

# Do Pregnancy Intentions Matter? A Research Note Revisiting Relationships Among Pregnancy, Birth, and Maternal Outcomes

Nicholas D. E. Mark and Sarah K. Cowan

**ABSTRACT** The prevention of unplanned or unintended pregnancies continues to be a cornerstone of U.S. reproductive health policy, but the evidence that such pregnancies cause adverse maternal and child outcomes is limited. In this research note, we examine these relationships using recent large-scale data and inverse propensity weights estimated from generalized boosted models. We find that pregnancy timing is related to maternal experience during pregnancy, but not to infant outcomes at birth—both of which are consistent with prior research. In an addition to the literature, we show that pregnancy timing is relevant for a number of maternal outcomes, such as the onset of depression and intimate partner violence, changes in smoking behavior, and receipt of medical care. These findings suggest that policy intended to improve infant welfare by preventing unintended pregnancies has little empirical support, but that policy focused on increasing reproductive autonomy and maternal well-being has the potential to improve outcomes.

**KEYWORDS** Pregnancy intention • Maternal health • Infant outcomes • Health policy

## Introduction

Preventing unintended or unplanned pregnancies has long been a cornerstone of U.S. reproductive health policy, partially because infant and maternal outcomes are better after a planned versus an unplanned pregnancy (Brown and Eisenberg 1995; Gipson et al. 2008; Institute of Medicine 2011). These well-established associations helped justify expanded contraceptive insurance coverage in the 2010 Affordable Care Act (Institute of Medicine 2011).

Despite its important influence in policy making, pregnancy intention—its relationship to outcomes, measurement, and conceptual value—has long been the subject of debate (Aiken et al. 2016; Kost and Lindberg 2015; Kost and Zolna 2019; Luker 1999; Potter et al. 2019; Trussell et al. 1999). Unintended pregnancies have been associated with negative family and child outcomes, even after controlling for maternal characteristics within a multiple regression framework (Cheng et al. 2009;

Joyce et al. 2000; Kost et al. 1998; Weller et al. 1987).<sup>1</sup> However, other studies have found almost no causal relationship between pregnancy intentions and pregnancy or infant outcomes at birth (Joyce et al. 2000; Kost and Lindberg 2015). We make two contributions to this debate.

First, we revisit the question of whether infants fare better when the pregnancy was well-timed using a larger sample and with more precise measures and methods than prior work. We aim to determine whether the association between pregnancy timing (for pregnancies taken to term) and adverse outcomes is due solely to maternal characteristics that are correlated with pregnancy timing or whether pregnancy timing independently exerts a causal effect on outcomes. It is worth noting here, although we consider it more in the following, that we use the traditional survey question about whether the pregnancy occurred when the woman wanted it to. Typically, this question has been used to measure intentions. In light of significant critiques of this operationalization, we instead use the language of timing.

Second, we expand the scope of outcomes to include a range of maternal pregnancy and postpartum outcomes. Much prior work addressed only infant outcomes at birth, child outcomes, or maternal outcomes directly affecting the *in utero* environment, such as maternal alcohol or tobacco consumption (Gipson et al. 2008). Research has found links between pregnancy intention and the experience of intimate partner violence (IPV) (Jasinski 2001) and postpartum depression (Abajobir et al. 2016; Abbasi et al. 2013; Fellenzer and Cibula 2014; Mercier et al. 2013; but see Christensen et al. 2011), as well as symptoms of anxiety and stress later in life (Biggs et al. 2017; Herd et al. 2016), suggesting that maternal outcomes may be related to pregnancy intentions.

## Data

We analyze data from the Pregnancy Risk Assessment Monitoring System (PRAMS), an annual survey administered by the Centers for Disease Control and Prevention and state health departments of a stratified sample of individuals who have recently given birth; respondents are contacted within 2–4 months of the live birth. Survey data are integrated with birth certificate data, which are the source of many critical infant outcomes at birth, such as birth weight and preterm birth. We use Phase 7 data from 2012–2015, representative of births in participating states and 83% of births in the United States.

The PRAMS questionnaire employs the traditional question to measure pregnancy intention: “Thinking back to *just before* you got pregnant with your new baby, how did you feel about becoming pregnant?” Respondents choose one of five response options: “I wanted to be pregnant later,” “I wanted to be pregnant sooner,” “I wanted to be pregnant then,” “I didn’t want to be pregnant then or at any time in the future,” and “I wasn’t sure what I wanted.” If mothers reported that they wanted to be pregnant later, the extent of mistiming was assessed with this follow-up question: “How much longer did you want to wait to become pregnant?” Response options were “less than 1 year,”

<sup>1</sup> People of all genders give birth. In the United States, most extant data sets include characterization by gender but assume that it corresponds to sex assigned at birth, and thus it is unclear whether men (or other genders) with a uterus provided information about births. For parsimony, we use female nouns and pronouns.

“1 year to less than 2 years,” “2 years to less than 3 years,” “3 years to 5 years,” and “more than 5 years.” We divide these responses into two groups: whether pregnancies were earlier than wanted by less than two years and whether they were earlier than wanted by two years or more. In Phase 7, PRAMS had added a new response option—“I wasn’t sure what I wanted.” Comparisons between Phases 7 and 6 indicate that respondents who selected this option were drawn from all of the other options except “I wanted to be pregnant then,” suggesting that this choice is distinct from the other three choices (Maddow-Zimet and Kost 2020); therefore, we include “unsure” as a fifth intention category. Our results are thus not strictly comparable to analyses employing a four-category measure of pregnancy intentions, but they may have greater conceptual validity.

We, like others, question the interpretation of this question as capturing “intentions” (Kost and Zolna 2019; Potter et al. 2019; Santelli et al. 2003). This concern is borne out of both conceptual and measurement issues. The consequences are considerable: unintended births can be construed as an inability or unwillingness to plan, a violation of Americans’ notion of a responsible adult (Shim 2010). Therefore, rather than using the traditional language of “intended” and “unintended,” we hew more closely to the data in describing pregnancies as “then/sooner,” “wanted <2 years later,” “wanted  $\geq 2$  years later,” “never/unwanted,” and “unsure.” We also share concerns that parents revise pregnancy timing preferences over the course of the pregnancy and in light of infant well-being, leaving a retrospective self-report vulnerable to measurement error. While typically reports shift from unintended to intended, some studies have shown the reverse (Guzzo and Hayford 2014; Joyce et al. 2002; Rosenzweig and Wolpin 1993; Westoff and Ryder 1977). Revision is particularly likely when the infant experiences adverse health events, which is discussed in more detail in the following.

All dependent variables and sample sizes are listed in Table 1.<sup>2</sup> Each outcome is binary (yes/no). Pregnancy outcomes include when the mother recognized her pregnancy and whether she received prenatal care within the first trimester, gained the recommended weight during pregnancy as defined by the American College of Obstetricians and Gynecologists (2013), engaged in smoking or drinking during pregnancy, or experienced the onset of IPV during pregnancy. Infant outcomes at birth include whether the birth was preterm and whether the newborn was low (<2,500 g) or very low (<1,500 g) birth weight, was small for gestational age, was admitted to the intensive care unit (ICU), or died before age 1. Maternal postpartum outcomes include mothers’ reports of ever breastfeeding or breastfeeding for at least three months, attending a postpartum medical visit, and changes in depression or smoking.

PRAMS data are collected from birthing parents who recently had a live birth and exclude those whose pregnancies ended in miscarriage, abortion, or stillbirth. We cannot assess whether maternal well-being during and after these pregnancies varied by pregnancy timing for those excluded populations. Because access to abortion differs by state of residence and economic and social privilege, selection into unintended birth is nonrandom. Our data are conditional on this selection process. Our analyses compare mothers who reported that their pregnancies were well-timed with otherwise similar mothers who reported that their pregnancies were mistimed, but we cannot say whether these same mothers would have taken their pregnancies to term if abortion had been more readily available.

<sup>2</sup> Section 2 of the online appendix describes the variable construction in detail.

**Table 1** Outcomes and samples

Outcome	Sample	<i>n</i>
Pregnancy Outcomes		
Recognized pregnancy within six weeks	Universe in states where question was asked (AL, DE, LA, MD, ME, NJ, OK, TX)	26,071
Prenatal care in first trimester	Universe	128,817
Recommended weight gain	Universe	106,951
Quit smoking in first/second trimester	Reported any tobacco use three months before pregnancy	23,230
Quit smoking in third trimester	Reported any tobacco use three months before pregnancy	29,430
Reduced drinking by third trimester	Reported alcohol consumption three months before pregnancy	35,166
IPV initiated	Reported no IPV before pregnancy	126,474
Infant Outcomes at Birth		
Preterm birth	Universe	131,175
Low birth weight	Universe	131,138
Very low birth weight	Universe	131,138
Small for gestational age	Universe	125,625
Infant in intensive care unit	Universe	129,895
Infant mortality	Universe	128,161
Maternal Postpartum Outcomes		
Postpartum visit	Universe	130,378
Depression initiated	Reported no depression before pregnancy	114,268
Depression improved	Reported depression before pregnancy	14,256
Smoking worsened	Reported smoking <41 cigarettes/day three months before pregnancy	114,350
Smoking improved	Reported any tobacco use three months before pregnancy	29,728
Ever breastfed	Universe	128,004
Breastfed for ≥3 months	Gave birth ≥91 days before survey	112,263

*Notes:* Data on pregnancy, infant, and maternal outcomes are from Phase 7 of the National PRAMS. The number of observations in the universe of data varies because of variation in response rates by question. IPV = intimate partner violence.

The independent variables include a number of the mother’s characteristics: age (≤19, 20–24, 25–29, ≥30), marital status (married or other), race and ethnicity (non-Hispanic White, Hispanic, non-Hispanic Black, non-Hispanic other), educational attainment (less than high school, high school, some college, college or more), experience of depression before pregnancy, number of stress events in the 12 months before the birth, and state of residence. Other variables are infant’s birth order (first, second, third or higher) and whether prenatal care was paid for by Medicaid.

**Methods**

We use inverse propensity weighting (IPW) to adjust the distribution of maternal characteristics so that pregnancy timing groups are similar with respect to observed variables that are (1) related to the probability of assignment to a pregnancy timing

category and (2) influence the outcome of interest. The goal of IPW is to eliminate differences in confounders between groups, essentially approximating comparison groups that are equivalent on all characteristics except for group assignment. Assuming that all confounders are adjusted for, regressing pregnancy timing on the outcome of interest provides unbiased estimates of the marginal causal effect of pregnancy timing (Austin and Stuart 2015; Rosenbaum and Rubin 1983). Because we cannot account for all of the factors that influence pregnancy timing relative to maternal preferences, including selection into taking pregnancies to term, our results should not be interpreted as unbiased estimates. Nevertheless, we can adjust for many of the major factors that influence pregnancy timing.

We use generalized boosted models to estimate multinomial propensity weights (McCaffrey et al. 2013). The predictors we use are mother's age, marital status, race and ethnicity, education, and state of residence, as well as birth order and whether Medicaid paid for prenatal care.<sup>3</sup> After the propensity weights are estimated, they are multiplied by the survey weights to permit calculation of average treatment effects that are representative of the PRAMS population.

Because our analyses of a five-level measure span 19 outcomes, the *p* values of individual coefficients are difficult to interpret; but because the categories and outcomes are not independent, standard corrections for multiple comparisons, such as Bonferroni corrections, are not appropriate (Perneger 1998). Thus, although we report the point estimates and 95% confidence intervals, we urge caution in interpreting specificity or statistical significance of individual coefficients, and we focus our discussion on broad patterns of results while noting where individual results differ substantively from those patterns.

## Results

As expected, mothers who wanted their pregnancies then, sooner, or later but within two years were advantaged compared with mothers in the three other groups (Table 2): they had more years of education, were more likely to be married, and were less likely to have had their prenatal care paid by Medicaid. Table 2 also shows that they were more likely to experience adverse pregnancy, birth, and postpartum outcomes. Disentangling these correlations requires adjusting for differences in mothers' characteristics.

Figure 1 shows the unadjusted and IPW associations between pregnancy timing and pregnancy experience, giving outcomes with 95% confidence intervals. After adjustment, women whose pregnancies occurred less than two years before they wanted had similar outcomes as their peers who wanted their pregnancies then or sooner (the reference group). Those whose pregnancies came two or more years sooner than wanted were less likely than the reference group to recognize their pregnancy in the first six weeks, to receive prenatal care in the first trimester, and to have quit smoking by the first or second trimester, but were no less likely to have quit by the third trimester. They were marginally less likely to have gained the recommended amount of weight during

<sup>3</sup> The online appendix includes a more detailed description of the estimation procedures (Appendix Section 1) and covariate balance tables (Appendix Section 4).

**Table 2** Descriptive statistics for the National PRAMS sample, by pregnancy intention

Variable	Full Sample	Wanted Then or Sooner	Wanted <2 Years Later	Wanted ≥2 Years Later	Never Wanted/ Unwanted	Unsure
Independent Variables						
Age						
≤19	.06	.02	.05	.22	.06	.08
20–24	.21	.14	.24	.43	.19	.26
25–29	.29	.31	.34	.23	.26	.27
≥30	.44	.52	.38	.12	.49	.39
Married	.61	.77	.60	.24	.41	.42
Birth order						
First	.40	.41	.39	.54	.21	.36
Second	.33	.36	.36	.25	.23	.28
Third or higher	.27	.23	.24	.21	.57	.37
Race/ethnicity						
Non-Hispanic White	.60	.67	.62	.44	.48	.54
Hispanic	.17	.16	.17	.23	.18	.15
Non-Hispanic Black	.13	.08	.12	.24	.26	.20
Non-Hispanic other	.09	.10	.09	.08	.09	.10
Prenatal care paid by Medicaid	.42	.30	.45	.67	.62	.58
Education						
Less than high school	.13	.10	.12	.24	.18	.17
High school	.24	.19	.24	.35	.32	.32
Some college	.28	.25	.30	.31	.33	.31
College or more	.34	.45	.34	.10	.17	.20
Total number of stress events	1.86	1.45	2.02	2.57	2.79	2.39
Dependent Variables						
Pregnancy outcomes						
Recognized pregnancy within six weeks	.72	.81	.68	.54	.54	.64
Prenatal care in first trimester	.85	.90	.85	.74	.70	.78
Recommended weight gain	.31	.33	.31	.28	.28	.29
Quit smoking in first/second trimester	.58	.65	.58	.57	.49	.52
Quit smoking in third trimester	.54	.61	.54	.54	.41	.46
Reduced drinking by third trimester	.98	.98	.98	.98	.97	.97
IPV initiated	.01	.00	.01	.02	.01	.01
Infant outcomes at birth						
Preterm birth	.08	.08	.08	.09	.10	.09
Low birth weight	.07	.07	.07	.08	.09	.08
Very low birth weight	.01	.01	.01	.01	.01	.01
Small for gestational age	.10	.09	.09	.12	.10	.11
Infant in intensive care unit	.12	.11	.11	.13	.13	.14
Infant mortality	.01	.01	.00	.00	.00	.01
Maternal postpartum outcomes						
Postpartum visit	.90	.93	.91	.87	.85	.86
Depression initiated	.10	.08	.10	.15	.16	.14
Depression improved	.72	.78	.73	.64	.63	.67
Smoking worsened	.02	.01	.02	.03	.04	.03
Smoking improved	.57	.62	.58	.55	.48	.54

Table 2 (continued)

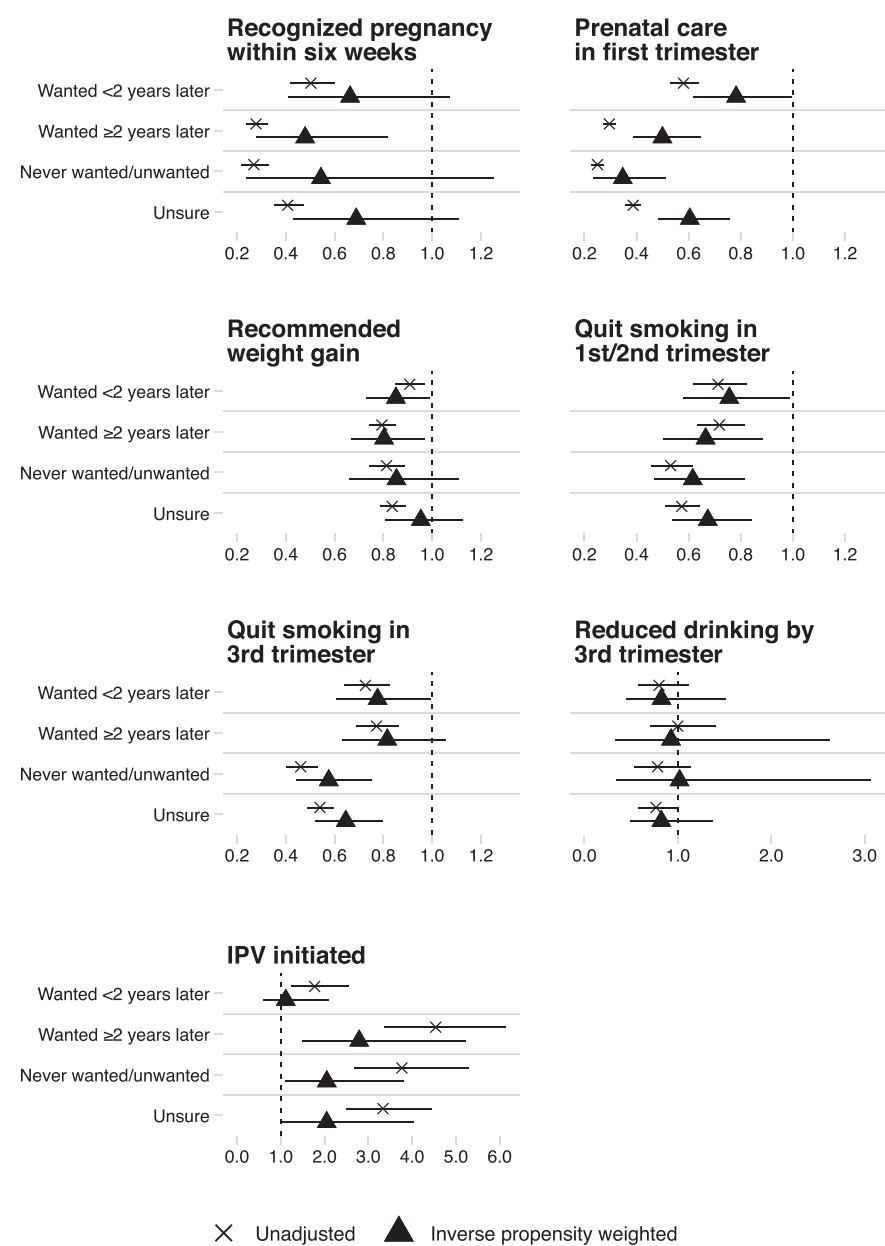
Variable	Full Sample	Wanted Then or Sooner	Wanted <2 Years Later	Wanted ≥2 Years Later	Never Wanted/ Unwanted	Unsure
Ever breastfed	.86	.89	.87	.81	.75	.79
Breastfed for ≥3 months	.57	.65	.57	.43	.44	.48
Observations	144,017	78,856	14,896	17,712	9,805	22,748

Notes: Data are from Phase 7 of the National PRAMS. Column 1 summarizes all of the data, and columns 2–6 provide summary statistics by intention status. IPV = intimate partner violence.

pregnancy, but no less likely to have reduced their alcohol consumption. Women who did not want to be pregnant were less likely than the reference group to recognize their pregnancy in the first six weeks, to receive prenatal care in the first trimester, and to have quit smoking during their pregnancy, but were no less likely to have gained the recommended amount of weight or reduced their alcohol consumption. Women who were unsure about their pregnancy timing were less likely to have received prenatal care in the first trimester and to have quit smoking during their pregnancy. Finally, women who wanted to be pregnant two or more years later, did not want to be pregnant, or were unsure how they felt were much more likely than the reference group to experience the onset of intimate partner violence during pregnancy.

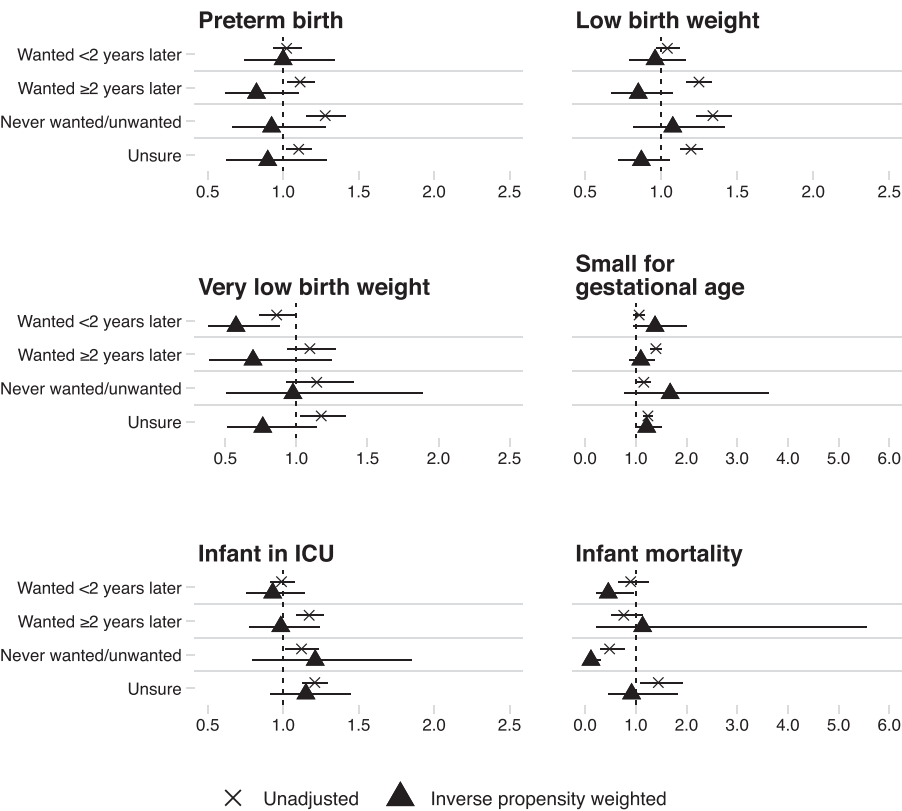
Despite these differences in maternal experience during pregnancy by pregnancy timing, infants’ health at birth was quite similar after propensity weighting (Figure 2). The sign and the magnitude of the coefficients varied across outcomes, and few were significantly different from zero. Of note, however, is the result that children who were born from unwanted pregnancies were substantially *less* likely to die in their first year than those born from wanted pregnancies. Given the rarity of this outcome and the potential for selective reporting and revision (Smith-Greenaway and Sennott 2016), we are hesitant to draw firm conclusions, but the direction, magnitude, and precision of the estimate suggest that unwanted births are at least as likely to result in infant mortality than wanted births. In sum, pregnancy timing may have affected maternal experience during pregnancy, but did not measurably impact infant health *in utero*.

Results for maternal postpartum outcomes are shown in Figure 3. Women whose pregnancies were unwanted or arrived more than two years earlier than wanted and those who were unsure how they felt about their pregnancy fared unambiguously worse than women whose pregnancies were better timed, even after weighting. Among women who were depressed prior to pregnancy, those with unwanted births, those who were unsure how they felt about their pregnancy, and those whose pregnancies occurred more than two years before they wanted to be pregnant were less likely than the reference group to experience relief from their depression. Women in these three categories who did not report depression prior to pregnancy were more likely to become depressed after giving birth. They were less likely to report having reduced or quit smoking and were equally likely to report having increased smoking. Further, women whose pregnancies were unwanted or who were unsure how they felt about their pregnancy were less likely to attend a postpartum checkup.



**Fig. 1** Unadjusted and inverse propensity-weighted estimates of associations between pregnancy intentions and pregnancy outcomes, giving odds ratios relative to pregnancies that were wanted then or sooner. Scales on the *x*-axes vary. The recognition, prenatal care, and weight gain models include all respondents; the smoking models include respondents reporting tobacco use three months before pregnancy; the drinking model includes respondents reporting alcohol consumption three months before pregnancy; and the IPV model includes respondents reporting no IPV before pregnancy. Data are from Phase 7 of the National PRAMS. See the online Appendix Section 1 for details on estimation of the propensity-weighted model. Odds ratios and standard errors are given in Appendix Section 3, Table 1. IPV = intimate partner violence.

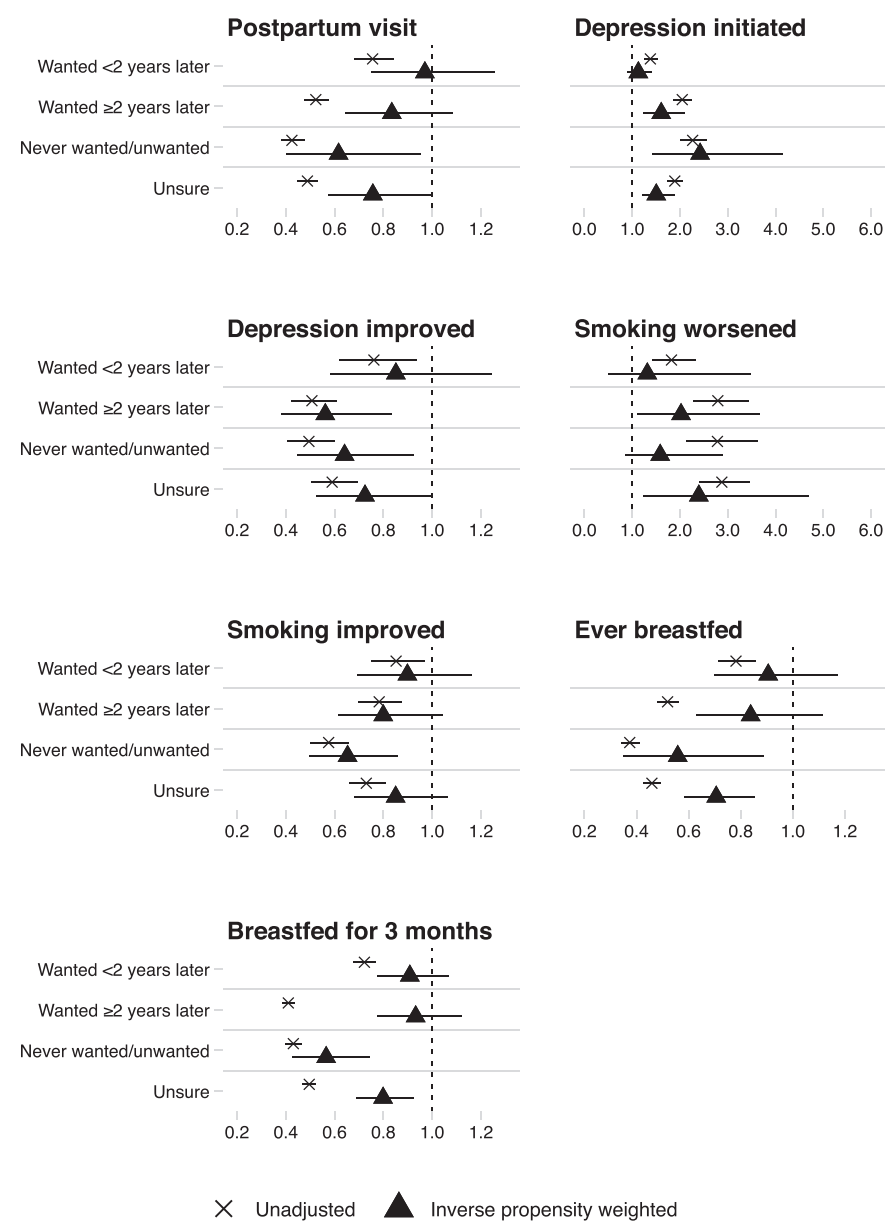




**Fig. 2** Unadjusted and inverse propensity-weighted estimates of associations between pregnancy intentions and infant outcomes at birth, giving odds ratios relative to pregnancies that were wanted then or sooner. Scales on the x-axes vary. Models include all respondents. Data are from Phase 7 of the National PRAMS. See the online Appendix Section 1 for details on estimation of the propensity-weighted model. Odds ratios and standard errors are given in Appendix Section 3, Table 2. ICU = intensive care unit.

Women whose pregnancies were earlier than they wanted were as likely as other mothers to have ever breastfed or to have breastfed for at least three months. Those whose pregnancies were unwanted or who were unsure about their pregnancy were less likely to have ever breastfed or to have breastfed for at least three months. These results complement findings from Kost and Lindberg (2015), who found similar relationships only for pregnancies that were unwanted. Our results reveal that meaningful relationships with breastfeeding extend beyond pregnancies that were unwanted to those about which the mother felt unsure.

In sum, after accounting for potential confounders, pregnancy timing was not associated with infant outcomes at birth, but women whose pregnancies arrived sooner than they wanted had worse postpartum outcomes than those whose pregnancies were on time or arrived later than they wanted. Women who had pregnancies that were unwanted or were markedly earlier than wanted, and women who were unsure about their pregnancy, suffered numerous deleterious outcomes and behaviors, including IPV, depression, tobacco consumption, lack of early prenatal care, and lack of postpartum care.



**Fig. 3** Unadjusted and inverse propensity-weighted estimates of associations between pregnancy intentions and postpartum outcomes, giving odds ratios relative to pregnancies that were wanted then or sooner. Scales on the x-axes vary. The postpartum visit and ever breastfed models include all respondents; the depression initiated model includes respondents reporting no depression prior to pregnancy; the depression improved model includes respondents reporting depression prior to pregnancy; the smoking worsened model includes respondents reporting smoking <41 cigarettes/day three months before pregnancy; the smoking improved model includes respondents reporting tobacco use three months before pregnancy; and the breastfed for ≥3 months model includes respondents interviewed at least 91 days after birth. Data are from Phase 7 of the National PRAMS. See the online Appendix Section 1 for details on estimation of the propensity-weighted model. Odds ratios and standard errors are given in Appendix Section 3, Table 3.

## Discussion

One justification for public policy encouraging planned or intended pregnancies, however defined, is that intended pregnancies are better for infants. Like previous researchers, we find that this is unsupported by the data. By contrast, our results highlight that pregnancy timing likely does matter for maternal outcomes. We show that women who wanted to be pregnant later, did not want to be pregnant at all, or were unsure about the best timing for their pregnancy were at higher risk of intimate partner violence and postpartum depression. Unwanted pregnancies and pregnancies about which the mother was unsure were also associated with lower rates of breastfeeding. These results are consistent with work showing that mistimed pregnancies taken to term may have negative impacts on older children in the family, in particular through changes in home environments and parents' cognitive and emotional resources (Barber et al. 1999; Barber and East 2009, 2011). Given that the pregnancy timing question was asked retrospectively, it is possible that these relationships are due to *ex post* revision in light of adverse events. Such revision is known to occur for infant outcomes (Smith-Greenaway and Sennott 2016), but more research is needed to understand their relationships with maternal outcomes.

To mitigate any negative effects of unwanted or mistimed pregnancies on maternal outcomes, reproductive health policy should be recentered around reproductive autonomy and should include policies such as universal access to no-cost contraception and abortion, comprehensive sex education, and equity in reproductive health care, with particular attention to maternal risks. Women who express that a pregnancy was “unwanted” or “mistimed” are telling us that they would have preferred not to have become pregnant at that time. Effective policy would work with, rather than attempt to change, these preferences. ■

**Acknowledgments** We thank Erica Hobby for her excellent research assistance, and Paula England, Isaac Maddow-Zimet, and four anonymous reviewers for helpful comments. We also thank the PRAMS working group. This project was supported by a seed grant from the Institute for Human Development and Social Change, New York University. Data are not public, but are available on request from the Centers for Disease Control and Prevention. Replication code will be made publicly available upon publication.

## References

- Abajobir, A. A., Maravilla, J. C., Alati, R., & Najman, J. M. (2016). A systematic review and meta-analysis of the association between unintended pregnancy and perinatal depression. *Journal of Affective Disorders*, 192, 56–63.
- Abbasi, S., Chuang, C. H., Dagher, R., Zhu, J., & Kjerulff, K. (2013). Unintended pregnancy and postpartum depression among first-time mothers. *Journal of Women's Health*, 22, 412–416.
- Aiken, A. R., Borrero, S., Callegari, L. S., & Dehlendorf, C. (2016). Rethinking the pregnancy planning paradigm: Unintended conceptions or unrepresentative concepts? *Perspectives on Sexual and Reproductive Health*, 48, 147–151. <https://doi.org/10.1363/48e10316>.
- American College of Obstetricians and Gynecologists (ACOG). (2013). *Weight gain during pregnancy* (Committee Opinion No. 548). Washington, DC: American College of Obstetricians and Gynecologists, Committee on Obstetric Practice.

- Austin, P. C., & Stuart, E. A. (2015). Moving towards best practice when using inverse probability of treatment weighting (IPTW) using the propensity score to estimate causal treatment effects in observational studies. *Statistics in Medicine*, 34, 3661–3679.
- Barber, J. S., Axinn, W. G., & Thornton, A. (1999). Unwanted childbearing, health, and mother-child relationships. *Journal of Health and Social Behavior*, 40, 231–257.
- Barber, J. S., & East, P. L. (2009). Home and parenting resources available to siblings depending on their birth intention status. *Child Development*, 80, 921–939.
- Barber, J. S., & East, P. L. (2011). Children's experiences after the unintended birth of a sibling. *Demography*, 48, 101–125.
- Biggs, M. A., Upadhyay, U. D., McCulloch, C. E., & Foster, D. G. (2017). Women's mental health and well-being 5 years after receiving or being denied an abortion: A prospective, longitudinal cohort study. *JAMA Psychiatry*, 74, 169–178.
- Brown, S. S., & Eisenberg, L. (Eds.). (1995). *The best intentions: Unintended pregnancy and the well-being of children and families*. Washington, DC: National Academies of Science Press.
- Cheng, D., Schwarz, E. B., Douglas, E., & Horon, I. (2009). Unintended pregnancy and associated maternal preconception, prenatal and postpartum behaviors. *Contraception*, 79, 194–198.
- Christensen, A. L., Stuart, E. A., Perry, D. F., & Le, H.-N. (2011). Unintended pregnancy and perinatal depression trajectories in low-income, high-risk Hispanic immigrants. *Prevention Science*, 12, 289–299.
- Fellenzer, J. L., & Cibula, D. A. (2014). Intendedness of pregnancy and other predictive factors for symptoms of prenatal depression in a population-based study. *Maternal and Child Health Journal*, 18, 2426–2436.
- Gipson, J. D., Koenig, M. A., & Hindin, M. J. (2008). The effects of unintended pregnancy on infant, child, and parental health: A review of the literature. *Studies in Family Planning*, 39, 18–38.
- Guzzo, K. B., & Hayford, S. R. (2014). Revisiting retrospective reporting of first-birth intendedness. *Maternal and Child Health Journal*, 18, 2141–2147.
- Herd, P., Higgins, J., Sicinski, K., & Merkurieva, I. (2016). The implications of unintended pregnancies for mental health in later life. *American Journal of Public Health*, 106, 421–429.
- Institute of Medicine. (2011). *Clinical preventive services for women: Closing the gaps*. Washington, DC: National Academies of Science Press.
- Jasinski, J. L. (2001). Pregnancy and violence against women: An analysis of longitudinal data. *Journal of Interpersonal Violence*, 16, 712–733.
- Joyce, T., Kaestner, R., & Korenman, S. (2002). On the validity of retrospective assessments of pregnancy intention. *Demography*, 39, 199–213.
- Joyce, T. J., Kaestner, R., & Korenman, S. (2000). The effect of pregnancy intention on child development. *Demography*, 37, 83–94.
- Kost, K., Landry, D. J., & Darroch, J. E. (1998). The effects of pregnancy planning status on birth outcomes and infant care. *Family Planning Perspectives*, 30, 223–230.
- Kost, K., & Lindberg, L. (2015). Pregnancy intentions, maternal behaviors, and infant health: Investigating relationships with new measures and propensity score analysis. *Demography*, 52, 83–111.
- Kost, K., & Zolna, M. (2019). Challenging unintended pregnancy as an indicator of reproductive autonomy: A response. *Contraception*, 100, 5–9.
- Luker, K. C. (1999). A reminder that human behavior frequently refuses to conform to models created by researchers. *Family Planning Perspectives*, 31, 248–249.
- Maddow-Zimet, I., & Kost, K. (2020). Effect of changes in response options on reported pregnancy intentions: A natural experiment in the United States. *Public Health Reports*, 135, 354–363.
- McCaffrey, D. F., Griffin, B. A., Almirall, D., Slaughter, M. E., Ramchand, R., & Burgette, L. F. (2013). A tutorial on propensity score estimation for multiple treatments using generalized boosted models. *Statistics in Medicine*, 32, 3388–3414.
- Mercier, R. J., Garrett, J., Thorp, J., & Siega-Riz, A. M. (2013). Pregnancy intention and postpartum depression: Secondary data analysis from a prospective cohort. *BJOG: An International Journal of Obstetrics and Gynaecology*, 120, 1116–1122.
- Perneger, T. V. (1998). What's wrong with Bonferroni adjustments. *British Medical Journal*, 316, 1236–1238.

- Potter, J. E., Stevenson, A. J., Coleman-Minahan, K., Hopkins, K., White, K., Baum, S. E., & Grossman, D. (2019). Challenging unintended pregnancy as an indicator of reproductive autonomy. *Contraception*, 100, 4–7.
- Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70, 41–55.
- Rosenzweig, M. R., & Wolpin, K. I. (1993). Maternal expectations and ex post rationalizations: The usefulness of survey information on the wantedness of children. *Journal of Human Resources*, 28, 205–229.
- Santelli, J., Rochat, R., Hatfield–Timajchy, K., Gilbert, B. C., Curtis, K., Cabral, R., . . . Schieve, L. (2003). The measurement and meaning of unintended pregnancy. *Perspectives on Sexual and Reproductive Health*, 35, 94–101.
- Shim, J. K. (2010). Cultural health capital: A theoretical approach to understanding health care interactions and the dynamics of unequal treatment. *Journal of Health and Social Behavior*, 51, 1–15.
- Smith-Greenaway, E., & Sennott, C. (2016). Death and desirability: Retrospective reporting of unintended pregnancy after a child's death. *Demography*, 53, 805–834.
- Trussell, J., Vaughan, B., & Stanford, J. (1999). Are all contraceptive failures unintended pregnancies? Evidence from the 1995 National Survey of Family Growth. *Family Planning Perspectives*, 31, 246–247.
- Weller, R. H., Eberstein, I. W., & Bailey, M. (1987). Pregnancy wantedness and maternal behavior during pregnancy. *Demography*, 24, 407–412.
- Westoff, C. F., & Ryder, N. B. (1977). The predictive validity of reproductive intentions. *Demography*, 14, 431–453.

---

Nicholas D. E. Mark (corresponding author)  
[nm2648@nyu.edu](mailto:nm2648@nyu.edu)

Mark • Department of Sociology, New York University, New York, NY, USA; <https://orcid.org/0000-0002-7923-1826>

Cowan • Department of Sociology, New York University, New York, NY, USA; <https://orcid.org/0000-0003-2838-079X>