Low perceived susceptibility to pregnancy as a reason for contraceptive nonuse among women with unintended births

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Contents

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Abstract

BACKGROUND
While low perceived susceptibility (PS) to pregnancy is a common risk factor for having sex without contraception among women susceptible to unintended pregnancy, little research has examined the correlates of low PS, and none have investigated whether low PS predisposes women to later pregnancy discovery and prenatal care initiation among women with unintended births.

METHODS
We use data from the 2004–2011 Pregnancy Risk Assessment Monitoring System and limit our sample to women in the United States with unintended births who were not using contraception at the time of the index pregnancy (n = 55,940). Women were classified as having low PS if they indicated they could not get pregnant at the time the index pregnancy occurred or they or their partner were sterile. We use logistic regression to identify correlates of low PS and determine whether low PS is associated with timing of pregnancy recognition and prenatal care initiation.

RESULTS
Over one-third of women with unintended births cited low PS as a reason for contraceptive nonuse. Maternal age and disadvantage are correlated with low PS. Among women with unintended births, those with low PS had lower odds of early pregnancy recognition (adjOR = 0.88; 95% CI: 0.82, 0.94) and prenatal care initiation (adjOR = 0.86; 95% CI: 0.79, 0.94) compared to those who did not hold these beliefs.

CONTRIBUTION
Although research remains focused on other barriers to contraceptive use, low perceived susceptibility to pregnancy is critical to understanding the high rates of unintended pregnancies and births in the United States and may affect prenatal health.

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1. Introduction

Approximately 50% of pregnancies and 35% of births in the United States are unintended (Mosher, Jones, and Abma 2012; Finer and Zolna 2016). A persistent question is: How can unintended pregnancy be so high in a country in which effective contraception is available? We provide a detailed description of one of the most common and underresearched reasons why women who recently had unintended births did not use contraception at the time of the conception: low perceived susceptibility to pregnancy (hereafter, low PS; Nettleman et al. 2007; Mosher, Jones, and Abma 2015). As shown in prior research, the reasons for low PS are often multifactorial but may involve beliefs of invulnerability to pregnancy (Frohwirth, Moore, and Maniaci 2013), misestimating the fertile period (Woodsong, Shedlin, and Koo 2004), beliefs related to biological difficulties in becoming pregnant (e.g., perceived subfecundity; Frohwirth, Moore, and Maniaci 2013; Polis and Zabin 2012; Gemmill 2018), and prior experiences of not becoming pregnant after having sex (Biggs, Karasek, and Foster 2012, Reed et al. 2014; Borrero et al. 2015). Oftentimes, these beliefs or perceptions are not accurate, leading to a false sense of protection from pregnancy.

In this paper, we not only identify the correlates of low PS among a sample of US women with unintended births but also investigate whether low PS is associated with timing of pregnancy recognition and prenatal care.

2. Methods

2.1 Data

Data are from the 2004–2011 Pregnancy Risk Assessment Monitoring System (PRAMS) surveys that are conducted annually by the Centers for Disease Control and Prevention (CDC) in collaboration with individual state health departments. In each participating state, a stratified sample of postpartum women is drawn from the state's birth certificate file, and questionnaires are filled out in paper; telephone follow-up is used to reduce nonresponse. During our study period, an average of 28 states reached the threshold response rate required to release data publicly (65% to 70% for 2004–2011). Women's responses are linked to data from their children's birth certificate, which provides additional demographic and medical information. We obtained permission to use PRAMS from the CDC.

We begin our analysis in 2004 because of a change in the question identifying sex without contraception, and we end in 2011 because PRAMS revised the pregnancy

intention question in 2012 to include a response option of "I wasn't sure what I wanted," which alters how women characterize their pregnancies (Maddow-Zimet and Kost 2020).

2.2 Measures and sample

The PRAMS survey asks women who have recently given birth a series of questions regarding their attitudes and behaviors in advance of the index pregnancy. In the first set of questions of interest, respondents are asked if they were trying to get pregnant, and if not, whether they were doing anything to keep from getting pregnant, with examples of birth control methods provided. Respondents who report they were not trying for pregnancy and not doing anything to prevent pregnancy are then asked the key question for this analysis: "What were you or your husband's or partner's reasons for not doing anything to keep from getting pregnant? Check all that apply." The response options include: "I didn't mind if I got pregnant," "I thought I could not get pregnant at that time," "I had side effects from the birth control method I was using," "I had problems getting birth control when I needed it," "I thought my husband or partner or I was sterile (could not get pregnant at all)," and "My husband or partner didn't want us to use anything," as well as an "other" option followed by a text box. We characterize women who perceived they thought they could not get pregnant at that time or they or their partner were sterile as having low perceived susceptibility to pregnancy.

Pregnancy intention is measured with the following question: "Thinking back to just before you got pregnant with your new baby, how did you feel about becoming pregnant?" The four possible response options include: "I wanted to be pregnant sooner," "I wanted to be pregnant later," "I wanted to be pregnant then," and "I didn't want to be pregnant then or at any time in the future." Following convention (Nettleman et al. 2007; Mosher, Jones, and Abma 2012), we categorize women who stated that they wanted to become pregnant later or did not ever want to become pregnant as unintended. Though these questions measure pregnancy desires and despite the controversy around them (Aiken et al. 2016; Kost, Maddow-Zimet, and Kochhar 2018; Kost and Zolna 2019; Potter et al. 2019), we use the term 'unintended' to be consistent with national public health goals and indicators (US Department of Health and Human Services 2016).

We assess the timing of pregnancy recognition and initiation of prenatal care with the following questions: "How many weeks or months pregnant were you when you were sure you were pregnant? (For example, you had a pregnancy test or a doctor or nurse said you were pregnant)" and "How many weeks or months pregnant were you when you had your first visit for prenatal care? Do not count a visit that was only for a pregnancy test or only for WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children)." Following prior research (Ayoola et al. 2010; Ayoola 2015; Kost and

Lindberg 2015), we dichotomize these answers into early vs. later and define early pregnancy recognition as less than 7 weeks gestation and early prenatal care initiation as a first visit that occurs during the first trimester (i.e., up to 14 weeks gestation). We also create a composite measure of whether women were early on both measures (Kost and Lindberg 2015).

The independent variables in our analysis include maternal age, race/ethnicity, education, marital status, parity, and whether the birth was paid for by Medicaid. We do not include a measure of income because of substantial missingness.

Information on low perceived susceptibility was available only for women who were not trying to get pregnant and were having sex without contraception when they got pregnant. We further restrict the sample to women who reported the index pregnancy as unintended (n = 59,020). The resulting sample therefore excludes intended births and births that result from contraceptive failure. We restrict our sample to those who are not missing data on either low PS to pregnancy (n = 185) or any covariates (n = 2,895), or around 5% of the eligible sample. Our final sample size is 55,940 women. Analyses involving measures of pregnancy recognition and initiation of prenatal care are limited to the 49,240 women with this information.

Because maternal characteristics and behaviors may differ by pregnancy acceptability (Aiken et al. 2016), we create a sensitivity analysis sample in which we exclude the 31% of women in our main sample who indicated, among other reasons, that they "didn't mind" getting pregnant, despite reporting that they were not trying to get pregnant and either wanted to become pregnant later or did not ever want to become pregnant.

2.3 Analytical approach

We use chi-square tests to examine the bivariate relationship between low PS to pregnancy with each independent variable, as well as with the three measures of prenatal behaviors (early pregnancy recognition, early prenatal care, and both early pregnancy recognition and prenatal care).

We then use logistic regression to identify correlates of women reporting low PS to pregnancy as a reason for contraceptive nonuse within our sample of women with unintended births; we include all independent variables in the same model. Last, we use logistic regression to examine whether low PS to pregnancy is associated with prenatal behaviors; we model each of the three dependent variables (i.e., early pregnancy recognition, early initiation of prenatal care, and our composite measure) separately and adjust for all independent variables listed above. We conduct these analyses separately for our main sample and sensitivity analysis sample.

We conduct all analyses in Stata 14.2 (StataCorp 2015) and weight all analyses using the *svy* command prefix to adjust for the complex survey design of PRAMS.

3. Results

Descriptive statistics of our main sample and sensitivity analysis sample are presented in Table 1. The majority of women with unintended births resulting from contraceptive nonuse were in their 20s (59%), non-Latina white (51%), not married (63%), parous (had a prior birth, 58%), and had a high school degree or less (62%).

Table 1: **Sample sizes and percent distributions by selected characteristics for the main sample and sensitivity analysis sample[a]**

| | Main sample | | Sensitivity analysis sample | |
	Unweighted N	weighted %	Unweighted N	weighted %
Total	55,940		38,781	
Age				
<17	3,681	6.5	3,073	7.8
18–19	7,009	11.9	5,299	13.2
20–24	18,928	34.5	13,378	35.7
25–29	13,292	24.3	8,608	22.4
30–34	7,848	14.8	4,877	12.9
35–39	4,026	6.3	2,669	5.9
40+	1,156	1.8	877	2.1
Race/ethnicity				
Non-Latina white	25,524	51.4	16,760	48.1
Latina	7,875	17.3	5,834	18.6
Non-Latina Black	14,801	24.8	11,212	27.2
Other	7,740	6.5	4,975	6.0
Education				
Less than high school	14,471	26.3	11,112	29.5
High school	21,137	36.1	15,120	37.4
Some college	13,405	24.1	9,036	23.5
College graduate	6,927	13.5	3,513	9.6
Marital status				
Not married	35,661	63.3	27,033	69.9
Married	20,279	36.7	11,748	30.1
Delivery paid by Medicaid				
No	18,456	34.6	10,996	29.5
Yes	37,484	65.4	27,785	70.5

Table 1:   (Continued)

	Main sample		Sensitivity analysis sample	
	Unweighted N	weighted %	Unweighted N	weighted %
Parity				
Nulliparous	23,919	42.5	16,752	43.0
Parous	32,021	57.5	22,029	57.0
Early pregnancy recognition[b,c]				
No	18,660	36.9	13,916	40.2
Yes	30,580	63.1	19,970	59.8
Early prenatal care[b,d]				
No	9,786	19.8	7,603	22.8
Yes	39,454	80.2	26,283	77.3
Early pregnancy recognition and prenatal care[b,c,d]				
No	21,358	42.9	15,917	46.8
Yes	27,882	57.2	17,969	53.2
Low PS				
No	34,948	64.2	21,050	55.9
Yes	20,992	35.8	17,731	44.1

Notes: [a] The sensitivity analysis sample excludes women who endorsed the option "I didn't mind if I got pregnant" as a reason for not using contraception at the time of conception.
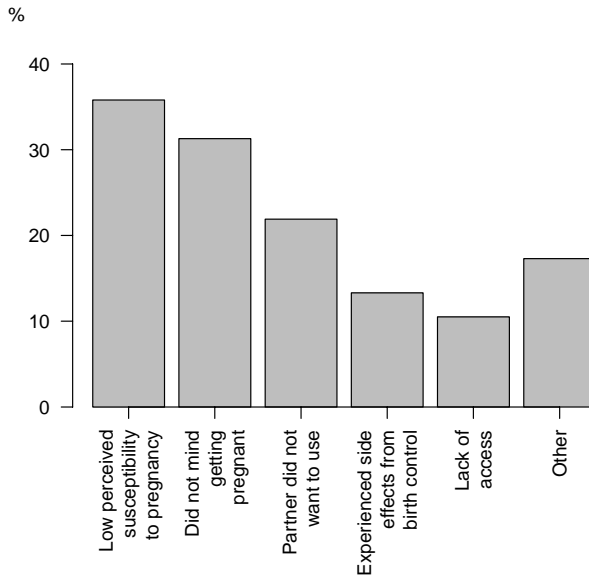[b] Due to missing information on pregnancy recognition and prenatal care, Ns are smaller than overall sample size.
[c] Early pregnancy recognition is defined as less than 7 weeks gestation.
[d] Early prenatal care initiation is defined as a first visit that occurs in the first trimester (i.e., up to 14 weeks gestation).

Figure 1 summarizes the reasons women in our sample gave for engaging in sex without contraception at the time the index pregnancy occurred; as noted above, women could provide more than one reason. Low PS to pregnancy was the most common reason women provided, with over one-third (35.8%) stating that they did not think they could get pregnant, which includes beliefs that they or their partner were sterile (8.4%).

Figure 1: **Percentage of women with unintended births who gave the specified reasons for not using contraception at the time of conception**

Note: Respondents could choose more than one option.

Table 2 presents the percent of women who had low PS to pregnancy when they got pregnant among all women and by selected characteristics; results are presented separately for the main and sensitivity analysis samples. In both samples, low PS is more common among teens and women over the age of 35, Latina women, and women who had less than a high school education. Low PS is also common among nulliparous women and women who had their delivery paid for by Medicaid. Women who were not married were more likely to have low PS in the main sample but not the sensitivity analysis sample. In bivariable analyses, low PS is also associated with all three measures of prenatal behaviors in the main sample, with women having low PS less likely to recognize their pregnancies early and enter prenatal care in the first trimester.

Table 2: **Percent of women with low perceived susceptibility by selected characteristics for the main sample and sensitivity analysis sample[a]**

	Main sample weighted %	p-value	Sensitivity analysis sample weighted %	p-value
All women	35.8		44.1	
Age				
<17	44.4	<0.001	47.1	<0.001
18–19	38.3		42.0	
20–24	33.6		40.3	
25–29	32.9		43.1	
30–34	34.4		48.3	
35–39	41.9		54.8	
40+	58.2		68.0	
Race/ethnicity		<0.001		<0.001
Non-Latina white	31.3		41.2	
Latina	48.4		55.3	
Non-Latina Black	36.3		41.0	
Other	36.0		47.1	
Education		<0.001		<0.001
Less than high school	42.3		46.7	
High school	34.7		42.3	
Some college	33.4		41.7	
College graduate	30.0		49.1	
Marital status		<0.001		0.9755
Not married	38.5		44.1	
Married	31.0		44.2	
Delivery paid by Medicaid		<0.001		0.0193
No	32.6		45.7	
Yes	37.4		43.5	
Parity				
Nulliparous	41.2	<0.001	50.1	<0.001
Parous	31.8		39.6	
Early pregnancy recognition[b,c]		<0.001		0.0241
No	39.1		45.5	
Yes	33.9		43.4	
Early prenatal care[b,d]		<0.001		0.3629
No	39.7		44.9	
Yes	34.7		43.9	
Early pregnancy recognition and prenatal care[b,c,d]				
No	38.8	<0.001	45.4	0.0183
Yes	33.5		43.2	

Notes: [a] The sensitivity analysis sample excludes women who endorsed the option "I didn't mind if I got pregnant" as a reason for not using contraception at the time of conception.
[b] Due to missing information on pregnancy recognition and prenatal care, Ns are smaller than overall sample size.
[c] Early pregnancy recognition is defined as less than 7 weeks gestation.
[d] Early prenatal care initiation is defined as a first visit that occurs in the first trimester (i.e., up to 14 weeks gestation).

Most of the relationships observed at the bivariable level persisted after full covariate adjustment (Table 3). For example, in our main sample, we find a clear gradient with age, with the highest odds of having low PS in women over 40 (vs. 20–24; adjOR = 4.43; 95% confidence interval [CI]: 3.48, 5.65). All racial/ethnic minority groups were more likely to have low PS than white women, although the magnitude of the association is largest for Latina women (adjOR = 1.92). We also find that education is largely protective against having low PS, with college graduates having the lowest odds of having low PS (adjOR = 0.76). Married women also have lower odds of having low PS compared to unmarried women (adjOR = 0.81), whereas women who paid for their delivery with Medicaid have 11% higher odds. Women with first births also have higher odds of having low PS compared with their parous peers.

Table 3: **Odds ratios and 95% confidence intervals assessing associations between selected characteristics and low perceived susceptibility for the main sample and sensitivity analysis sample[a]**
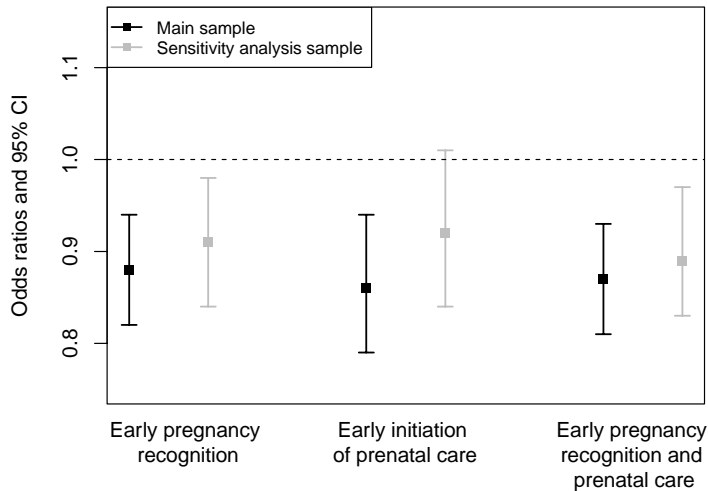
	Main sample Odds ratio & 95% CI	Sensitivity analysis sample Odds ratio & 95% CI
Age		
<17	0.87 (0.75, 1.01)	0.75 (0.64, 0.89)
18–19	0.92 (0.83, 1.03)	0.80 (0.71, 0.91)
20–24 (ref)	1.00	1.00
25–29	1.24 (1.14, 1.35)	1.36 (1.23, 1.50)
30–34	1.57 (1.41, 1.75)	1.86 (1.63, 2.11)
35–39	2.34 (2.04, 2.68)	2.53 (2.15, 2.99)
40+	4.43 (3.48, 5.65)	4.40 (3.29, 5.88)
Race/ethnicity		
Non-Latina white (ref)	1.00	1.00
Latina	1.92 (1.74, 2.11)	1.80 (1.61, 2.01)
Non-Latina Black	1.20 (1.11, 1.29)	1.05 (0.97, 1.15)
Other	1.22 (1.10, 1.36)	1.25 (1.10, 1.42)
Education		
Less than high school	1.35 (1.24, 1.47)	1.25 (1.13, 1.38)
High school (ref)	1.00	1.00
Some college	0.93 (0.86, 1.01)	0.90 (0.82, 0.99)
College graduate	0.76 (0.68, 0.85)	0.98 (0.85, 1.13)
Married		
No (ref)	1.00	1.00
Yes	0.81 (0.75, 0.88)	0.96 (0.88, 1.05)
Delivery paid by Medicaid		
No (ref)	1.00	1.00
Yes	1.11 (1.03, 1.20)	1.00 (0.92, 1.09)
Parous		
No (ref)	1.00	1.00
Yes	0.54 (0.50, 0.58)	0.46 (0.42, 0.50)

Note: [a] The sensitivity analysis sample excludes women who endorsed the option "I didn't mind if I got pregnant" as a reason for not using contraception at the time of conception.

Demographic predictors of low PS are somewhat different after excluding women who said that they "didn't mind" if they became pregnant (Table 3, sensitivity analysis sample column). For example, the overall relationship between age and perceptions of low susceptibility becomes more pronounced, whereby the 95% confidence intervals for odds ratios among women under 20 all fall below 1.0. Moreover, we no longer observe differences in the odds of low PS between non-Latina white and Black women at $p<0.05$; Latina women and women in the other category, though, continue to have higher odds of low PS compared with their non-Latina white counterparts. Education also becomes less protective of having low PS.

Figure 2 shows that in the main sample, women who had a low PS to pregnancy had lower odds of early pregnancy recognition (adjOR = 0.88; 95% CI: 0.82, 0.94), earlier initiation of prenatal care (adjOR = 0.86; 95% CI: 0.79, 0.94), and were less likely than their non-low-PS peers to have both early pregnancy recognition and prenatal care initiation (adjOR = 0.87; 95% CI: 0.81, 0.93). In our sensitivity analysis sample, all estimates were somewhat attenuated and the 95% confidence interval for early initiation of prenatal care included 1.0 (adjOR = 0.92; 95% CI: 0.84, 1.01). The adjusted odds ratio for early pregnancy recognition was 0.91 (95% CI: 0.84, 0.98), and the adjusted odds ratio for both early pregnancy recognition and prenatal care initiation was 0.89 (95% CI: 0.83, 0.97).

Figure 2: **Odds ratios and 95% confidence intervals assessing associations between low perceived susceptibility, early pregnancy recognition, and early prenatal care initiation among the main sample and sensitivity analysis sample**

Notes: Early pregnancy recognition is defined as less than 7 weeks gestation. Early prenatal care initiation is defined as a first visit that occurs in the first trimester (i.e., up to 14 weeks gestation). Regressions control for all sociodemographic characteristics. The sensitivity analysis sample excludes women who endorsed the option "I didn't mind if I got pregnant" as a reason for not using contraception at the time of conception.

4. Discussion

In our study of women with unintended births across the United States, we find that the most common reason for not using contraceptives at the time of the index pregnancy was low perceived susceptibility to pregnancy. We also describe important demographic variation among those citing low PS, which has not been examined thoroughly in the literature.

We build on prior research examining the consequences of unintended pregnancy on maternal and child health by showing that even among women with unintended births, those who did not think they were at risk of pregnancy had lower odds of early pregnancy recognition and prenatal care initiation than those who did not have low PS. Our findings therefore suggest that the potential impacts of addressing low PS as a barrier to

contraceptive use may affect not just who gets pregnant but also how those pregnancies fare with respect to when they are recognized and when prenatal care begins.

Although we did not examine pregnancies that result in abortion, late pregnancy recognition also affects who has access to abortion and under what conditions and who does not. Terminating a pregnancy becomes more difficult at later gestational ages due to legal gestational age limits, increased cost, and fewer available providers (Foster 2020). For some, late pregnancy recognition may make these obstacles more difficult to overcome; for others, it may make them impossible to surmount, and they will have an unintended birth. Future research should therefore integrate measures of low PS to understand the full range of fertility-related experiences.

4.1 Sensitivity analysis

We find that the relationship between low PS and prenatal behaviors is somewhat attenuated when we limit our sample to pregnancies that are likely less acceptable (i.e., excluding "didn't mind" responses). It should be noted, however, that women in the sensitivity analysis sample (vs. the main sample) were more likely to have a delivery paid by Medicaid, were more likely to be unmarried, and were less likely to have a college degree – all factors that have been shown in prior research to increase the risk of late pregnancy recognition and initiation of prenatal care (Ayoola et al. 2010; Ayoola 2015). Our sensitivity analysis therefore likely offers a more conservative test of the hypothesis that low PS is independently associated with the timing of pregnancy recognition and prenatal care initiation.

4.2 Limitations

This study has some limitations. First and foremost, we are missing the approximately 42% of unintended pregnancies in the United States that result in abortion (Finer and Zolna 2016), as well as unintended pregnancies that occur due to contraceptive failure. Second, we did not examine open-ended responses that women could provide if they endorsed "other" as the reason for not using contraception (17% of women in our sample), even though some women may have provided answers that could be classified as low PS.

Last, the available measures in PRAMS preclude an in-depth examination of the origins of pregnancy susceptibility. We instead rely on a constructed measure of low PS that combines two possible response options: (1) the respondent thought she could not get pregnant at the time of conception (30.9%); and (2) the respondent felt that she or her

partner was sterile (8.4%). We did not separately analyze these response categories because there was substantial overlap between the two options (e.g., 46% of women who cited perceived sterility as a reason also stated that they thought they could not get pregnant at the time of conception). Furthermore, lay interpretations of the term 'sterility' may not adequately capture the spectrum of beliefs about one's biological ability to become pregnant or carry a pregnancy to term (Greil, McQuillan, and Slauson-Blevins 2011).

5. Conclusion

Surprisingly little research has paid specific attention to describe and understand low perceived susceptibility to pregnancy (notable exceptions come from Frohwirth, Moore, and Maniaci 2013, Polis and Zabin 2012, and Gemmill, Sedlander, and Bornstein 2020). These beliefs are a common barrier to contraceptive use and have meaningful sociodemographic variation. Low PS may distally determine maternal behaviors among those with unintended births, which may similarly extend to women seeking abortion care. These descriptive findings should therefore stimulate more in-depth research to unearth the meaning and source of these beliefs as well as their consequences across the life course.

6. Acknowledgements

References

Aiken, A.R.A., Borrero, S., Callegari, L.S., and Dehlendorf, C. (2016). Rethinking the pregnancy planning paradigm: Unintended conceptions or unrepresentative concepts? *Perspectives on Sexual and Reproductive Health* 48(3): 147–151. doi:10.1363/48e10316.

Ayoola, A.B. (2015). Late recognition of unintended pregnancies. *Public Health Nursing* 32(5): 462–470. doi:10.1111/phn.12182.

Ayoola, A.B., Nettleman, M.D., Stommel, M., and Canady, R.B. (2010). Time of pregnancy recognition and prenatal care use: A population-based study in the United States. *Birth* 37(1): 37–43. doi:10.1111/j.1523-536X.2009.00376.x.

Biggs, M.A., Karasek, D., and Foster, D.G. (2012). Unprotected intercourse among women wanting to avoid pregnancy: Attitudes, behaviors, and beliefs. *Women's Health Issues* 22(3): e311–e318. doi:10.1016/j.whi.2012.03.003.

Borrero, S., Nikolajski, C., Steinberg, J.R., Freedman, L., Akers, A.Y., Ibrahim, S., and Schwarz, E.B. (2015). 'It just happens': A qualitative study exploring low-income women's perspectives on pregnancy intention and planning. *Contraception* 91(2): 150–156. doi:10.1016/j.contraception.2014.09.014.

Finer, L.B., and Zolna, M.R. (2016). Declines in unintended pregnancy in the United States, 2008–2011. *New England Journal of Medicine* 374(9): 843–852. doi:10.1056/NEJMsa1506575.

Foster, D.G. (2020). *The Turnaway Study: Ten years, a thousand women, and the consequences of having – or being denied – an abortion.* New York: Scribner.

Frohwirth, L., Moore, A.M., and Maniaci, R. (2013). Perceptions of susceptibility to pregnancy among U.S. women obtaining abortions. *Social Science and Medicine* 99: 18–26. doi:10.1016/j.socscimed.2013.10.010.

Gemmill, A. (2018). Perceived subfecundity and contraceptive use among young adult US women. *Perspectives on Sexual and Reproductive Health* 50(3): 119–127. doi:10.1363/psrh.12072.

Gemmill, A., Sedlander, E., and Bornstein, M. (2020). Variation in self-perceived fecundity among young adult US women. *Women's Health Issues* 31(1): 31–39. doi:10.1016/j.whi.2020.07.002.

Greil, A., McQuillan, J., and Slauson-Blevins, K. (2011). The social construction of infertility. *Sociology Compass* 5(8): 736–746. doi:10.1111/j.1751-9020.2011.00397.x.

Kost, K. and Lindberg, L. (2015). Pregnancy intentions, maternal behaviors, and infant health: Investigating relationships with new measures and propensity score analysis. *Demography* 52(1): 83–111. doi:10.1007/s13524-014-0359-9.

Kost, K. and Zolna, M. (2019). Challenging unintended pregnancy as an indicator of reproductive autonomy: A response. *Contraception* 100(1): 5–9. doi:10.1016/j.contraception.2019.04.010.

Kost, K., Maddow-Zimet, I., and Kochhar, S. (2018). *Pregnancy Desires and Pregnancies at the State Level: Estimates for 2014.* New York: Guttmacher Institute. doi:10.1363/2018.30238.

Maddow-Zimet, I. and Kost, K. (2020). Effect of changes in response options on reported pregnancy intentions: A natural experiment in the United States. *Public Health Reports* 135(3): 354–363. doi:10.1177/0033354920914344.

Mosher, W., Jones, J., and Abma, J. (2015). Nonuse of contraception among women at risk of unintended pregnancy in the United States. *Contraception* 92(2): 170–176. doi:10.1016/j.contraception.2015.05.004.

Mosher, W.D., Jones, J., and Abma, J.C. (2012). Intended and unintended births in the United States: 1982–2010. (National health statistics reports 55). Hyattsville, MD: National Center for Health Statistics.

Nettleman, M.D., Chung, H., Brewer, J., Ayoola, A., and Reed, P.L. (2007). Reasons for unprotected intercourse: analysis of the PRAMS survey. *Contraception* 75(5): 361–366. doi:10.1016/j.contraception.2007.01.011.

Polis, C.B. and Zabin, L.S. (2012). Missed conceptions or misconceptions: perceived infertility among unmarried young adults in the United States. *Perspectives on Sexual and Reproductive Health* 44(1): 30–38. doi:10.1363/4403012.

Potter, J.E., Stevenson, A.J., Coleman-Minahan, K., Hopkins, K., White, K., Baum, S.E., and Grossman, D. (2019). Challenging unintended pregnancy as an indicator of reproductive autonomy. *Contraception* 100(1): 1–4. doi:10.1016/j.contraception.2019.02.005.

Reed, J., England, P., Littlejohn, K., Bass, B.C., and Caudillo, M.L. (2014). Consistent and inconsistent contraception among young women: Insights from qualitative interviews. *Family Relations* 63(2): 244–258. doi:10.1111/fare.12058.

StataCorp (2015). Stata Statistical Software: Release 14. College Station: StataCorp LP.

US Department of Health and Human Services (2016). Healthy People 2020 topics and objectives [electronic resource]. Washington: U.S. Department of Health and Human Services. https://www.healthypeople.gov/2020/topics-objectives/topic/family-planning.

Woodsong, C., Shedlin, M., and Koo, H. (2004). The 'natural' body, God and contraceptive use in the southeastern United States. *Culture, Health and Sexuality* 6(1): 61–78. doi:10.1080/13691050310001611165.