.2	100.0
Formerly married	239	7.9	17.6	36.3	13.3	4.8	14.5	5.6	100.0
Parity									
1	2,099	7.8	13.5	20.8	15.7	9.5	13.0	19.7	100.0
2	1,140	8.9	26.6	29.2	17.8	3.0	8.0	6.5	100.0
≥3	881	10.0	33.3	28.3	10.2	4.0	7.8	6.4	100.0
Poverty level at interview									
0-149%	1,274	6.4	17.4	31.1	17.3	7.3	11.7	8.8	100.0
150-299%	1,079	9.5	33.7	23.8	13.9	2.5	7.0	9.6	100.0
≥300%	740	19.4	30.4	27.6	10.5	2.5	3.9	5.7	100.0
Education at interview									
<high school diploma/GED	558	9.5	28.3	24.9	17.0	5.5	6.1	8.7	100.0
High school diploma/GED	1,317	7.9	20.8	30.4	17.1	5.7	10.7	7.4	100.0
Some college	735	8.1	28.2	30.5	10.2	3.7	8.6	10.7	100.0
≥college	481	22.9	35.5	19.2	11.0	1.4	3.1	6.9	100.0
Race									
Black	861	3.4	10.8	25.4	17.8	8.1	15.2	19.2	100.0
White	2,987	10.0	24.7	24.7	13.9	6.5	9.5	10.7	100.0
Other	272	9.1	18.3	22.4	19.2	2.8	6.7	21.5	100.0

Notes: For poverty level and education, data are shown only for women aged 22-44 at the time of interview. Ns are weighted to reflect national averages.

RESULTS

Women's Characteristics and Extent of Mistiming

Fifty-five percent of mistimed pregnancies were mistimed by 24 months or less, 32% were mistimed by 25-60 months and 13% were mistimed by more than 60 months (Table 1). Pregnancies were disproportionately mistimed by more than three years among women younger than 20 (56%), never-married women (47%), black women (43%) and women for whom this birth was the first (42%). By contrast, more than half (58%) of mistimed pregnancies among women who had completed college were 12 months or less too early.

In our multivariate analyses, only age, marital status, and race were significantly associated with mistiming (Table 2). Teenagers' pregnancies were mistimed by significantly more months than pregnancies among women in any other age-group (46 vs. 25-31 months), and pregnancies among women in their early 20s were mistimed by significantly more months than pregnancies among older women. Pregnancy mistiming was not significantly different between women in the two oldest age-groups.

Never-married women's pregnancies were mistimed by significantly more months than formerly married women's

(39 vs. 29 months), and married women's pregnancies were mistimed by significantly more months than formerly married women's (35 vs. 29).

Black women's pregnancies were mistimed by significantly more months than white women's (38 vs. 32), but there were no significant differences in mistiming between black women or white women and women of other racial groups.

Maternal Characteristics and Intendedness

Sixty-nine percent of all pregnancies ending in a singleton live birth were reported as intended, 12% as moderately mistimed, 10% as seriously mistimed and 9% as unwanted (Table 3). Only 6% of intended pregnancies were among women younger than 20, compared with 14% of moderately mistimed and unwanted pregnancies and 47% of those that were seriously mistimed. Of the six pairwise comparisons between categories of intendedness, five revealed significant differences by women's age; the exception was that the distributions of moderately mistimed and unwanted pregnancies were indistinguishable.

The results for marital status were similar to those for age: Only 14% of intended pregnancies were among never-married women, while 64% of seriously mistimed pregnancies and intermediate proportions of other categories were among this group. Again, the only comparison that was not significant was between moderately mistimed and unwanted pregnancies.

Sixty-six percent of pregnancies reported as seriously mistimed ended in first births. By comparison, first births accounted for 18% of unwanted pregnancies. About 40% of both intended and moderately mistimed pregnancies were first births; these were the only distributions that did not differ significantly from each other on this variable.

Significantly larger proportions of unwanted and seriously mistimed pregnancies than of others were among women living below 150% of the poverty level, women who

TABLE 2. Results of multivariate analysis indicating mean number of months (and standard error) of mistiming, by maternal characteristics

Characteristic	Mean mos.
Age**	
<20	46.4 (2.4)
20-24	31.2 (1.4)†
25-29	24.7 (1.8)†,‡
30-44	25.3 (2.1)†,§
Marital status**	
Never-married	38.8 (1.7)††
Married	35.3 (3.0)††
Formerly married	28.8 (1.4)
Race*	
Black	38.2 (2.4)§§
White	32.0 (1.1)
Other	37.4 (3.5)

*Overall p<.05. ** Overall p<.0001. †Significantly different from <20 at p<.0001. ‡Significantly different from 20-24 at p<.001. §Significantly different from 20-24 at p<.05. ††Significantly different from formerly married at p<.0001. ‡‡Significantly different from formerly married at p<.05. §§Significantly different from white at p<.05. Note: Analysis also included parity, poverty level and education.

TABLE 3. Percentage distribution of pregnancies ending in live births, by intendedness, and percentage distribution within each category of intendedness, by selected maternal characteristics, maternal behaviors and pregnancy outcomes

Variable	Intended	Moderately mistimed	Seriously mistimed	Unwanted
All	69.0	11.5	9.6	9.1
CHARACTERISTIC				
Age at birth				
<20	5.9†,‡,§	14.4‡	47.0§	14.0
>20	94.1	85.6	53.0	86.0
Marital status at birth				
Never-married	13.9†,‡,§	29.0‡	63.8§	38.0
Ever-married	86.1	71.0	36.2	62.0
Parity				
1	40.6‡,§	39.6‡,§	65.5§	18.4
>1	59.4	60.4	34.5	81.6
Poverty level at interview				
<150%	28.4‡,§	34.7‡,§	52.6	56.7
≥150%	71.6	65.3	47.4	43.3
Education at interview				
≤high school/GED	52.5‡,§	56.3§	67.9	74.5
>high school	47.5	43.7	32.1	25.5
Race				
Black	10.4‡,§,††	15.4‡,§	27.3	31.0
Nonblack	89.6	84.6	72.7	69.1
BEHAVIOR				
Prenatal care initiated (weeks)				
≤8	72.9‡,§,††	63.0	51.3	57.6
>8	27.1	37.0	48.7	42.4
Breastfed				
Yes	60.8‡,§	57.5§,‡‡	42.4	39.1
No	39.2	42.5	57.6	60.9
OUTCOMES				
Birth weight (g)				
<2,500	5.1	6.6	8.0	6.0
≥2,500	94.9	93.5	92.1	94.0
Gestational age at birth (weeks)				
<37	7.7‡‡	10.4	13.7	11.0
≥37	92.3	89.7	86.4	89.0
Total	100.0	100.0	100.0	100.0

†Significantly different from moderately mistimed at $p < .0001$. ‡Significantly different from seriously mistimed at $p \leq .0001$. §Significantly different from unwanted at $p < .0001$. ††Significantly different from moderately mistimed at $p = .001$. ‡‡Significantly different from seriously mistimed at $p < .001$. Notes: Moderately mistimed pregnancies are those mistimed by 24 or fewer months, and seriously mistimed pregnancies are those mistimed by more than 24 months. The percentage distribution of all births does not add to 100 because women who responded "don't know" were not included. For poverty level and education, data are shown only for women aged 22–44 at the time of interview.

had completed high school or fewer years of education and black women. For poverty level, all of the comparisons but two (intended vs. moderately mistimed pregnancies and seriously mistimed vs. unwanted pregnancies) were significant. For educational level, three comparisons (intended vs. seriously mistimed, intended vs. unwanted and moderately mistimed vs. unwanted) were significant. For race, five of the six comparisons were significant; the exception was the comparison between seriously mistimed and unwanted pregnancies.

Thus, the distributions of moderately and seriously mistimed pregnancies were significantly different in comparisons for five of six maternal characteristics, and the distributions of moderately mistimed and unwanted pregnancies were significantly different in comparisons for four of six. By contrast, the distributions of intended and moderately mistimed pregnancies and those of seriously mistimed and unwanted pregnancies were significantly different in comparisons for only three of six characteristics.

Women's mean happiness scores—which ranged from 9.4 for intended pregnancies to 4.1 for unwanted pregnancies—differed significantly from one another by intendedness (not shown). The exception was the comparison between seriously mistimed and unwanted pregnancies. Women whose pregnancies were moderately and seriously mistimed scored means of 6.4 and 5.3, respectively, on the happiness scale.

Maternal Behavior and Intendedness

The proportion of pregnancies for which women initiated prenatal care at or before eight weeks was significantly greater if the pregnancy was intended (73%) than if it was moderately or seriously mistimed or unwanted (51–63%). The proportion of pregnancies for which women initiated breastfeeding decreased with decreasing intendedness—ranging from 61% of intended pregnancies to 39% of unwanted pregnancies. All but two of the comparisons (intended vs. moderately mistimed and seriously mistimed vs. unwanted) were significant for this variable. Thus, the comparisons between intended and seriously mistimed or unwanted pregnancies were significantly different for both maternal behavior variables, and seriously mistimed and unwanted pregnancies did not differ for either variable.

Pregnancy Outcomes and Intendedness

Although only one of the comparisons for pregnancy outcomes was significant, the proportions of pregnancies that ended in the birth of a low-birth-weight infant (that is, one weighing less than 2,500 g) or in preterm delivery (before 37 weeks' gestation) increased along the continuum of intendedness from intended to seriously mistimed births. The only significant comparison was for preterm delivery between intended and seriously mistimed pregnancies (8% vs. 14%).

DISCUSSION

Pregnancy mistiming does not appear to be a unitary construct. The amount of time by which pregnancies occur earlier than intended varies widely: For some women it is only six months, and for others it is more than five years. Pregnancies among young women, never-married women and black women are disproportionately mistimed by three or more years.

When we categorized pregnancies according to the degree of mistiming, we found that pregnancies described as intended, moderately mistimed, seriously mistimed or unwanted differ significantly from each other by maternal char-

acteristics and behaviors and pregnancy outcomes. Thus, our results raise questions about the validity of combining all mistimed pregnancies, regardless of degree of mistiming, into a single mistimed pregnancy category or of combining them with unwanted pregnancies into an unintended pregnancy category.

The amount of time by which a pregnancy is mistimed varies according to women's socioeconomic status, race or stage of life. This is most apparent in our findings that intended pregnancies differ from both unwanted and seriously mistimed pregnancies according to all six maternal characteristics we studied, and that moderately and seriously mistimed pregnancies differ according to five of the six characteristics. By contrast, comparisons between intended and moderately mistimed pregnancies, and between seriously mistimed and unwanted pregnancies, are significant for only three maternal characteristics. It is noteworthy that seriously mistimed and unwanted pregnancies differ according to age, marital status and parity—which are related to life stage—but not according to poverty level, education and race, which are more enduring characteristics. This suggests that seriously mistimed and unwanted pregnancies occur more frequently than intended or moderately mistimed pregnancies among women who are poor, less-educated or black, but at different stages of their lives.

Our analyses also suggest that there may be a continuum of maternal happiness and behavior according to intendedness: Mean happiness scores and the proportions of pregnancies for which women initiate prenatal care and breastfeeding appear to decrease with decreasing degree of intendedness, except in the case of prenatal care for unwanted pregnancies. Similarly, measures of pregnancy outcome appear to worsen with decreasing degree of intendedness, again except in the case of unwanted pregnancies. However, seriously mistimed and unwanted pregnancies are not significantly different on any of these variables.

Finally, our findings suggest that future studies of pregnancy intendedness and its association with maternal characteristics and behaviors and pregnancy outcomes should examine mistiming in increments of time rather than as a single category of mistimed pregnancies, as the extent of mistiming can vary widely. For the same reason, mistimed and unwanted pregnancies should not be grouped into a single unintended category. Alternatively, researchers could use the four categories of intendedness we used here, or combine intended and moderately mistimed pregnancies into one category, and seriously mistimed and unwanted pregnancies into another. The latter classification probably better reflects the problems of unintended pregnancies than the current dichotomy between intended and unintended.

CONCLUSIONS

A pregnancy that is mistimed by a matter of a few months probably has minimal consequences for the mother, child or family. However, the consequences of pregnancies that are mistimed by more than a few months can be great for the mother, child and family, and thus they represent a pub-

lic health problem that needs to be addressed by researchers, program planners and policymakers. Additional research is necessary before the importance of the category of mistimed pregnancies can be determined. Currently, all pregnancies that are reported as being later than wanted are considered intended. Perhaps pregnancies that occur one or even two years too soon should also be combined with intended pregnancies. In particular, future research should explore whether the impact of the extent of mistiming varies with women's age, marital status and educational attainment. For example, it is likely that mistiming has more negative sequelae for teenagers who have not completed high school than for older women who have completed their education. Surveys should continue to include a question about the extent of mistiming, and analyses should not assume that "mistimed pregnancy" is a unitary concept.

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Coming Up in *Perspectives*

Knowing the characteristics of women who obtain abortions can help policymakers and family planning providers determine which groups of women need better access to family planning services. “Patterns in the Socioeconomic Characteristics of Women Obtaining Abortions in 2000–2001,” by Rachel K. Jones and colleagues from The Alan Guttmacher Institute, provides the most up-to-date profile of U.S. women who have abortions. The report will appear in the September/October issue of *Perspectives on Sexual and Reproductive Health*.

Also coming up in the September/October issue:

- “Preventing Pregnancy and Improving Health Care Access Among Teenagers: An Evaluation of the Children’s Aid Society–Carrera Program,” by Susan Philliber et al.
- “Association of Early Childbearing and Low Cognitive Ability,” by Darlene L. Shearer et al.
- “Family Characteristics and Sexual Risk Behaviors Among Black Men in the United States,” by Rosalie J. Bakken and Mary Winter
- “Legal and Ethical Considerations in Research with Sexually Active Adolescents: The Requirement to Report Statutory Rape,” by Nancy Findholt and Linda C. Robrecht