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Intentionally or Ambivalently Risking a Short Inter-pregnancy Interval: Reproductive Readiness Factors in Women's Postpartum Non-Use of Contraception

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Authors :

Michael S. Rendall

Eowna Young Harrison

Mónica Caudillo

University of Maryland

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Abstract

A focus of research on short interpregnancy intervals (IPI) has been on young, disadvantaged women whose births are likely to be unintended. Later initiation of family formation in the U.S. and other high-income countries points to the need to also consider a woman's attributes indicative of readiness for purposefully-accelerated family formation achieved through short IPIs. We test for whether factors including being married, older, and having just had a first birth or a birth which was later than desired predict a woman's non-use of contraception in the postpartum months. We also test for whether this contraceptive non-use is explicitly because of wanting to become pregnant again. The data come from the 2012-2015 Pregnancy Risk Assessment Monitoring System, representing women who recently gave birth in any of 35 U.S. states and New York City (N=123,943). We find that these reproductive readiness factors are highly predictive of women's postpartum non-use of contraception because she wants to become pregnant, and are moderately predictive of contraceptive non-use without an explicit pregnancy intention. We conclude that planning for, or ambivalently risking, a short IPI is a frequent family-formation strategy for women whose family-formation has been delayed. This is likely to become increasingly common as family-formation in the U.S. is initiated later in the reproductive life course.

Introduction

Closely-spaced pregnancy or birth intervals, sometimes referred to in the public health and medical literature as "rapid repeat pregnancy" (e.g., Tocce, Sheeder, and Teal 2012), have long been believed to increase the risks of adverse infant and maternal health conditions. For the infant, these include low birth weight, small for gestational age, autism, and mortality (Conde-Agudelo et al., 2006; Cheslack-Postava, Liu, and Bearman 2011; DeFranco et al 2015; McKinney et al 2017); for the mother, gestational diabetes and preeclampsia/eclampsia (Conde-Agudelo et al 2007, 2012). The current World Health Organization (2006, p.18) recommendation is for an inter-pregnancy interval (IPI), defined by the time between a live birth and next conception, of 24 months or longer "…in order to reduce the risk of adverse maternal, perinatal and infant outcomes."

One strand of demographic literature has examined IPIs from this "adverse associations" perspective. These studies (Boardman et al. 2006; Teitler et al 2012; Gemmill & Lindberg 2013; Cheslack-Postava and Winter 2015; White, Teal, and Potter 2015) have accordingly focused on variables associated with how to better provide for and motivate postpartum contraceptive use. They have paid less attention to variables associated with yet-to-be-achieved fertility goals, such as low parity and perception of the recent birth as being later than desired. Guzzo, Eickmeyer, and Hayford (2018) unexpectedly found that, relative to women whose recent birth was unintended, women whose recent birth was intended were less likely to use postpartum contraception and less likely to use highly effective methods. One of their speculations for why was that these women may "be in a family-building stage" in which they "feel prepared to meet the needs of parenting an infant." That is, risking a short IPI may be part of a purposeful family-building strategy. We explore this further in the present study. In doing so, we build on a second strand of demographic research that has investigated the potential benefits of short IPIs for achieving fertility goals and reducing women's labor-market costs of childbearing. Troske and

Voicu (2013) find that a later first birth and a shorter second-birth interval facilitate continuation of full-time employment among married women in the U.S., especially when the first birth is after age 30 (but see also Herr 2016 and Gough 2017). Sobotka (2017) notes that successful “catch up” after increasingly postponed family initiation has been responsible for maintaining cohort fertility around replacement levels in the face of substantial declines in period fertility in high-income countries. Consistent with this, later first births in high-income countries have been followed by shorter subsequent birth intervals (Rendall and Smallwood 2003; Troske and Voicu 2013).

The “adverse associations” and “purposeful strategy” literatures on short IPIs and closely-spaced births have recently come together with the re-evaluation in the medical-science literature of whether a short IPI really does have an adverse causal impact on infant and maternal health. “Within-woman” (individual fixed-effect) studies that compare health outcomes from short-IPI births with outcomes from regularly-spaced births experienced by the same woman (Ball et al 2014; Hanley et al., 2017; Schacher et al 2016) find that length of the IPI either has no causal effect or has a much smaller magnitude of effect than had been established from “cross-women” studies. This implies that unobserved factors causing short IPIs may be the main cause of adverse infant and maternal health outcomes. Long-term adverse health associations with short-IPI births have similarly been found not to be causal in within-women analyses, even when such adverse associations have been found using cross-women multivariate analyses (Barclay and Kolk 2018). In an editorial accompanying the study by Hanley et al. indicating that the medical risks of short IPIs have been overstated, Klebanoff (2017, p.405) opined that “Women whose pregnancies were uncomplicated and who are in good health can be advised that decisions regarding timing of subsequent pregnancies should be based primarily on personal desires regarding child spacing and ultimate family size and only secondarily on obstetric concerns." Relatedly, Ahrens and Hutcheon’s (2018, p.149), in an

invited commentary, critiqued the optimal-spacing literature for not providing an answer to whether "…modifying when parous women start trying to conceive again leads to better outcomes for the mother and child."

In the present study, we apply a reproductive life-course perspective to the reasons that women may either purposefully *plan for* a short IPI or, ambiguously or ambivalently, *risk* having a short IPI. Using a large, population-representative sample of women who recently gave birth in 35 U.S. states and New York City, we investigate factors associated with the outcome of women's use or non-use of contraception while sexually active at approximately 3-7 months postpartum. We also investigate how these associations differ according to whether or not the new mother reports that her not using contraception is because she wants to become pregnant. In predicting contraceptive non-use by this prospective pregnancy intention, we attend to "readiness" factors including the woman's marital status, age, parity, and perception of the timing of her recent birth relative to her desired family-formation schedule. We find that being married, older, of parity one, and describing her recent birth as later than desired are highly predictive of women's postpartum non-use of contraception because she wants to become pregnant, and are moderately predictive of contraceptive non-use without an explicit pregnancy intention.

Literature Review

Age at fertility has increased dramatically in the U.S. over recent decades. In 2016, the mean age at first birth was 27, a record high, and the fertility rate of 30-34 year old women, at 103 per 1,000, overtook that of any other age group (Martin et al 2018a, p.5, p.18). The provisional 2017 age 15-19 fertility rate of 19 per 1,000 (Martin et al 2018b) is a record low for the U.S., down two thirds from 62 per 1,000 in 1991 (Hamilton and Mathews 2016). Nevertheless, the literature on short IPIs has focused on adolescent and young women (e.g., Boardman et al 2006).

Population-representative studies of the determinants of short IPIs among women across all reproductive ages the U.S. are few. They include several studies (Gemmill & Lindberg, 2013; Cheslack-Postava & Winter, 2015; White et al. 2015) using the nationally-representative National Survey of Family Growth (NSFG) and a study of new mothers in the state of New Jersey (Teitler et al 2012). We begin by reviewing that literature.

Gemmill & Lindberg, White et al, and Teitler et al all define IPIs as pregnancies occurring up to 18 months following a birth. Cheslack-Postava & Winter, by combining the 1995, 2002, and 2006-2010 NSFG survey cycles, were able to restrict their analyses to IPIs of duration less than 12 months following a birth. Although 24 months is the World Health Organization recommendation, the more recent studies using a within-mother design uniformly find no adverse health impacts or associations of IPIs of 12-24 months (Ball et al 2014; Hanley et al., 2017; Sacher et al 2016). Similarly, cross-women studies of adverse infant outcomes with IPIs of 12-17 months find small-magnitude associations that rarely attain statistical significance (Conde-Agudelo et al 2006). Gemmill & Lindberg (2013) note this point among the limitations of their study, in which almost half of IPIs under 18 months were between 12 and 17 months. The Cheslack-Postava & Winter (2015) study is thus unique, to our knowledge, in limiting its analysis to the more “at risk” short-IPIs in a population-representative sample.

Cheslack-Postava & Winter’s and Gemmill & Lindberg’s studies also take into account the mother’s reports on the timing and wantedness of the pregnancy that follows (closes) a short IPI when assessing the strength of different predictor variables. In Cheslack-Postava & Winter’s study, of the 17% of pregnancies occurring under 12 months after the last birth, as many as 31% were reported by the mother to have been “at the right time” (versus 57% of IPIs between 12 and 60 months). Among all pregnancies described by the mother as well timed, the chance that the IPI was less than 12 months increased with mother’s age and with her report that she wanted her previous pregnancy to have occurred sooner. The authors interpreted both

findings as pointing to a “catch-up” strategy in their reproductive life course. In Gemmill & Lindberg’s study of IPIs of less than 18 months, they also inferred “catch-up,” family-building motivations. They found that births following short IPIs were more likely to have been intended when the woman had her first birth after age 30, had only 1 birth before this interval, and when the woman was White, married, and a college graduate.

Unsurprisingly given that only recently has the claimed harmfulness of short IPIs been challenged, the above-cited studies all begin from the premise that short IPIs are something a woman should be helped to avoid. Variables that may serve as indicators of a woman’s motivation to instead purposefully choose a short IPI, therefore, are not emphasized. For example, neither Cheslack-Postava & Winter nor Teitler et al included parity among their predictors. Only Cheslack-Postava & Winter included among their predictor variables an indicator for whether the woman wanted the previous birth to have occurred sooner. Other variables indicating readiness to continue, and possibly accelerate, family formation, such as being married, were included but not emphasized. Moreover, the directions and statistical significance of the estimated associations with short IPIs of variables such as age and marital status were inconsistent across studies.

Across studies, short IPIs are more frequent for lower socio-economic status (SES) mothers, whether low SES is indicated by lower maternal education, lower household income, or being covered by Medicaid. A first explanation for this might be that a low-SES mother’s pregnancy is more likely to be unintended (Finer and Zolna 2016). Cheslack-Postava & Winter, however, found that even among women who described their recent birth as well-timed, both lower maternal education and lower income predicted a short IPI. Gemmill & Lindberg found that the likelihood that a short IPI is intended rises monotonically with the mother’s educational attainment. This all suggests that purposeful acceleration of family formation is a mechanism for shorter IPIs among women across SES levels, but it is unclear how the relationship of SES to

short IPI differs by whether the latter occurs through an intended or unintended pregnancy. Consistent with incentives for planning for a short IPI being stronger for women with lower SES, Troske and Voicu (2013) found that married women with no more than a high school diploma gained the most from a shorter birth interval in terms of their continuity of full-time employment.

The NSFG has been the primary data source used for population-representative analyses of short IPIs in the U.S. An important limitation of this source is that it is a survey of all reproductive-age women, both nulliparous and parous, and therefore its sample sizes are somewhat small especially for the shortest IPIs. Not only has this led researchers to incorporate IPIs of greater than 12 months into their analyses to obtain sufficient sample sizes. It also meant that Cheslack-Postava & Winter's study of IPIs under 12 months had very wide confidence intervals around a number of its key estimates, even after pooling data across three NSFG cycles. Another limitation of the NSFG is its use of retrospectively-reported intendedness of pregnancies. Women's reports of a pregnancy's timing and wantedness may differ prospectively, before a pregnancy occurs, from retrospectively after the pregnancy has been carried to term (Williams, Abma, and Piccinino 1999; Guzzo and Hayford 2014). In particular, a woman may be reluctant to describe her short-IPI newborn as having been unwanted or even mistimed. Finally, all of the studies using population-representative samples calculate IPIs based on interval-closing pregnancies that are carried to term, excluding those ending by miscarriage or abortion. Conzuelo-Rodriguez and Naimi (2018) show that attenuation of the estimated magnitudes of some predictors of short-IPIs, notably maternal age, results from this exclusion.

Another set of literature has examined exposure to the risk of IPI through non-use or inconsistent use of contraception. Again, a focus of these studies has been on adolescents' contraceptive use (Kershaw et al., 2003; Kelly et al 2005; Garbers et al 2013; Wilson, Fowler, and Koo 2013), though Guzzo et al. (2018) analyzed contraceptive use among new mothers of

all reproductive ages. With the exception of Wilson et al and Guzzo et al, these studies of contraceptive use and non-use in the postpartum period use convenience samples, typically of clinic-attending young women, limiting the generalizability of their results. Wilson et al's study of 15-19 year old women exploited the large numbers of observations exposed to risk of short IPI from samples of women surveyed following a birth in the Pregnancy Risk Assessment Monitoring System (PRAMS) in seven states and New York City in 2006-2008. Among their findings was that using contraception when becoming pregnant with the index child (that is, contraceptive failure) was strongly predictive of using postpartum contraception. Guzzo et al used the 2011-15 NSFG to analyze women's postpartum contraceptive use. Their focus on contraceptive method type in their multivariate analyses makes it difficult to compare directly non-use with use of any contraceptive method. However, one result relevant to the present study is that having had only one birth was associated with a lower likelihood of using a highly effective postpartum contraceptive method.

The analysis of exposure to, rather than of occurrence of, a short IPI has two major advantages. First, because the birth has not yet occurred, the pregnancy intention around a new mother's not using contraception does not risk retrospective reporting bias. Second, because of the probabilistic nature of conception, the number of women exposed to short IPIs will be considerably higher than the number of women who actually become pregnant within that interval, and higher still than the number of women who become pregnant and carry the pregnancy to term. By investigating non-use of contraception in the early postpartum months among sexually active women, a larger and less selected set of women can therefore be considered, as compared to a study of women who have experienced an IPI ending in a live birth. We exploit these advantages in the present study, in which we investigate purposeful and ambivalent risk of exposure to short IPIs through non-use of contraception in the approximately 3 to 7 months postpartum. For our outcome variable, we consider separately women not using

contraception because they are trying to get pregnant and women not using contraception without a stated intention to become pregnant. We include as our main explanatory variables, indicators of a woman's readiness for additional, possibly accelerated family formation. We hypothesize that these reproductive readiness indicators will be positively associated with purposeful non-use of contraception to become pregnant. Indicators include older age, being married, having had only one child so far, and reporting that her immediately-previous birth was later than desired. We hypothesize that these same readiness indicators will also predict non-use of contraception without the explicit intention of becoming pregnant, as women ambivalently risk having a short IPI.

Data and Methods

We used data from the 2012-2015 Pregnancy Risk Assessment Monitoring System (PRAMS). The PRAMS is an annual, state-level survey from a probability sample of women who gave birth in a given calendar year. It is coordinated by the Centers for Disease Control and Prevention (CDC) in collaboration with state health departments (Centers for Disease Control and Prevention 2016). The years 2012-2015 constitute "Phase 7" of the PRAMS survey, and have a uniform set of core questions over these 4 years. The CDC PRAMS files also include information about the index birth obtained from the birth certificate record.

The PRAMS is a probability sample of women who gave birth in each participating state. For the survey component, initial contact is made 2–4 months after delivery of this "index" birth. The surveys are mailed, with telephone follow-ups for those who did not respond to multiple mailings. Only states that reached a minimum 60% response rate in a given year are included in the PRAMS data files made available by CDC. Our study includes the 35 states and New York City that surpassed the minimum 60% response rate in any of the years 2012-2015 and that had the variables needed for our analysis. These include states spread reasonably evenly

across all regions of the U.S. The most notable among the 15 excluded states, however, is the largest by population size, California, which does not conduct a PRAMS (see appendix for specific years included for each PRAMS state in our analytical sample). We excluded the 61 women whose survey was completed more than 9 months after the index birth. Of the remaining 147,686 women, the large majority (96.3%) completed their PRAMS survey 3-7 months after the index birth. We excluded from our sample the 847 women who were already pregnant again at the time of the survey. We excluded an additional 9,594 women (6.0%) who were not sexually active (defined below). Of the 137,245 women who met these criteria, we excluded an additional 2,154 women (1.6%) for whom data were missing on the outcome variable of postpartum contraceptive use and postpartum pregnancy intention (see below). We additionally excluded 11,148 women (8.3%) who had missing data on at least one predictor variable used in our multivariate analyses, resulting in a final sample size of 123,943 women.

We estimated a binary logistic regression for the outcome of using contraception or not during the postpartum period, and a multinomial logistic regression analysis for a three-outcome variable that additionally distinguishes between women who were not contracepting postpartum because they wanted to get pregnant and women who were not contracepting postpartum for other reasons. For both regressions, the reference outcome category is those who were using a contraceptive method postpartum. All estimates were obtained using the CDC-provided sampling weights, strata, and finite population correction indicators, constructed to account for sample design, non-response, and non-coverage.

Postpartum Contraception and Pregnancy Intention among Sexually Active Women

We used three PRAMS core survey questions on current contraceptive practice to code a three-category outcome for postpartum contraception and pregnancy intention, and to restrict our analytical sample to sexually-active, not-currently-pregnant women. We excluded women who

are pregnant or sexually inactive as follows. Women are first asked, “Are you or your husband or partner doing anything now to keep from getting pregnant? Some things people do to keep from getting pregnant include using birth control pills, condoms, withdrawal, or natural family planning (Check ALL that apply).” Respondents who reply “no” to this question are asked in a separate question, “What are your reasons or your husband’s or partner’s reasons for not doing anything to keep from getting pregnant now (Check ALL that apply)”. Among the possible responses to this question are “I am pregnant now”, and “I am not having sex.” If the respondent checks either of these responses, we exclude her from our analyses. If the respondent marked “I want to get pregnant,” we classify her as not contracepting because she wants to get pregnant. We classify the respondent as not contracepting for other reasons if she chose any combination of responses except “I want to get pregnant.” These other responses, with weighted percentages of the 11,392 women in our sample who did not check “I want to get pregnant” but did check at least one other response option are: “I don’t want to use birth control” (44%), “I am worried about side effects from birth control” (36%), “My husband or partner doesn’t want to use anything” (14%), “I have problems getting birth control when I need it” (6%), and “Other” (37%).

Respondents who reply “yes” to the question, “Are you or your husband or partner doing anything now to keep from getting pregnant?” are asked to identify all forms of contraception they are using. The options are comprehensive, including female and male contraceptive sterilization (tubes tied or blocked, vasectomy), withdrawal, natural family planning, and “not having sex (abstinence).” We consider the respondent to be using postpartum contraception if she checks any method, with the exception of abstinence. Checking “abstinence”, however, does not necessarily identify her as being sexually inactive, since in many cases women who check ‘abstinence’ also identified other contraceptive methods including active methods such as

condom use. We therefore classify them among women not using contraception for reasons other than wanting to get pregnant.

Predictor Variables

Our predictor variables come from both the birth certificate and survey components of the PRAMS. From survey questions, we coded intendedness and contraceptive use at the time of becoming pregnant with her index birth. Respondents were asked "when you got pregnant with your new baby, were you or your husband or partner doing anything to keep from getting pregnant?", and to "think back to just before you got pregnant with your new baby, how did you feel about becoming pregnant?" Two response options identify intended births: "I wanted to be pregnant then" (On-time index birth), "I wanted to be pregnant sooner" (Later-than-desired index birth). Three response options identify unintended births: "I wanted to be pregnant later" (Earlier-than-desired birth) "I didn't want to be pregnant then or at any time in the future" (Unwanted), or "I wasn't sure what I wanted" (Unsure). Respondents who had been contracepting when they got pregnant, and who described the pregnancy as falling into one of the three unintended categories, were collapsed these into a single "contraceptive failure" category. This decision followed preliminary analyses that revealed closely similar relationships with their postpartum contraceptive use and pregnancy intention.

We included socio-demographic variables capturing the new mother's age, parity, race and ethnicity, education, and marital status. After preliminary analyses showing a U-shaped relationship between parity and postpartum non-use of contraception, we classified parity (index-birth order) into 1st birth and 4th or higher versus a reference category of 2nd or 3rd birth. Marital status is dichotomous, married or not at birth. Neither cohabitation status nor unmarried subcategory is collected in the PRAMS. Other predictor variables from the birth certificate that we use in our models are whether the baby had low birth weight or was born premature. We

alternately included whether the index baby had visited the Intensive Care Unit (ICU). After finding no significant associations with our outcome variables, we excluded it to reduce loss of sample size due to substantial numbers of missing values on this variable. Finally, we re-estimated the regression models alternately including categorical controls for Census regions and sub-regions, and for calendar year of index birth, 2012 to 2015, and found that the estimates of our main predictor variables were not substantially changed (results not shown).

Results

Summary Statistics

In Table 1, we present distributions of socio-demographic and index-birth characteristics for sexually-active women who gave birth in one of the 35 PRAMS states or New York City in the years 2012 to 2015, overall and separately by the three categories of our postpartum contraception and pregnancy intention outcome variable categories. The large majority (87.3%) of women were using contraception postpartum. Of the 12.7% who were not, 9.7% did not explicitly want to become pregnant, and 3.0% reported not using contraception because they wanted to become pregnant. As we show below, however, among women whose attributes we hypothesize to be indicative of reproductive readiness, much larger proportions were not using contraception postpartum.

[TABLE 1 ABOUT HERE]

Overall, just under half (43.1%) of postpartum women reported their recent ("index") birth was from an on-time pregnancy ("I wanted to be pregnant then"). A substantial fraction of women (14.1%) had "wanted to be pregnant sooner." We pay particular attention to this group in our subsequent analyses, finding this indicator to be especially predictive of postpartum non-use of contraception because of wanting to become pregnant. The remaining women were more or less evenly divided between those who became pregnant even though they were using

contraception (19.4%), which we refer to as “contraceptive failure,” and those who were not using contraception when they became pregnant but who reported their pregnancy as earlier than desired (11.6%), unwanted (2.6%), or as an ambiguous event (“I wasn’t sure what I wanted”, 9.3%).

These distributions of index-birth contraceptive use and pregnancy intention differed markedly by our outcome variable of postpartum contraceptive use and pregnancy intention. As many as 38.5% of women who were not using contraception postpartum because they wanted to become pregnant reported that their index birth was later than desired. The highest single category of women not using contraception postpartum because they wanted to become pregnant were those reporting the index birth was on time (48.6%). Among women using contraception postpartum, only 12.9% reported their index births as being later than desired and 42.5% as on time. Women not using contraception postpartum for reasons other than because they wanted to become pregnant fell between these two groups: 17.3% reported their index birth as later than desired and 46.4% on time. Women who were using contraception postpartum were by far the most likely to have had their index-birth pregnancy occur through contraceptive failure (21.4%). Contraceptive failure for the index birth accounted for only 2.7% of those women not using contraception postpartum because they wanted to become pregnant, and for only 6.6% of those not currently using contraception but not explicitly wanting to become pregnant.

First births accounted for 58.5% of index births to women who were not contracepting postpartum because they wanted to get pregnant. In contrast, first births accounted for 39.4% of women who were not contracepting for other reasons, and for 39.0% of women who were using contraception postpartum. Women who were not contracepting postpartum because they wanted to get pregnant were also much more likely to have had a marital index birth: 81.2%,

versus 61.5% of women using postpartum contraception and 67.2% of women who were not contracepting for other reasons.

Women who were not contracepting because they wanted to become pregnant stand out from the other two postpartum groups for their being White (71.8%), older (55.4% over 30 years old), and having a college degree (46.4%). In comparison, those using contraception postpartum were 61.4% White, 42.8% over 30, and 34.2% with a college degree. Women who were not contracepting postpartum for reasons other than explicitly wanting to get pregnant were also somewhat more likely to be older (46.4% over 30 years old) than were the contracepting group. Their socio-demographic characteristics are otherwise similar to the contracepting group. Finally, women's postpartum contraception and pregnancy intention was not associated with the index birth's health outcome: consistently across the three outcome groups, around 8 to 9% had a baby that was premature, and around 7% had a low-birth-weight baby.

Binary Logistic Regression: Predicting Contraceptive Non-Use

Previous studies of short IPIs have largely not distinguished intendedness of the interval-closing birth. Therefore, we begin our multivariate analyses with the binary outcome of not using versus using contraception postpartum, irrespective of pregnancy intention around contraceptive non-use (see Table 2). First, relative to having had an on-time index birth, a woman's having had a later-than-desired index birth, or having been unsure about her intentions around the index birth, are both positively associated with her *not* contracepting during the postpartum months (odds ratios of 1.50 and 1.13 respectively for later-than-desired and unsure). Having become pregnant because of contraceptive failure is highly predictive of using contraception in the postpartum months, with odds of non-use of contraception 75% lower than for an on-time index birth.

Women whose index birth was earlier than desired were slightly (9%) less likely to be not using contraception postpartum than were women with an on-time birth.

[TABLE 2 ABOUT HERE]

Given the focus of the short-IPIs literature on adolescent childbearing, it is noteworthy that 15-19 year olds (the reference age category) is the age group associated with the lowest likelihood of not using contraception in the postpartum months. The age groups 20-24, 25-29, and 30-34 have respectively odds ratios 1.35, 1.14, and 1.25 for not using contraception postpartum, relative to the 15-19 year old reference group. The age group most likely not to be using contraception postpartum is those women of age 35+, with an odds ratio of 1.58 times that of the age 15-19 group. Having had a marital birth is associated with a 34% higher odds of not using contraception postpartum. Being of parity 1 is associated with a 35% higher odds of not contracepting during the postpartum period than women at parity 2 or 3, and being of parity 4+ with a 29% higher odds of not contracepting.

Both bivariate (Table 1) and multivariate (Table 2) associations therefore show that not contracepting postpartum is positively associated with our hypothesized reproductive life-course indicators of readiness to advance quickly to another birth. Multivariate associations of postpartum contracepting with education, however, are opposite to the bivariate associations. Controlling for reproductive life-course indicators and other socio-demographic and index-birth variables, having more education is associated with a higher likelihood of postpartum contraceptive use. The odds of not using postpartum contraception fall monotonically with increasing education, with high-school graduate, some college, and college graduate attainment being associated with lower odds (ratios respectively of 0.79, 0.71, and 0.64) of not using contraception compared to women with less than a high-school graduate education. Thus the overrepresentation of more educated new mothers among those not using contraception

postpartum (seen in Table 1) can be attributed to their high reproductive "readiness" characteristics, such as their being older, married, of parity 1, and reporting the index birth as later than desired. Conditional on these "readiness" characteristics, it is less educated women who are less likely to be using contraception postpartum.

Race/ethnic differences are neither large nor consistently patterned with respect to the non-Hispanic White reference group. Hispanic women have odds of not contracepting that are 20% lower than those of non-Hispanic White women, whereas Black, Asian, and other-race women's odds of not contracepting are between 9 and 25% higher. Finally, postpartum contraceptive use did not differ significantly by whether the index birth was premature or low birth weight.

Multinomial Logistic Regression: Distinguishing Between Reasons for Contraceptive Non-use

We next present results from a multinomial logistic model that distinguishes between women who were not contracepting during the postpartum months because they wanted to get pregnant and those who were not contracepting for other reasons. Table 3 shows relative risk ratios (RRRs) of belonging to each of these two outcome categories. The reference outcome category is again using contraception postpartum.

[TABLE 3 ABOUT HERE]

Women not using contraception because they wanted to get pregnant differ much more from the "contracepting" reference-outcome group than do women not using contraception for other reasons. Not using contraception because the woman wanted to become pregnant was much more likely among women whose index birth was later than desired (2.29 times higher relative risk than women whose index birth was on-time), who were 35 or older (2.02 times

higher than for women age under 20), whose index birth was their first (2.42 times higher than when they had just had a second or third birth), and who were married (1.69 times higher).

Not using contraception without explicitly wanting to get pregnant was also more likely when the woman's index birth was later than desired (1.20 times higher than women whose index birth was on-time), when married (1.26 times higher than unmarried), and when her index birth was her first (RRR of 1.11 relative to a second or third birth). On the other hand, having 4 or more children is associated with a considerably higher likelihood of non-use of contraception without explicitly wanting to get pregnant (RRR of 1.34). The age relationship to non-use of contraception without explicitly wanting to get pregnant is mixed. Age 35 or older has a risk ratio of 1.39, but age 20-24 has a similarly-high risk ratio (1.35 times higher than for a woman under 20).

Relative to not graduating from high school, having some college education and being a college graduate are both associated with a lower risk of being in the "not contracepting because of wanting to be pregnant" group (RRRs of 0.76 and 0.67 respectively for some college and bachelors-plus). The negative association of education with "not contracepting for reasons other than explicitly wanting to be pregnant" is even stronger, with additionally high school graduates being less likely than women with less than a high school graduate education to be in this group (RRRs of .77, .70, and .64 respectively for high school graduate, some college, and bachelors-plus). Again, these education associations are opposite to those shown in bivariate distributions, in which more educated women were over-represented among the two groups not using contraception postpartum.

Non-Hispanic White women are statistically no more or less likely to be not contracepting because they want to become pregnant than are Black, Asian, or Other race/ethnicity women. Hispanic women, however, are 35% less likely to be not contracepting because they want to become pregnant than are White women. Black, Asian, and Other

race/ethnicity women are more likely than are non-Hispanic White women to be not contracepting for reasons other than that they want to become pregnant (RRRs respectively of 1.14, 1.38 and 1.29). Hispanic women, however, are 16% less likely to be not contracepting for reasons other than wanting to become pregnant. Having had a premature or low-birth-weight index birth is not associated with postpartum non-use of contraception.

Relative risk ratios have the disadvantage of depending on which is the reference outcome category, and lack a substantively meaningful metric based on differences in probabilities. To further aid interpretation, we therefore also present predicted probabilities of falling into each postpartum contraceptive non-use category for selected predictor-variable combinations (see Table 4). We saw earlier that only 12.7% of all postpartum women were not using contraception postpartum, comprised of 3.0% who were not using contraception because they wanted to become pregnant and 9.7% who were not using contraception for other reasons. These are very much lower than the contraceptive non-use probabilities for women whose reproductive life-course attributes we hypothesized to be indicative of high readiness for purposefully-accelerated family formation through a short IPI (see Panel A of Table 4). The attributes we select here are: having just given birth for the first time, later than desired, while married, and at ages 25 or older. We present predicted probabilities, separately by whether the woman reported the non-use to be because she wanted to become pregnant, for the three age groups, 25-29, 30-34, and 35+, for the three largest race/ethnic groups (White, Black, and Hispanic), and by all four education categories. All probabilities are derived from the multinomial logistic regression estimates from Table 3, averaging over the observed distributions on the two index birth health outcomes.

[TABLE 4 ABOUT HERE]

Among women age 35 or older who just had their first birth while married, and reported it to be later than desired, a predicted 38% of high-school graduate and 28% of college-graduate

White and Black women were not using contraception postpartum. White women age 35+ had the highest predicted probabilities of not using contraception because of wanting to become pregnant, at 22% of high school graduates and 17% of college graduates. At ages 25-29, a predicted 24-25% of high-school graduate and 20% of college-graduate White and Black women with high reproductive-readiness attributes were not using contraception postpartum, approximately equally divided between those whose contraceptive non-use was because of wanting to become pregnant and whose contraceptive non-use was for other reasons. Hispanic women's predicted probabilities of not using contraception are between 5 and 8 percentage points lower.

For comparison, we present also contraceptive non-use probabilities for women whose reproductive life-course attributes have been identified in the literature as the groups of most concern for their propensities towards short IPIs (see Panel B of Table 4). These are younger women who just had a first birth but who were unmarried and became pregnant through non-use of contraception, earlier than desired, and who had no more than a high school graduate education. We present predicted probabilities for 15-19, 20-24, and 25-29 year olds with these characteristics. Unmarried 15-19 year old first-time mothers had mostly lower-than-average proportions not contracepting, at between 9 and 14% total, and with only 1 to 2% not contracepting because of wanting to get pregnant. The 25-29 year old category overlaps with Panel A, and serves to show how important are the women's marital status and perception of the timing of the index birth relative to the woman's desired schedule and her marital status at that birth. Very few (1-2%) women in this group with low readiness for short IPIs chose contraceptive non-use because of wanting to become pregnant, compared to 9-13% of the 25-29 year old "high readiness" group (see again Panel A), and fewer than in the high-readiness group were not using contraception without explicitly wanting to become pregnant: 8-10%

compared to 10-13% of married 25-29 year old women who perceived their index, first birth to have been later than desired.

Discussion

From our analyses of women's postpartum contraception and pregnancy intention, we found evidence strongly supportive of our main hypothesis that "reproductive-readiness" variables predict purposeful non-use of contraception to become pregnant. Being married, older, and describing her recent birth as later than desired were all strongly predictive of a woman's non-use of contraception because of wanting to become pregnant. Consistent with our second hypothesis, these characteristics were also all predictive of higher non-use of contraception without explicitly wanting to become pregnant, though in much lower magnitudes. In some cases, non-use of contraception without explicitly wanting to become pregnant may be because the woman did not consider herself at high risk of becoming pregnant again, for example because she is older. We speculate, however, that these women may also have been less concerned to avoid another pregnancy precisely because of their favorable "readiness" characteristics.

For socio-demographic groups identified in previous studies (Kershaw et al 2003; Kelly et al 2005; Boardman et al 2006; Garbers et al 2013; Wilson, Fowler, and Koo 2013) as of most concern for their propensities towards short inter-pregnancy intervals (IPIs), often somewhat alarmingly referred to as "rapid repeat pregnancies" (e.g., Tocce et al 2002), we found instead that their likelihood of not contracepting postpartum tended to be somewhat lower than the overall rate. Among our multivariate findings, sexually-active teenage new mothers were the least likely age group not to be using contraception postpartum (irrespective of their postpartum pregnancy intention). Women whose recent birth was earlier than desired and who became pregnant because of non-use of contraception had a slightly lower likelihood of postpartum non-

use of contraception than did women whose recent birth was on time. Women whose recent birth was unintended and occurred because of contraception failure had a very low likelihood of not using contraception postpartum, 75% lower than for women whose recent birth was on time. The latter result provides insights also into resolving the paradox identified by Guzzo et al (2018) that women with unintended pregnancies appear to be more likely than women with intended pregnancies to use postpartum contraception. Whether or not the unintended pregnancy occurred because of contraceptive failure appears to be the crucial factor for subsequent contraceptive use. This finding generalizes the earlier, similar result found by Wilson et al (2013) for 15-19 year olds in seven states in 2006-08.

Many of the previous studies of postpartum contraceptive non-use or inconsistent use and of resulting short IPIs use convenience samples of younger mothers and do not compare these "at risk" new mothers to other new mothers (Kershaw et al., 2003; Kelly et al 2005; Garbers et al 2013). Their findings on risks of "rapid repeat pregnancy" are therefore difficult to assess in the overall context of U.S. women's patterns of birth spacing. Overall, our findings on who was not using contraception postpartum are reasonably consistent with those from population-representative studies about who is more likely to have short IPIs (Teitler et al 2012; Gemmill & Lindberg 2013; Cheslack-Postava & Winter 2015; White et al. 2015). This indicates to us that women's postpartum non-use of contraception and women's experiencing a short IPI are measuring largely the same thing, which is the propensity to have a short IPI. Our findings build most closely on those from Cheslack-Postava & Winter's (2015) analyses of short IPIs, as their study is unique in its distinguishing between women who described their interval-closing birth as being well-timed versus as mistimed, and for its focus of IPIs of under 1 year. In particular, our finding that there is a strong positive relationship of both age and a later-than-desired index birth with non-use of contraception because of wanting to become pregnant reinforce Cheslack-Postava & Winter's analogous findings with respect to having a short IPI

through a “well-timed” birth. Our having analyzed exposure to short IPIs through postpartum non-use of contraception, however, afforded us much larger sample sizes than available in studies analyzing short IPIs directly. By using the PRAMS data on contraceptive use and pregnancy intention in the postpartum period (approximately 3-7 months postpartum), we were able to analyze more than 100,000 women with a recent birth in 2012-15, 15,000 of whom were not using contraception postpartum. This allowed for much more precise estimation of the associations of various reproductive life-course characteristics with propensity for a short IPI.

The larger magnitudes that we found for our “reproductive readiness” variables largely occur for women whose postpartum non-use of contraception was because they wanted to become pregnant. Distinguishing reason for contraceptive use by pregnancy intention is therefore a key factor for the strength of our results. A secondary factor, however, may be that *exposure to* short IPI is a more sensitive measure of behavior than is *occurrence of* short IPI. This follows Conzuelo-Rodriguez and Naimi’s (2018) finding of attenuation bias occurring when excluding miscarriages and abortions from the definition of IPIs, particularly on coefficients for reproductive-readiness variables such as older age.

A crucial theoretical difference between the present study and preceding studies using population-representative samples is that those studies begin with the premise that women should be helped to avoid short IPIs. Given this premise, it is unsurprising that the variables that may serve as indicators of a woman’s motivation to instead purposefully choose a short IPI were not emphasized. It was therefore less likely that a set of “reproductive readiness” factors would have emerged as a coherent set of predictors of non-use or inconsistent use of contraception leading to short IPIs. For example, neither Cheslack-Postava & Winter nor Teitler et al included parity among their predictors, whereas we found parity 1 to be a strong predictor of contraceptive non-use. Only Cheslack-Postava & Winter included among their predictor variables an indicator for whether the woman wanted the previous birth to have occurred

sooner. We found this variable to again be among the strongest predictors of postpartum non-use of contraception, especially in conjunction with the woman's wanting to become pregnant. Other variables indicating readiness to accelerate family formation, such as being married, were included but not emphasized in these other studies of short IPIs, and the directions and statistical significance of the estimated associations were mixed. With our fuller specification of reproductive readiness factors and large sample sizes, we found that having a marital birth raised substantially the risk of contraceptive non-use postpartum, both with and without the explicit intention of becoming pregnant, though especially with that intention. We found that women with marital births constituted four fifths of all women not contracepting postpartum because they wanted to become pregnant again (versus three fifths of all births).

Our study departed from those that begin from the premise that short IPIs cause adverse infant and maternal health outcomes. Recent studies in the medical literature have challenged this premise (Ball et al 2014; Hanley et al., 2017; Schacher et al 2016). Our focus instead on reproductive life-course factors indicative of readiness for accelerated family formation instead follows the revised medical recommendation that "Women whose pregnancies were uncomplicated and who are in good health can be advised that decisions regarding timing of subsequent pregnancies should be based primarily on personal desires regarding child spacing and ultimate family size and only secondarily on obstetric concerns." (Klebanoff 2017, p.405.) Viewing exposure to short IPIs as an intentional strategy for child spacing relates our study to studies of maternal labor market outcomes (Troske and Voicu 2013), of women's achievement of fertility goals with respect to completed family size (Rendall and Smallwood 2003; Sobotka 2017), and of intendedness and infant health outcomes (Kost and Lindberg 2015).

Of particular interest for women's labor market considerations when choosing, or risking, a short IPI through postpartum non-use of contraception is Troske and Voicu's (2013) finding that U.S. women at all education levels gain from close spacing between a first and second

births in terms of continuity of full-time employment, but that higher-educated women gain less than do lower-educated women. Consistent with this, we found non-use of contraception postpartum to be monotonically decreasing in education, both in conjunction with wanting to become pregnant and without explicitly stating that non-use was for that reason. This education relationship, however, emerges only after controlling for variables indicating readiness for accelerated childbearing. Our bivariate distributions of contraceptive non-use by education showed that it is instead higher-educated women who are disproportionately likely to be postpartum contraceptive non-users. This mirrors a finding that more closely-spaced first and second and second and third births occur more among higher-educated women in the United Kingdom (Rendall and Smallwood 2003). We therefore conclude that it is more-educated women's reproductive readiness characteristics, such as their being older, married, of parity 1, and perceiving the index birth to have been later than desired, and not their behavioral propensity, that explains why they are the most likely not to be using contraception postpartum.

With respect to infant health outcomes, our emphasis on postpartum pregnancy intention around contraceptive non-use is consistent with Kost and Lindberg's (2015, p.103) argument that intendedness is important because "women know when they are ready to become a mother and when they are not." Factors such as their marital status and their having only recently begun family formation may be more important indicators of conditions that will be favorable to the infant's health and well-being than the more strictly physiological marker of time since the last birth. We note, however, recent findings from within-women studies of adverse causal impacts of short IPIs in the case that the previous birth was premature (Koullali et al 2017), and of elevated risk to the mother of gestational diabetes and high pre-pregnancy BMI as result of a short IPI (Hanley et al. 2017). We included premature-birth among our predictors and found that it was not predictive of women's use of postpartum contraception. These recent medical-science findings, however, suggest an important role remains for counseling on, and provision of,

effective postpartum contraception, especially when a woman is not trying to accelerate her family formation.

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Appendix A.1 States included in analysis by year, PRAMS 2012-2015

	Year			
State	**2012**	**2013**	**2014**	**2015**
AK	X	X	X	X
AL			X	X
AR	X	X		X
CO	X	X		X
CT			X	X
DE	X	X	X	X
GA	X	X		
HI	X	X	X	X
IA		X	X	X
IL	X	X	X	X
LA				X
MA	X	X	X	X
MD	X	X	X	X
ME	X	X	X	X
MI	X	X		X
MN	X	X		
MO	X	X	X	X
NE	X	X	X	X
NH		X	X	X
NJ	X	X	X	X
NM	X	X	X	X
NY		X	X	X
OH	X		X	X
OK	X	X	X	X
OR	X	X		X
PA	X	X	X	X
RI	X	X	X	
TN	X	X	X	X
TX				X
UT	X	X	X	X
VA				X
WA	X	X	X	X
WI	X	X	X	X
WV	X	X	X	X
WY	X	X	X	X
NYC	X	X	X	X

TABLE 1. Characteristics of sexually active women in the postpartum period, Pregnancy Risk Assessment Monitoring Systems (PRAMS) States 2012-2015, percentages

		Postpartum Contraceptive Use and Pregnancy Intention			
	All	**Contracepting**	**Not Contracepting, Not Wanting to Get Pregnant**	**Not Contracepting, Wanting to Get Pregnant**	**Chi^2 test signficance**
Postpartum contraceptive use and pregancy intention					-
Contracepting, Not wanting to get pregnant	87.3	100.0	0.0	0.0	
Not contracepting, Not wanting to get pregnant	9.7	0.0	100.0	0.0	
Not contracepting, Wanting to get pregnant	3.0	0.0	0.0	100.0	
Index birth contraceptive use and pregnancy intention					***
On time	43.1	42.5	46.4	48.6	
Later than desired	14.1	12.9	17.3	38.5	
Not contracepting, Earlier than desired	11.6	11.6	13.3	4.8	
Not contracepting, Unsure	9.3	9.0	13.3	4.7	
Not contracepting, Not wanted	2.6	2.6	3.2	0.6	
Contraceptive failure	19.4	21.4	6.6	2.7	
Birth order (index birth)					***
First birth	39.7	39.0	39.4	58.5	
Second or third birth	49.4	50.1	47.3	34.7	
Fourth or higher birth	10.9	10.8	13.3	6.7	
Married	62.7	61.5	67.2	81.2	***
Race/ethnicity					***
Non-Hispanic White	61.6	61.4	60.8	71.8	
Black	12.6	12.7	12.8	7.5	
Asian	5.2	5.0	7.1	6.7	
Other	3.5	3.4	4.2	3.4	
Hispanic	17.1	17.5	15.0	10.7	
Age					***
<20	5.9	6.1	4.6	3.2	
20-24	20.6	20.7	21.2	15.0	
25-29	30.0	30.3	27.8	26.4	
30-34	28.0	27.8	28.1	31.2	
35+	15.6	15.0	18.3	24.2	
Education					***
< High School	13.1	13.0	15.5	8.7	
High School	24.1	24.2	23.6	20.5	
Some College	28.2	28.5	26.8	24.4	
Bachelors+	34.6	34.2	34.1	46.4	
Index birth health outcome					
Low birth weight	6.9	6.9	7.2	7.2	
Premature baby	8.3	8.3	8.7	8.9	
Observations	123,943	108,809	11,531	3,603	

Notes: *** p<0.001 for differences in distribution by postpartum contraceptive use and pregnancy intention category

TABLE 2. Odds ratios (and 95% confidence intervals) from logistic regression analysis assessing the likelihood that women are not using contraception during the postpartum period (Reference = Using contraception), PRAMS States 2012-2015

	Not Contracepting	
	Odds Ratio	CI
Index birth contraceptive use and pregnancy intention (Ref: On time)		
Later than desired	1.50***	[1.40,1.60]
Not contracepting, Earlier than desired	0.91*	[0.83,1.00]
Not contracepting, Unsure	1.13*	[1.02,1.25]
Not contracepting, Not wanted	0.90	[0.75,1.08]
Contraceptive Failure	0.25***	[0.22,0.28]
Birth Order (Ref: 2nd or 3rd birth)		
First birth	1.35***	[1.27,1.44]
4th or higher birth	1.29***	[1.17,1.43]
Married	1.34***	[1.24,1.44]
Race/ethnicity (Ref: Non-Hispanic White)		
Black	1.09+	[1.00,1.19]
Asian	1.25***	[1.14,1.38]
Other	1.24***	[1.10,1.41]
Hispanic	0.80***	[0.72,0.88]
Age (Ref: <20)		
20-24	1.35***	[1.15,1.59]
25-29	1.14	[0.96,1.35]
30-34	1.25*	[1.05,1.49]
35+	1.58***	[1.32,1.89]
Education (Ref: <High School Graduate)		
High School Graduate	0.79***	[0.71,0.89]
Some College	0.71***	[0.63,0.79]
Bachelors+	0.64***	[0.57,0.72]
Index birth health outcome		
Premature baby	1.04	[0.92,1.17]
Low birth weight	1.01	[0.91,1.11]
Observations	123,943	

Notes: Confidence intervals (CI) in brackets
+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

TABLE 3. Relative risk ratios (and 95% confidence intervals) from multinomial regression analysis assessing the likelihood that women are wanting to get pregnant or not wanting to get pregnant but not using contraception during the postpartum period (Reference = Using contraception), PRAMS States 2012-2015

	Not Contracepting, Not Wanting to Get Pregnant		Not Contracepting, Wanting to Get Pregnant	
	RRR	CI	RRR	CI
Index birth contraceptive use and pregnancy intention (Ref: On time)				
Later than desired	1.20***	[1.11,1.31]	2.29***	[2.05,2.57]
Not contracepting, Earlier than desired	1.05	[0.96,1.16]	0.41***	[0.32,0.53]
Not contracepting, Unsure	1.30***	[1.17,1.45]	0.51***	[0.40,0.66]
Not contracepting, Not wanted	1.07	[0.89,1.28]	0.26*	[0.09,0.74]
Contraceptive Failure	0.28***	[0.25,0.32]	0.14***	[0.09,0.21]
Birth Order (Ref: 2nd or 3rd birth)				
First birth	1.11**	[1.04,1.19]	2.42***	[2.15,2.73]
4th or higher birth	1.34***	[1.20,1.49]	1.04	[0.82,1.33]
Married	1.26***	[1.16,1.37]	1.69***	[1.41,2.02]
Race/ethnicity (Ref: Non-Hispanic White)				
Black	1.14**	[1.04,1.25]	0.87	[0.72,1.06]
Asian	1.38***	[1.24,1.54]	0.93	[0.76,1.13]
Other	1.29***	[1.12,1.48]	1.09	[0.86,1.38]
Hispanic	0.84**	[0.76,0.94]	0.65***	[0.52,0.83]
Age (Ref: <20)				
20-24	1.35***	[1.14,1.61]	1.14	[0.76,1.71]
25-29	1.10	[0.92,1.32]	1.05	[0.70,1.57]
30-34	1.18+	[0.98,1.42]	1.29	[0.85,1.95]
35+	1.39**	[1.14,1.68]	2.02***	[1.33,3.06]
Education (Ref: <High School Graduate)				
High School Graduate	0.77***	[0.68,0.86]	0.96	[0.74,1.25]
Some College	0.70***	[0.63,0.79]	0.76*	[0.59,0.98]
Bachelors+	0.64***	[0.56,0.73]	0.67**	[0.52,0.86]
Index birth health outcome				
Premature baby	1.02	[0.89,1.17]	1.09	[0.88,1.34]
Low birth weight	1.02	[0.91,1.14]	0.96	[0.80,1.16]
Observations	123,943			

Notes: RRR = Relative Risk Ratio, Confidence intervals (CI) in brackets

+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 4. Predicted probabilities of not contracepting because woman wanted to become pregnant versus not contracepting for other reasons, PRAMS States 2012-15, selected groups

	Non-Hispanic White		Black		Hispanic	
	Wanting to become pregnant	Not wanting to become pregnant	Wanting to become pregnant	Not wanting to become pregnant	Wanting to become pregnant	Not wanting to become pregnant
Panel A: Index birth later than desired, 1st birth, Married						
Age 35+						
< High School Grad.	0.221	0.158	0.194	0.181	0.160	0.148
High School Graduate	0.223	0.127	0.197	0.146	0.161	0.118
Some College	0.187	0.123	0.165	0.142	0.133	0.114
Bachelors+	0.170	0.115	0.15	0.132	0.120	0.105
Age 30-34						
< High School Grad.	0.158	0.149	0.138	0.17	0.111	0.136
High School Graduate	0.158	0.119	0.139	0.137	0.111	0.109
Some College	0.131	0.114	0.114	0.131	0.091	0.103
Bachelors+	0.118	0.106	0.103	0.121	0.082	0.095
Age 25-29						
< High School Grad.	0.133	0.146	0.116	0.166	0.093	0.132
High School Graduate	0.133	0.116	0.117	0.133	0.093	0.105
Some College	0.110	0.111	0.096	0.126	0.076	0.099
Bachelors+	0.099	0.103	0.086	0.117	0.068	0.091
Panel B: Index birth earlier than desired and not contracepting, 1st birth, Unmarried						
Age 25-29						
< High School Grad.	0.017	0.121	0.015	0.136	0.011	0.105
High School Graduate	0.017	0.096	0.015	0.108	0.011	0.083
Age 20-24						
< High School Grad.	0.018	0.144	0.016	0.162	0.012	0.125
High School Graduate	0.018	0.115	0.016	0.129	0.012	0.099
Age <20						
< High School Grad.	0.016	0.111	0.014	0.125	0.011	0.096
High School Graduate	0.016	0.088	0.014	0.099	0.011	0.075

Note: Predicted probabilities based on estimates from the multinomial logistic regression in Table 3, averaged over observed distributions of index-bith health outcomes.