Are pregnancy intentions associated with transitions into and out of marriage?

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Abstract

CONTEXT—Beyond associations with health outcomes, pregnancy intentions may be associated with social outcomes, including marital transitions.

METHODS—Linked data from the 2004-2008 Oklahoma Pregnancy Risk Assessment Monitoring System (PRAMS) survey and The Oklahoma Toddler Survey (TOTS) from 2006-2010 were used to examine a four category measure of women's pregnancy intentions (intended, mistimed <2 years, mistimed >=2 years, unwanted) and changes in marital status between conception, birth and age two. Analyses were stratified by marital status at conception (married, N=3,617; unmarried, N=2,123). Propensity score methods were used to adjust for confounding factors, and logistic regressions were used to estimate the association between pregnancy intention and marital formation and dissolution at birth and child's age two.

RESULTS—Intention status was associated with mothers' marital transitions by child's age two, both in analyses unadjusted and adjusted for confounding background characteristics. In adjusted models, among women married at conception, those with a birth resulting from an unwanted pregnancy were more likely (OR=2.2) than those with an intended pregnancy to transition out of marriage by the time their child was age two. Among women unmarried at conception, those with an unwanted pregnancy were less likely (OR=.4) than those with an intended pregnancy to marry before the child was age two. Births resulting from mistimed pregnancies were not significantly associated with marital transitions.

CONCLUSIONS—Women with a child resulting from an unwanted pregnancy are less likely to marry, and less likely to stay married, than women with an intended birth. Future assessments of the consequences of unintended childbearing should distinguish between mistimed and unwanted births.

Introduction

National public health policy and research on reproductive behaviors has been strongly influenced by the premise that unintended childbearing has significant negative consequences.[1,2] Much research has focused on health consequences of unintended childbearing, particularly its effect on the behavior of mothers both during pregnancy and afterward, such as use of prenatal care or breastfeeding.[3-5] In contrast, far less attention has

been given to the potential relationship between unintended childbearing and negative social outcomes. In 1995, the National Academy of Science's watershed report *The Best Intentions* reviewed research on the consequences of unintended pregnancy and concluded that "such consequences undoubtedly impede the formation and maintenance of strong families."[6(p.251)] However, in the twenty years since this report, there has been limited research attention on associations between unintended childbearing and marital behaviors. Despite the substantial research and policy focus on marriage formation and stability associated with childbearing, intention status has generally not been included in this work. Yet transitions into or out of marriage may be influenced by the experience of having a birth from an unintended pregnancy. With births from unintended pregnancies comprising about 37% of all births that occur each year in the United States,[7] research is needed to better understand the relationship between unintended childbearing and marital transitions.

In this paper, we examine associations between childbearing intentions and women's transitions into and out of marriage using a unique longitudinal dataset representative of all mothers giving birth in Oklahoma. These data include information about formal marital status at conception, birth and when the child is age two, as well as a detailed measure of intention status. Beyond providing high-quality data about childbearing and marriage transitions, Oklahoma offers an important setting to study the relationship between intention status and both marriage formation and stability. Unintended childbearing rates are high in the state, accounting for almost half of all live births in 2010 (as compared with 38% nationally),[8] and when faced with an unintended pregnancy, about two-thirds of women in Oklahoma carry to term, a share amongst the highest in the country.[9] Childbearing women in Oklahoma also face relatively severe economic challenges. For example, in 2010, 65% of deliveries in Oklahoma were paid for with public funding (through programs such as Medicaid and the Indian Health Service), compared to 51% of US births overall.[8]

At the same time, Oklahoma has made marriage promotion a state-level priority. The Oklahoma Marriage Initiative (OMI),[*] launched in 1999, is the nation's longest running and largest marriage promotion program.[10] The OMI provides free educational workshops "designed to teach individuals and couples the attitudes, communication, and behavioral skills known to improve relationship quality and increase family stability;"[11(p. 4)] The reach of the program is extensive: between 2001 and 2007, around 5-10% of Oklahoma households participated in workshops funded by the program.[12] Despite the initiative, however, trends in the share of births to unmarried mothers in Oklahoma has largely mirrored national trends, rising from 34% in 2000 to 41% in 2007, a level that has been stable through 2012.[13] In addition, although the divorce rate has been declining in Oklahoma (by about 25% from 2000 to 2013),[14] it still has the third highest divorce rate in the nation.[15]

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[*]In 2015, the program's name was changed to Project Relate Oklahoma (PRO); for consistency, however, we refer to it as the Oklahoma Marriage Initiative throughout the text.

Background

Research on the associations between childbearing and marital transitions tends to examine marital and nonmarital conceptions separately. For married couples, there is strong evidence that childbearing is associated with increased marital stability.[16,17] In contrast, for couples unmarried at conception, childbearing generally is not followed by the formation of marriages. For example, in an analysis of recent national data, Lichter (2012) found that few nonmarital conceptions resulted in marriages before the time of the birth.[18] Even after the birth, few of these women marry; research from the Fragile Families and Child Wellbeing Study found that only 16% of women with nonmarital births married the father by the time their child was five years old.[19] However, whether the pregnancy leading to the birth had been intended, mistimed or unwanted was not considered in any of these analyses. [†]

Only a handful of studies directly examine the association of pregnancy intentions with marriage transitions following childbirth. Among women experiencing a nonmarital birth, there is some evidence of an association between marriage formation and pregnancy intentions. In the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B), a nationally representative sample of children born in 2001, cohabiting women with births from intended pregnancies were more likely to marry within two years of the birth than were cohabiting women with births from unintended pregnancies, after controlling for background characteristics; similarly, women outside of a union at the time of conception were more likely to be cohabiting or married at two years postpartum if the pregnancy had been intended than unintended.[20] Other studies examined marital formation following a birth exclusively among cohabiting unions and found mixed results. Using data from the 2002 National Survey of Family Growth (NSFG), Manlove et al. (2012) found a significant positive association between pregnancy intentions and marriage among cohabitors in multivariate regressions controlling for other background factors, but only for white mothers.[21] Using the same data, Guzzo and Hayford (2014) estimated that marriage following a birth was more likely among cohabiters with an intended than an unintended pregnancy in a bivariate model, but not after controlling for confounding background characteristics.[22]

There also is limited evidence that pregnancy intentions are associated with marital stability. In analyses of the 2002 NSFG, first births from an unintended pregnancy were associated with an increased likelihood of marriage dissolution relative to first births from an intended one among married women, even when accounting for stable unobserved characteristics using fixed-effects models.[23] In the ECLS-B, women married at conception were more likely to remain married when the child was two years old if the pregnancy had been intended than if it had been unintended.[20] Other analyses have not differentiated between cohabiting and marital relationships, but still suggest that births from unintended pregnancies have a negative association with the stability of unions generally as compared to births from intended ones.[24,25]

[†]In fact, the Fragile Families study, a highly influential survey of non-marital childbearing, has no measure of the intention status of births.

Studies of marital transitions associated with childbearing find significant relationships between a range of background characteristics, including age, race/ethnicity, parity, education, income,[16,17,26,27] and intimate partner violence,[26,28] and the odds of both marital formation and dissolution after the birth of a child. Studies have used a variety of statistical approaches to adjust for potential confounding between intention status and these demographic variables; these variables may also have a direct and independent association with marital transitions beyond their relationship with intention status.

This paper addresses a number of research and methodological gaps in the study of marital formation and stability. First, existing studies refer to births in 2001 or earlier, and since that time, the proportion of childbearing occurring outside of marriage has increased substantially, rising from 34% of all births in 2001 to 41% in 2013:[29] the majority of these nonmarital births are from unintended pregnancies.[30] Second, although recent studies show that meaningful distinctions can be made between unintended pregnancies by the length of mistiming,[5,7] the few prior studies on intention status and marital transitions either do not identify the extent of mistiming,[20,21] or combine births from mistimed pregnancies with either intended or unintended ones,[22,23] and thus cannot examine differences in the association between the extent of mistiming and union transitions. For example, the likelihood of marriage in the period between conception and birth may be more likely among women with only modestly mistimed nonmarital conceptions if this mistiming simply hastens longer-range marriage plans. Third, in order to identify the relationship between pregnancy intentions and marital transitions, there is a need to further address the potential confounding of pregnancy intention and other demographic and socioeconomic characteristics. Pregnancy intentions are strongly related to many of women's demographic and socio-economic characteristics, which in turn are associated with marriage transitions after a birth—age, marital status, race/ethnicity and parity, educational attainment, and poverty status among others.[5] Thus, it is essential to disentangle pregnancy intentions from demographic characteristics that are associated with transitions into and out of marriage.

To address these gaps, this study capitalizes on longitudinal data from the 2004–2008 Oklahoma Pregnancy Risk Assessment Monitoring System (PRAMS) and The Oklahoma Toddler Survey (TOTS) for 2006–2010 to investigate the association between women's pregnancy intentions and marriage formation and stability, by examining the mothers' formal relationships at three points in time: conception, birth and when the child is two years old. The longitudinal nature of these data are a key advantage in this analysis; the intention status of the conception is measured shortly after the time of the birth and prior to marital status at child's age two. In contrast, both marital status and pregnancy intentions are reported retrospectively in national cross-sectional surveys such as the NSFG and if recall of the pregnancy intention at two years or beyond the time of the birth is affected by relationship quality or other factors that either led to marital formation or dissolution then estimates of the association could be biased.

Data and Methods

Data

The annual Oklahoma PRAMS survey is a random sample of postpartum women who delivered live births in Oklahoma. The TOTS survey was sent to PRAMS respondents when their child was two years old. Both the PRAMS and TOTS surveys are mixed-mode surveillance systems; in each case two mail surveys are sent, followed by telephone follow-up for nonrespondents. A detailed explanation of the methodology is documented elsewhere.[31,32]

From 2004 to 2008, 9,829 mothers completed the Oklahoma PRAMS questionnaire within 2-4 months of the birth of their child; 6,648 of these (68%) completed the TOTS survey two years later. We found no significant differences in the distributions of sociodemographic measures and intention status among the PRAMS and TOTS respondents, suggesting loss to follow-up was not selective for the variables included in our analyses.

Measures

Pregnancy intentions—All state-level PRAMS surveys include a question that allows births to be characterized as resulting from intended, mistimed or unwanted pregnancies: "Thinking back to *just before* you got pregnant with your *new* baby, how did you feel about becoming pregnant?" The response categories are, 1) "I wanted to be pregnant sooner," 2) "I wanted to be pregnant later," 3) "I wanted to be pregnant then," and 4) "I didn't want to be pregnant then or at any time in the future." If the mother responded that she wanted to become pregnant sooner than she did or "then," the pregnancy is considered intended. Pregnancies to mothers who did not want to become pregnant are considered unwanted, and those who desired a pregnancy later than it occurred are mistimed. The Oklahoma PRAMS added a follow-up question for women reporting they wanted to be pregnant later: "How much later did you want to become pregnant?" Response categories were less than 1 year, 1 year to less than 2 years, 2 years to less than 3 years, 3 years to less than 4 years, and 4 years or more.[‡] We combined responses to these two questions into a four-category measure of intention status used in other studies:[5,7] intended, mistimed by less than two years, mistimed by two or more years, and unwanted.

Marital status—Using the linked responses to the PRAMS and TOTS surveys provides indicators of formal marital status (married, unmarried) at three points in time: at conception (measured retrospectively in the PRAMS survey), at birth (taken from the birth certificate as reported in the PRAMS data set), and when the child is two years old (measured in the TOTS survey).

Other measures—In addition to marital status and pregnancy intention, the PRAMS and TOTS surveys provide a range of demographic and socio-economic measures which have been shown in prior literature to have direct associations with both marital transitions and pregnancy intentions.[5,16-18] These include age (measured in the PRAMS survey as age at the

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[‡]Only one other state (Utah) included such a question in the PRAMS survey during the same period.

time of the birth), whether or not the respondent had a prior live birth, race (non-Hispanic white, Hispanic, non-Hispanic black, non-Hispanic other), education (less than high school, high school, college or more), and the poverty level of the respondent (above or below the federal poverty line in the 12 months prior to the birth). The PRAMS survey also asked respondents about physical abuse by a partner or ex-partner in the 12 months prior to conception, as well as during pregnancy, which prior research has found to increase the likelihood of unintended childbearing;[33,34] we recoded these as dichotomous indicators of intimate partner violence in each of the two time periods.

Analyses

We excluded 75 births in the linked PRAMS-TOTS dataset from the analysis because of missing data on intention status, as well as 34 births with missing data on marital status at one point in time or more. Additional births were excluded due to missing values on other covariates, resulting in an analytical sample of 5,740 women with births during the survey period. All of the analyses were stratified by the mother's marital status at conception (married, N=3,617; unmarried, N=2,123), in order to examine separately the odds of marital dissolution and marital formation after a birth.

We first examined bivariate associations between pregnancy intentions and marital status at conception, birth and child's age two. We then investigated the extent to which mothers differed in their background characteristics across the four intention status groups, stratified by marital status at conception. Such differences indicate a need to control for the sociodemographic composition of each group, in order to isolate the association of pregnancy intentions with marriage transitions that is not attributable to background characteristics related to both.

Next, we employed inverse probability weights, an adaptation of propensity score analysis. Generally, propensity score methods are used for adjusting the distribution of characteristics of two groups so that they are matched, or balanced with respect to observed characteristics that are relevant to group assignment but which also affect the outcome of interest.[35,36] Since we have four pregnancy intention groups rather than two, we used an alternate approach of inverse probability weighting (IPW).[37] This methodology requires a multi-stage process of first estimating, and then applying, inverse probability weights to create balanced groups for comparison.[38] These steps were done separately by marital status at time of conception.

Initially, we calculated the propensity scores—that is, the probability of the birth being in each intention status group, given the observed covariates—using a multinomial logistic regression model with pregnancy intention status (intended, mistimed by less than two years, mistimed by two or more years, unwanted) as the dependent variable. We used a nonparsimonious approach and included all available covariates in the model that are known to be related to both pregnancy intentions and marital transitions—and which temporally preceded the pregnancy—regardless of statistical significance. The inclusion of multiple covariates in propensity score models is important because estimates based on only a few covariates are more likely to yield biased estimates (see Appendix 1 for a complete list of variables included in our final model).[39] We then constructed weights using the inverse of

the propensity score, multiplying each observation's inverse probability weight by the population weight in order to obtain unbiased effects based on the population of all births in the state.[40] We assessed the quality of the propensity score estimation process by calculating a measure of standardized bias in the balanced samples. We considered the adjusted distributions of characteristics across intention status groups adequately balanced once all estimates of standardized biases fell below .25.[36] In addition, in order to reduce the influence of outliers in our analysis, we trimmed inverse probability weights to the value at the 99th percentile so that large weights of any outliers did not have a strong influence on the analysis.[41]

Finally, we estimated logistic regression models of transitions in marital status using the balanced samples; that is, with observations weighted using inverse probability weights to control for observed variance in background characteristics between the intention groups. Controlling for these distributional differences allows us to isolate the association of pregnancy intentions on marriage transitions that are not attributable to sociodemographic characteristics of the mothers.

Among women unmarried at conception (N=2,123), the outcome of interest is whether the mother married by the time of the birth and by child's age two (0=unmarried at birth or age two, 1= married at birth or age two). Among women married at conception, the outcome of interest is marital dissolution by child's age two (0=stayed married, 1=ended marriage); too few mothers ended their marriage between conception and birth to estimate a robust model of this transition. For each outcome we estimated two multivariate models with different sets of independent variables. Model 1 included only the four-category measure of intention status, to examine the direct effect of intention status on marital transitions in the balanced sample. In Model 2 we added sociodemographic variables that may have direct associations with marriage transitions, as well as an indicator of reported intimate partner violence during pregnancy.

We performed all analyses using *svy* commands in Stata 13.1 to account for the complex sampling designs of the surveys. Only statistically significant differences at p<.05 are discussed in the text.

Results

Descriptive Analysis

Pregnancy intentions for mothers who were married at the time of conception differ dramatically from those who were unmarried. Two-thirds of births to married mothers were reported as being the result of intended pregnancies (67%) compared to less than one-third of births to unmarried mothers (31%; Table 1). In contrast, mothers unmarried at conception were significantly more likely than married mothers to report the pregnancy leading to their birth as greatly mistimed (38% vs. 10%) or unwanted (13% vs. 8%; Table 1).

Among mothers married at conception, few women transitioned out of marriage, either by the time of the birth or by the time their child was two years old (Table 1, second panel). Only 1% of women married at conception were divorced or separated by the time of the

birth, while 7% were no longer married to the father two years after the birth. Marital transitions were more common among women unmarried at conception; overall 16% married before their child was born. By the time their child was two years old, nearly one in three (30%) had transitioned into marriage.

These overall patterns, however, mask significant differences by the intention status of the pregnancy. Among women married at conception, all of those with a birth from an intended pregnancy remained married at birth, with small declines among the other intention groups; those with a pregnancy mistimed by 2 or more years were significantly less likely to remain married at birth than women with an intended pregnancy (97% vs. 100%). Differences in marital stability by age two increased, as women with a birth resulting from an unwanted pregnancy or a pregnancy mistimed by two or more years were significantly less likely than women with births from intended pregnancies to remain married (85%, 89%, and 94% respectively). Similarly, among women unmarried at conception, transition to marriage by birth or age two was significantly more likely among women with an intended pregnancy than women with a pregnancy mistimed by two or more years or one that was unwanted (21% versus 14% and 10%, respectively at birth; 37% vs. 26% and 24% by age two). The differences by intention status increased over time. Regardless of marital status at conception, there were no significant differences in marital status at birth or age two between women with births from pregnancies mistimed by less than two years and those with births from intended pregnancies.

We next examined the distribution of sociodemographic characteristics within intention status groups (Table 2), to consider if such differences drive the patterns of patterns by pregnancy intentions shown in Table 1. Within each marital status group, most characteristics varied significantly by intention status. Among women married at conception, mothers with births resulting from a mistimed or unwanted pregnancy were less likely to be having their first birth than those with a birth from an intended pregnancy (30% of slightly mistimed, 21% of greatly mistimed, and 6% of unwanted were having a first birth vs. 39% of intended). They were also less likely to have completed college (57%, 45% and 55% respectively vs. 66%) or to live above the federal poverty line (77%, 64%, and 79% vs. 87%). Mothers of births from unwanted pregnancies were more likely to be older than those with births from intended pregnancies (60% aged 30-44 vs. 41%), while mothers of births from mistimed pregnancies (regardless of the extent of mistiming) were more likely to be aged 15-24 (34% of slightly mistimed and 36% of greatly mistimed vs. 23% of intended). Among married mothers, only those with births from greatly mistimed pregnancies varied significantly by race/ethnicity; these women were more likely to be Hispanic (15% vs. 9%) and less likely to be Non-Hispanic white (70% vs. 78%).

Among women unmarried at conception, slightly different patterns emerge. As compared to mothers of births from intended pregnancies, mothers of births from greatly mistimed pregnancies were more likely to be under age 20 at the time of the birth (27% vs. 12%); these women were also more likely to be having their first birth (64% vs. 50%). Mothers of births from unwanted pregnancies, in contrast, were more likely to have had previous children than mothers of births from intended pregnancies: only 32% were having their first birth. In addition, unmarried mothers with births from unwanted or greatly mistimed

pregnancies were more likely to be Non-Hispanic black (16% and 18% vs. 9%), and less likely to be Hispanic (11% and 6% vs. 19%), than unmarried mothers with births from intended pregnancies. Women with births from unwanted pregnancies (as well as those with births from slightly mistimed pregnancies) were also less likely to be in the lowest education group (16% of unwanted and 25% of slightly mistimed, vs. 35% of intended). Finally, among unmarried women, those with births from unwanted pregnancies were more likely than women with births from intended pregnancies to have experienced intimate partner violence in the 12 months before conception (14% compared to 7%).

We compared the standardized bias of the distributions of sociodemographic characteristics of mothers within the four intention status groups both before inverse probability weighting and again afterward, to determine whether the adjusted sample was balanced with respect to these characteristics (see Appendix 1). In the unbalanced data, large standardized bias estimates for many of the covariates indicate large and potentially meaningful differences in the distribution of these characteristics by intention status. After weighting the observations by the inverse of the propensity scores derived from multinomial regression, the measures of standardized bias fell below .25 for each variable examined (see Appendix 1).[§]

Intention status and marital stability in the balanced sample

In the balanced sample of mothers married at conception, we estimated logistic regression models of the association between intention status and marriage dissolution (Table 3). Model 1, which includes only the four-category measure of intention status, shows that married women with a birth resulting from an unwanted pregnancy had two times greater odds of transitioning out of marriage by the time their child was two years old (OR=2.2) than married women with a birth from an intended pregnancy. Marital dissolution among women with births from mistimed pregnancies, regardless of the extent of mistiming, did not differ significantly from those with births from intended pregnancies. Model 2 includes sociodemographic measures, as well as women's report of abuse by partner during the pregnancy, to examine whether these factors have any direct association with marital dissolution. Mothers with at least a college education were significantly less likely to have their marriage end by the time the child was two years old (OR=.2) as compared with mothers with only a high school degree. However, there were no significant differences in the likelihood of marital dissolution by age, parity or race. Intimate partner violence during the pregnancy, however, has a large positive association with marital dissolution (OR=5.0).

Intention status and marital formation in the balanced sample

We estimated logistic regression models of the association between intention status and marriage at two time points (birth and child's age two) for mothers unmarried at conception, adjusting for variation in background characteristics using inverse probability weights. In the unadjusted data, we found that among women unmarried at conception intention status was significantly associated with marriage between conception and the child's birth (Table 1). After balancing the sample with the inverse probability weights, we find no significant

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[§]There was one exception. In the group of mothers married at conception, whether or not the child was the first birth to the mother was slightly above the .25 cut-off (.26). In order to test whether this slight imbalance affected our results, we conducted a sensitivity analysis with this measure, including and excluding it as a control in all models; all results were unaffected.

differences between the intention status groups in the likelihood of being married by the time the child is born (Model 1, Table 4). However, unmarried women with a birth from an unwanted pregnancy were less likely (OR=.5) than those with a birth from an intended pregnancy to marry by the time the child was age two. Women with births from mistimed pregnancies (whether greatly or slightly mistimed) did not differ significantly from those with births from intended pregnancies on the odds of becoming married, either at the child's birth or two years later.

For both outcomes shown in Table 4, findings in Model 2, which includes additional sociodemographic control variables, indicate that non-Hispanic Black mothers were significantly less likely than non-Hispanic White mothers to transition to marriage. The differences between non-Hispanic Black and Hispanic women were also statistically significant. Additionally, mothers with less than a high school education were only half as likely as those with a high school degree to marry between conception and the birth of the child; they were also significantly less likely than college educated mothers to marry during this time period. In contrast, there was no significant association between education and marriage by age two, although the direction of associations was the same for both outcomes. None of the other sociodemographic variables were associated with marriage at either point in time.

Unmarried women who reported partner abuse during pregnancy had no differential likelihood of marrying by the child's birth; however, these women had a significantly reduced likelihood (OR=.3) of marrying by the time their child was two years old.

Discussion

In this analysis of women having a birth in Oklahoma, intention status—particularly an unwanted pregnancy—was associated with mothers' transitions both into and out of marriage by the time the child was age two, even when differences in underlying background characteristics were accounted for using propensity score methods. This is similar to the general pattern of findings in research on the 2001 ECLS-B, which found fewer transitions to marriage and more marital dissolution among women with births from unintended pregnancies as compared to births from intended pregnancies.[20] Here, by distinguishing between unintended pregnancies that were mistimed or unwanted, we find that the associations are limited to births resulting from unwanted pregnancies. This concentration of associations among births from unwanted pregnancies mirrors patterns found in recent analyses on the relationships between health outcomes and unintended pregnancy nationally[5] as well as in Oklahoma specifically.[42]

Fewer than one in five women unmarried at conception, married in the short period between the conception and birth of their child. In the unadjusted data, these marriages were less common among women with births from greatly mistimed and unwanted pregnancies than women with births from intended pregnancies; but, after adjusting for confounding background characteristics, there was no association between intention status and transition to marriage by the time of the child's birth. Of particular interest is the lack of an association between having a birth from a pregnancy reported as mistimed by less than two years and

the likelihood of marriage by birth or child's age two; we might have expected to observe an increased likelihood of marriage in response to this pregnancy mistiming, with already planned or expected marriages simply shifting earlier in a relationship's timeline. In addition, we find no differences by extent of mistiming in the adjusted data; this suggests that the decreased odds of marital formation (and increased odds of marital dissolution) shown in the unadjusted sample were due to demographic and life course differences between the two mistimed groups.

We used a number of approaches to help disentangle women's intentions from their other sociodemographic traits, including stratifying by marital status at conception, and employing propensity score methods. Yet there are probably still associations between marital status at the time of conception and intention status that we have not been able to uncouple. This reflects the fact that intention status and marital status at time of conception are inextricably linked. Women reporting a pregnancy as mistimed or unwanted are likely reflecting, at least in part, on the quality and status of their partnership at the time. The characterization of a pregnancy as unintended at conception may be a direct result of the absence of a formal relationship between the mother and the father. More stable or higher quality unions may also be more likely to plan a birth.[43] Recent evidence from the Turnaway Study found that romantic relationships between the father and mother dissolved rapidly among both women who obtained abortions in the wake of an unintended pregnancy as well as those who went on to have a birth; this suggests that the relationships in which unintended pregnancies occur are already particularly fragile.[44] In addition, although women whose pregnancies were categorized as unwanted are responding to a statement that they did not want to conceive a child "then or at any point in the future," several studies have suggested that this intention category may indicate strength of feeling about being pregnant at that time as opposed to long-term childbearing desires.[45-47] Women reporting an unwanted pregnancy may potentially want another child in the future in response to changing life or partnership circumstances.[48] Given that pregnancy intention was measured 2-4 months after the birth of the child, it is possible that the stated intention status may have been influenced by the ongoing quality or stability of the relationship with the child's father. Future efforts should focus on incorporating measures of union quality, which were not available in the PRAMS and TOTS data, into analyses of the association between intention status and marriage formation and stability.

Many studies that purport to show that marriage is the best setting for children do not address the intention status of the pregnancy leading to the birth[49,50]— which itself is significantly associated with a variety of child outcomes.[3,5,42] The intention status of a pregnancy is, unsurprisingly, strongly influenced by the union in which it occurs.[30] We found substantial variation in intention status by marital status at conception, with one-third of births to married mothers, as compared to more than two-thirds of births to unmarried mothers, reported as resulting from unintended pregnancies. Accordingly, it is possible that some of the positive associations between marriage and child well-being observed in prior studies may be confounded with the intention status of the pregnancy itself. Future work should further investigate these relationships, particularly as this has relevance for family formation and stability promoting policies. Additionally, it is important to recognize that nonmarital childbearing is not synonymous with unintended childbearing, nor is unintended

childbearing limited to unmarried women; a substantial share of births to married women are from unintended pregnancies.

Similar to earlier studies,[26,28] we found strong evidence that women experiencing intimate partner violence during pregnancy had weakened marital stability if already married, and greatly decreased odds of transitioning to marriage if unmarried at conception. This negative association exists regardless of intention status. However, other research has suggested that unintended pregnancies themselves may be a risk factor for abuse by a partner.[34] Indeed, the influences work in both directions, as intimate partner violence also has been identified as a risk factor for unintended pregnancy through a variety of individual and partner specific mechanisms, including reproductive control by the abusive partner.[33,51] Efforts to promote women's well-being, whether through marriage promotion programs, family planning programs, programs to identify and treat partner abuse, or others, need to be responsive to the interrelationships between these factors.

Limitations

Our study has several limitations. The analysis investigates only the experiences in Oklahoma, and more research is needed to determine if similar patterns are observed in national data. The available data allow us to examine marital transitions only in the two years following a birth. However, previous work has found that rates of both union formation and union dissolution are highest during this early period,[19,22] and there is substantial evidence that early patterns of marriage have influences on child well-being extending far beyond the first two years of life.[49,50] The available data also limited the analysis to formal marriages, leaving us unable to identify specifically any transitions in cohabitation associated with intention status, as cohabitors are included among unmarried women. Although current cohabitation status is collected as part of the PRAMS survey at 4-6 months postpartum, there is no retrospective report of cohabitation at conception, nor does the follow-up TOTS survey measure cohabitation when the child is two years old. Future data collection efforts should include measures of informal union status to help distinguish any differential patterns of marriage formation and stability between cohabiting and non-cohabiting women. However, given work on the relative instability of cohabiting unions,[24,52] and mixed research on the benefits for children of even stable cohabition,[49,53] we feel this focus on transitions into and out of marriage is a useful contribution.

This research demonstrates the necessity of adjusting for confounding variables. Given that we can only adjust for measured variables, there may still be unobserved factors that affect marital transitions and stability. If we have failed to measure important characteristics of mothers that are predictive of intention status and that also affect marriage transitions or stability, then our findings may be biased. Notably, many factors contribute to couples' decisions to marry, stay together or divorce and the measures available in the Oklahoma PRAMS and TOTS data provide only a limited perspective on these decision-making processes. In particular, we lack detailed information on the characteristics of the relationships in which these pregnancies occur, the quality of the relationship, or any detailed demographic information on the father of the child, all of which may be expected to have some influence on marital stability and formation. Nonetheless, this investigation

constitutes an important step towards understanding the relationship between unintended childbearing and marriage.

Acknowledgments

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Table 1

Percent distribution of intention status, and proportion of women married at conception, birth and two years after the birth, by intention status and marital status at conception, Okahoma PRAMS 2004-2008 and TOTS 2006-2010.

Intention status	Percent distribution	Percent married at:		
		Conception	Birth	Two years
Women married at conception				
Total	**100%**	**100%**	**99%**	**93%**
Intended	67%	100%	100%	94%
Mistimed< 2 years	16%	100%	99%	93%
Mistimed>= 2 years	10%	100%	97% *	89% *
Unwanted	8%	100%	98%	85% *
Women unmarried at conception				
Total	**100%**	**0%**	**16%**	**30%**
Intended	31% ^	0%	21%	37%
Mistimed< 2 years	18%	0%	15%	31%
Mistimed>= 2 years	38% ^	0%	14% *	26% *
Unwanted	13% ^	0%	10% *	24% *

^
Significantly different between women married and unmarried at conception at p<.05

*
p<.05 vs. intended.

Table 2

Percentage distribution of background characteristics of mothers of births, by intention status and marital status at conception, Okahoma PRAMS 2004-2008 and TOTS 2006-2010.

Characteristic	All women	Married at conception					Unmarried at conception				
	Total	Total	Intended	Mistimed <2 years	Mistimed >=2 years	Unwanted	Total†	Intended	Mistimed <2 years	Mistimed >=2 years	Unwanted
N	**5,740**	**3,617**	2,516	511	314	276	**2,123**	702	383	753	285
Age at index birth											
15-24	**38%**	**23%**	20%	34% *	36% *	8% *	**58%**	51%	57% *	73% *	38%
(15-19)	**8%**	**1%**	NA	NA	NA	NA	**17%**	12%	11%	27% *	9%
(20-24)	**30%**	**21%**	19%	31% *	32% *	8% *	**41%**	38%	46%	46%	29%
25-29	**33%**	**39%**	39%	38%	45%	32%	**26%**	29%	34%	19% *	31%
30-44	**28%**	**39%**	41%	28% *	19% *	60% *	**15%**	21%	9% *	8% *	31%
First birth	**42%**	**33%**	39%	30% *	21% *	6% *	**53%**	50%	49%	64% *	32% *
Race											
Non-Hispanic white	**70%**	**78%**	79%	76%	70% *	79%	**60%**	58%	62%	62%	53%
Hispanic	**10%**	**9%**	8%	10%	15% *	6%	**12%**	19%	11% *	6% *	11% *
Non-Hispanic black	**8%**	**4%**	3%	5%	5%	6%	**13%**	9%	11%	16% *	18% *
Non-Hispanic other	**13%**	**10%**	11%	9%	10%	9%	**15%**	14%	16%	15%	18%
Education											
Less than high school	**17%**	**9%**	7%	10%	18% *	9%	**28%**	35%	25% *	27%	16% *
High school	**38%**	**30%**	28%	33%	37% *	36%	**47%**	43%	51%	47%	53%
College or more	**45%**	**61%**	66%	57% *	45% *	55% *	**25%**	22%	25%	26%	31%
Above federal poverty line [a]	**65%**	**83%**	87%	77% *	64% *	79% *	**42%**	39%	43%	43%	46%
Intimate partner violence [b]	**5%**	**2%**	2%	1%	3%	1%	**10%**	7%	12%	10%	14% *

Note: NA - results not shown due to small sample sizes.

*
p<.05 *vs.* intended.

† All differences in totals between women married and unmarried at conception are significant at the p<.05 level

[a]in 12 months before baby was born

[b]in 12 months before conception

Table 3

Odds ratios for marital dissolution by child's age 2 among women married at conception, obtained from logistic regression models with inverse probability weights, Okahoma PRAMS 2004-2008 and TOTS 2006-2010.

Characteristic	Relative odds of being unmarried at age 2	
	Model 1	**Model 2**
Intention Status		
Intended (reference)	1.00	1.00
Mistimed< 2 years	1.07	1.08
Mistimed>= 2 years	1.33	1.34
Unwanted	2.23[*]	3.01[**]
Age at index birth		
15-24		1.38
25-29 (reference)		1.00
30-44		1.51
First birth		1.60
Race		
Non-Hispanic white (reference)		1.00
Hispanic		0.71
Non-Hispanic black		2.52
Non-Hispanic other		0.99
Education		
Less than high school		1.06
High school (reference)		1.00
College or more		0.22[**]
Intimate partner violence during pregnancy		5.04[**]

[***] p<.001

[*]
p <.05

[**]
p<.01

Table 4

Odds ratios for marital formation by birth and by child's age 2 among women unmarried at conception, obtained from logistic regression models with inverse probability weights, Okalahoma PRAMS 2004-2008 and TOTS 2006-2010.

Characteristic	Relative odds of being married at birth		Relative odds of being married at age 2	
	Model 1	Model 2	Model 1	Model 2
Intention Status				
Intended (reference)	1.00	1.00	1.00	1.00
Mistimed< 2 years	1.01	1.00	0.79	0.76
Mistimed>= 2 years	0.92	0.93	0.77	0.77
Unwanted	0.56	0.53	0.46*	0.45*
Age at index birth				
15-19		0.66		0.54
20-24		0.83		0.68
25-29 (reference)		1.00		1.00
30-44		0.76		0.64
First birth		1.04		0.70
Race				
Non-Hispanic white (reference)		1.00		1.00
Hispanic		0.78		1.30
Non-Hispanic black		0.08**		0.06***
Non-Hispanic other		0.57		0.66
Education				
Less than high school		0.48*		0.61
High school (reference)		1.00		1.00
College or more		1.53		1.18
Intimate partner violence during pregnancy		0.76		0.33**

***
p<.001

*
p<.05

**
p<.01

Appendix Table 1

Standardized bias estimates for unbalanced and balanced samples, by union status at conception; births from intended pregnancies compared to each of the other three intention status groups.

	Married at conception						Unmarried at conception					
	Intended vs. mistimed < 2 years		Intended vs. mistimed >= 2 years		Intended vs. unwanted		Intended vs. mistimed < 2 years		Intended vs. mistimed >= 2 years		Intended vs. unwanted	
	Unbalanced	Balanced	Unbalanced	Balanced	Unbalanced	Balanced	Unbalanced	Balanced	Unbalanced	Balanced	Unbalanced	Balanced
Age at index birth												
15-19	0.13	0.03	0.24	0.05	0.07	0.07	0.04	0.07	0.41	0.06	0.10	0.03
20-24	0.32	0.02	0.34	0.16	0.27	0.11	0.16	0.02	0.15	0.04	0.19	0.14
25-29	0.02	0.01	0.14	0.01	0.15	0.07	0.13	0.03	0.22	0.01	0.06	0.03
30-44	0.27	0.04	0.45	0.14	0.37	0.17	0.32	0.01	0.33	0.01	0.27	0.11
First birth	0.18	0.06	0.36	0.05	0.68	0.26	0.03	0.00	0.28	0.02	0.36	0.16
Race												
Non-Hispanic white (reference)	0.07	0.10	0.23	0.19	0.01	0.09	0.09	0.02	0.09	0.08	0.10	0.16
Hispanic	0.09	0.06	0.27	0.19	0.07	0.10	0.26	0.04	0.43	0.10	0.28	0.17
Non-Hispanic black	0.10	0.07	0.13	0.02	0.16	0.01	0.05	0.08	0.20	0.02	0.25	0.06
Non-Hispanic other	0.05	0.04	0.02	0.07	0.05	0.03	0.05	0.09	0.04	0.01	0.12	0.14
Education												
Less than high school	0.14	0.09	0.45	0.07	0.10	0.02	0.24	0.02	0.19	0.07	0.45	0.06
High school	0.11	0.02	0.21	0.09	0.19	0.12	0.15	0.08	0.08	0.04	0.20	0.17
College or more	0.18	0.03	0.44	0.12	0.23	0.10	0.06	0.06	0.09	0.02	0.21	0.14
Above federal poverty line *	0.29	0.06	0.64	0.08	0.24	0.02	0.08	0.05	0.08	0.04	0.14	0.06

Note: Other factors also varied significantly by intention status and were therefore included in the multivariate regression used to calculate propensity scores: on Medicaid before pregnancy (yes/no), abuse by partner in 12 months prior to birth (yes/no), Spanish questionnaire (yes/no), all sources of income, stressful life events in year before birth, number of dependents in household, cigarettes smoked per day in 3 months previous to pregnancy, drinks per week in 3 months previous to pregnancy, frequency of binge drinking in 3 months previous to pregnancy, visited dentist in past year (yes/no), dieting in order to lose weight 3 months prior to pregnancy (yes/no), heard or read about benefits of folic acid (yes/no), and tested for HIV (yes/no). Interaction terms between several of the above variables, as well as for the year of survey administration, were also included in the propensity model but are not listed here due to space constraints. However all of the variables listed above had estimated standardized bias values of less than .25 in the balanced sample.

*
In 12 months before baby was born