State Prescription Contraception Insurance Mandates: Effects on Unintended Births

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Objective. To test the effects of state prescription contraception insurance mandates on unintended, mistimed, and unwanted births in a sample of privately insured recent mothers.

Data. We pooled Pregnancy Risk Assessment Monitoring System (PRAMS) data from 1997 to 2012 to study 209,964 privately insured recent mothers in 24 states, 11 of which implemented prescription contraception coverage mandates between 2000 and 2008.

Study Design. Individual-level difference-in-differences models compare the probability of unintended birth among privately insured recent mothers in state-years with mandates to those in state-years without mandates. Additional models use aggregate data to estimate the effect of mandates on states' number of unintended births.

Principal Findings. State mandates are associated with decreased probability of unintended birth (1.58 percentage points) among privately insured women in the second year of implementation, driven by decreased probability of mistimed birth (1.37 percentage points or 614 births per state-year) in the second year of implementation. We find no effects in the first year of implementation or on the probability of unwanted birth. Unexpectedly, recent mothers without private insurance experienced declines in unintended birth, but among unwanted, rather than mistimed, births.

Conclusions. State prescription contraception insurance mandates are associated with reduced probability of unintended and mistimed births among privately insured women.

Key Words. Health policy/politics/law/regulation, state health policies, maternal and perinatal care and outcomes

Nearly half of all pregnancies in the United States are unintended, occurring primarily among women who do not use contraception (54 percent) and women who use contraception inconsistently or incorrectly (41 percent) (Finer and Zolna 2011, 2016; Guttmacher Institute 2015c). Births resulting from unintended pregnancy are associated with a range of negative outcomes such

as delayed prenatal care and increased risk of poor child health outcomes (Brown and Eisenberg 1995; Gipson, Koenig, and Hindin 2008; Cheng et al. 2009; Mosher, Jones, and Abma 2012; Sonfield et al. 2013). Preventing unintended births is associated with broader health, social, and economic benefits for women and their families (Sonfield et al. 2013).

The Affordable Care Act (ACA) has the potential to decrease rates of unintended pregnancy in the United States by increasing women's access to no-cost prescription contraceptives. Beginning in August 2012, the law required health insurance plans to cover women's preventive health services without cost sharing, including all FDA-approved contraceptive methods and contraceptive counseling (Federal Register 2013; Health Resources and Services Administration 2015). Early evidence indicates that the mandate has reduced out-of-pocket costs, increased use of prescription contraception, and increased continuity of oral contraceptive use among privately insured women (Finer, Sonfield, and Jones 2014; Becker and Polsky 2015; Sonfield et al. 2015; Carlin, Fertig, and Dowd 2016; Pace, Dusetzina, and Keating 2016).

The extent to which the ACA mandate may reduce unintended births is uncertain, however, as removing financial barriers may not guarantee full access to prescription contraceptives. Women who remain uninsured or employed by religious employers exempt from the requirement will not gain access to no-cost contraceptives through the mandate. Among women affected by the mandate, nonfinancial barriers to consistent use of effective contraceptive methods may remain. Understanding the effects of prior contraception mandates at the state level can inform expectations regarding both the effect of the new ACA contraceptive coverage mandate on unintended births and the effect of removing or weakening the mandate.

Before the ACA, 28 states implemented mandates requiring insurers that covered prescription drugs to also cover the full range of FDA-approved contraceptive drugs and devices (Guttmacher Institute 2015b). While less comprehensive than the ACA mandate, which both mandates coverage and eliminates cost sharing, these state mandates were designed to increase access to prescription contraceptives for privately insured women (Atkins and Bradford 2014). Prior studies have found that state mandates increased the coverage of prescription contraceptives for privately insured women, increased

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women's use of prescription contraceptives, decreased abortion rates, and decreased birth rates for certain groups (Sonfield et al. 2004; Magnusson et al. 2012; Atkins and Bradford 2014; Raissian and Lopoo 2014; Mulligan 2015; Dills and Grecu 2017). No studies, however, have analyzed the effects of state contraception coverage mandates on unintended pregnancy or unintended birth.

We use data from a mixed panel of states participating in the Pregnancy Risk Assessment Monitoring System (PRAMS) 1997–2012 and variation in the year of implementation of state prescription contraception insurance mandates (2000–2008) to implement a quasi-experimental design and test the effects of these state mandates on unintended and mistimed births in a sample of privately insured recent mothers.

BACKGROUND

State Prescription Contraception Insurance Mandates

Maryland enacted the first state prescription contraception insurance mandate in 1998; 27 additional states implemented mandates (hereafter referred to as *state mandates*) in subsequent years (Dailard 2004; Mulligan 2015). State mandates arose after the failure of a similar mandate at the federal level and gained support following the FDA's approval of Viagra (sildenafil) and its subsequent coverage by many health insurance plans, which highlighted gender disparities in prescription coverage (Dailard 2004). State mandates require all fully insured (not self-funded) health plans that cover prescription drugs to also cover the full range of FDA-approved contraceptive methods (Guttmacher Institute 2015b). The effectiveness of state mandates may be limited by exemptions of self-insuring firms from state insurance regulations, religious belief exemptions, existing nonmandated coverage of contraceptives by insurance plans, and high cost-sharing for newly covered contraceptives (Mulligan 2015).

Prior studies found that state mandates accounted for 30 percent of the increase in health insurance coverage of oral contraceptives between 1993 and 2002 (Sonfield et al. 2004). Mulligan (2015) found that state mandates increased the likelihood of contraception use among all women by 2.1 percentage points and the use of hormonal birth control by 1.8 percentage points, while decreasing state abortion rates by about 3 percent. Dills and Grecu (2017) found that state mandates had no effect on overall birth rates, but decreased the birth rate among Hispanic teens by 4 percent. Because these

studies included all women ages 18–44, regardless of insurance coverage, they likely underestimate the effect of mandates on privately insured women exposed to the mandate.

Atkins and Bradford (2014) limited their sample to insured women (including both private and public coverage) and found that mandates in Delaware and Iowa increased the likelihood of using any effective contraceptive method by 5 percent. Magnusson et al. (2012) found that privately insured women in states with a comprehensive mandate had 64 percent higher odds of consistent contraceptive use compared to those in nonmandate states. Raisian and Lopoo (2014) did not find an overall effect of state mandates on contraception use but found an increase in use among women of low-educational attainment. While prior studies have investigated birth and abortion rates, they have not measured intendedness (Mulligan 2015; Dills and Greco 2017).

We build on this literature by extending analysis of the effects of state prescription contraception insurance mandates to measure the effect of mandates on the probability and number of unintended births.

Conceptual Framework

Our analysis is guided by the Andersen & Aday behavioral model on access to health care, which asserts that use of health services is influenced by individuals' predisposing characteristics, enabling characteristics, and need (Andersen and Aday 1978; Andersen 1995). By requiring private insurance plans to cover prescription contraceptives, we expect mandates to lower out-of-pocket costs, thereby reducing women's financial barriers and increasing women's overall access to prescription contraceptives. Despite reductions in financial barriers to prescription contraceptive use, nonfinancial barriers may remain, such as fear of side effects, difficulty with method use, and barriers to provider access (Foster et al. 2004; Dennis et al. 2012). Therefore, we expect that state mandates will reduce, but not eliminate, the probability that women experience problems getting prescription contraceptives and, hence, the effect on unintended births may be limited.

By increasing access, we expect consistent use of prescription contraceptives to increase among women exposed to a mandate who do not want to become pregnant. This hypothesis is supported by evidence that low-cost and no-cost contraceptive access leads to increased contraceptive use and lower rates of pregnancy, birth, and abortion (Postlethwaite et al. 2007; Gariepy et al. 2011; Secura et al. 2014). We expect increased use of prescription contraceptives to reduce rates of unintended pregnancy and, ultimately,

unintended birth. When used correctly, contraceptives are effective at preventing pregnancy; an estimated 12 million pregnancies are averted annually by consistent contraceptive use (Trussell 2007; Guttmacher Institute 2015a; Sundaram et al. 2017).

We hypothesize that the effect of mandates on women's probability of unintended birth will be moderated by individual characteristics, such as income, preferences, and potential ambivalence toward pregnancy. We expect to observe the largest decreases in the probability of the subset of unintended births classified as mistimed (occurred sooner than desired), rather than unwanted (occurred when no children were desired), as women who do not desire any additional children may be more motivated than those planning for a future child to take action to prevent a birth, and therefore less sensitive to costs and more likely to choose abortion if they become pregnant.

Once pregnant, unintended births may be averted through abortion. If increased access to prescription contraceptives decreases unintended pregnancy, it may decrease abortion rates either in addition to, or instead of, decreasing unintended births. The extent to which abortion rates are affected will depend on factors such as access to abortion services and women's preferences. Changes in abortion rates attributable to access may also affect the probability of unintended birth, independent from effects of state contraception mandates.

Finally, effects of state mandates may not appear during the first year of implementation. If mandates apply only to newly issued or renewed plans, for example, it may take up to a year following implementation for a woman's plan to comply. Once prescription contraceptives are covered, the process of visiting a doctor, filling a prescription, and using prescription contraceptives effectively may take additional time. Therefore, we expect that any effects of state mandates may lag, occurring in the second or third year following implementation.

DATA

Pregnancy Risk Assessment Monitoring System

Pregnancy Risk Assessment Monitoring System is a mixed-mode, population-based, state-specific surveillance system of selected maternal behaviors and experiences during pregnancy and following childbirth (Gilbert et al. 1999). PRAMS data provide a unique sample of state-identified

pregnancies ending in live births, key variables of maternal attitudes and experiences before and during pregnancy, and infant health outcomes. Women are sampled through identification using state birth-certificate files so as to be representative of births in the state (Gilbert et al. 1999; Shulman, Gilbert, and Lansky 2006). PRAMS data are only available to researchers for state-years that achieve a survey response rate of 70 percent for years 2006 and earlier, and a response rate of 65 percent for years 2007 and later (Centers for Disease Control and Prevention 2016). Currently, 39 states, the District of Columbia, and New York City participate in PRAMS, representing approximately 78 percent of all U.S. live births (Centers for Disease Control and Prevention 2016).

Pregnancy Risk Assessment Monitoring System is well suited for analysis of pregnancy outcomes because it collects annual, state-level data on maternal and child health, including intendedness of birth (Mosher, Jones, and Abma 2012). Importantly, it also measures women's health insurance status 3 months prior to pregnancy. This allows for the measurement of intendedness of birth specifically for recent mothers who were privately insured at the time of conception in each state-year in the sample.

State Prescription Contraception Insurance Mandates

State prescription contraceptive coverage mandates are defined as state regulations requiring that insurers cover FDA-approved contraceptive methods if any other prescription drugs are covered. State mandates and their timing (Table 1) were identified through a review of reports from the Guttmacher Institute, the National Conference of State Legislators, the Center for Reproductive Rights, and prior studies (Center for Reproductive Rights 2006; National Conference of State Legislators 2012; Raissian and Lopoo 2014; Guttmacher Institute 2015b; Mulligan 2015; Dills and Greco 2017).

We pool state-years of PRAMS data, including states based on the presence (or absence) of a state mandate and the years of available data, resulting in an unbalanced panel of 277 state-years. The study sample includes 11 treatment states that implemented mandates between 2000 and 2008 and 13 control states that never implemented mandates. The remaining 26 states and the District of Columbia are excluded either because they do not participate in PRAMS or are missing PRAMS data surrounding the year of mandate implementation (Table S1).

Table 1: Timing of State Prescription Contraception Insurance Mandates (1997–2012) and Classification of Study States

Treatment States	Date of Mandate Implementation	Premandate Conception Period	Postmandate Conception Period	Control States	Conception Period
Arkansas	August 12, 2005	1997–July 2005	August 2005–2012	Alabama	1997–2003
Illinois	January 1, 2004	1997–2003	2004–2010	Alaska	1997–2010
Maine	March 1, 2000	1997–February 2000	March 2000–2012	Florida	1997–2005
Michigan	April 20, 2006	2000–April 2006	May 2006–2012	Louisiana	1997–2004
New Jersey	July 3, 2006	2001–June 2006	July 2006–2012	Minnesota	2001–2012
New Mexico	July 1, 2001	1997–June 2001	July 2001–2005	Nebraska	1999–2012
New York	January 1, 2003	1997–2002	2003–2008	Ohio	1998–2010
North Carolina	January 1, 2000	1997–1999	2000–2005	Oklahoma	1997–2012
Oregon	January 1, 2008	2002–2007	2008–2012	Pennsylvania	2006–2012
Washington	October 6, 2001	1997–September 2001	October 2001–2012	South Carolina	1997–2007
West Virginia	July 8, 2005	1997–June 2005	July 2005–2011	Tennessee	2007–2009
				Utah	1998–2012
				Wyoming	2006–2011

Source: Authors’ analysis of state prescription contraception insurance mandate implementation dates and availability of Pregnancy Risk Assessment Monitoring System (PRAMS) data.

ANALYTIC STRATEGY

Individual-Level Models

Our individual-level analysis models use a quasi-experimental study design that exploits variation in the year of implementation of state mandates using a two-way fixed-effect method. We conduct logistic regression analysis of pooled PRAMS data using a dummy variable indicating the presence or absence of a state mandate for each state-month-year based on the month and year of mandate implementation and the estimated month and year of conception. Timing of conception is identified using child's date of birth and gestational age. The mandate indicator is specific to the conception-month of each birth and captures mandates implemented mid-year. These models compare the treatment group of privately insured recent mothers who conceived in state-month-years with mandates to privately insured recent mothers who conceived in state-month-years without mandates. All models include state and year fixed effects, robust standard errors clustered at the state level, and PRAMS survey weights. Marginal effects were estimated using the "margins, dydx" command in *Stata 14*. The model specification is presented below:

$$P(Y)_{ist} = \beta_0 + \beta_1 \text{Mandate}_{st} + \beta_2 X_{ist} + \beta_3 Z_{st} + U_s + T_t + \epsilon$$

where $P(Y)_{ist}$ is the probability of an unintended birth for a mother i in state s during conception-month-year t ; Mandate_{st} is a dummy variable indicating the presence of a mandate in state s during conception-month-year t ; X_{ist} is a vector of individual characteristics for a mother i in state s who conceived during conception-month-year t ; Z_{st} is a vector of state characteristics for state s during conception-year t ; U_s is a state fixed effect; T_t is a conception-year fixed effect; and ϵ is an unobserved error term.

The primary analytic sample is limited to women who were privately insured prior to pregnancy because mandates apply specifically to private plans. Identification of mothers with private health insurance in PRAMS is based on the individuals' reported insurance 3 months prior to pregnancy. We use the hierarchy defined by Gavin et al. (2007) when more than one source of insurance is reported. The resulting unweighted sample includes 209,964 births to privately insured women.

Alternative Specifications

We also conduct state-level analysis to provide a policy-relevant estimate of the number of unintended births averted by state mandates. This analysis uses

the same quasi-experimental study design described above. Whereas individual-level analysis estimated the effects of mandates on the probability of a women having an unintended birth, this state-level analysis estimates the effect of mandates on the number of unintended births in a state-year, controlling for the total number of births. The study sample is limited to privately insured women and includes 277 state-years.

To test for a delayed effect of mandate implementation on birth outcomes, we estimate the above models separately using dummy variables indicating (1) the year of implementation ($Mandate_{st}$); (2) the second year of implementation ($Mandate_{st+1}$); and (3) the third year of implementation ($Mandate_{st+2}$). We also estimate the models described above on a sample of non privately insured women (including both publicly insured and uninsured women) as a falsification test, with the expectation that state mandates will have no effect on women who are not privately insured.

Measures

Unintended Birth. We measure unintended birth, mistimed birth, and unwanted birth using constructed dichotomous measures that account for changes in PRAMS questionnaires over time. For all years, women are asked the question, *Thinking back to just before you got pregnant with your new baby, how did you feel about becoming pregnant?* We classify births as intended if a mother answered either that she (1) wanted to be pregnant then or (2) wanted to be pregnant sooner. If a mother (3) wanted to be pregnant later, the birth is classified as mistimed. If a mother (4) did not want to be pregnant then or at any time in the future, the birth is classified as unwanted. Both mistimed and unwanted births are classified as unintended.

Beginning in 2012, a fifth answer was added to the questionnaire: (5) I wasn't sure what I wanted. If the mother said she was not sure what she wanted, the birth is classified based on her answer to a second question: *When you got pregnant with your new baby, were you trying to get pregnant?* Births about which mothers were not sure how they felt but were *not* trying to get pregnant are classified as unintended. Births about which mothers were not sure how they felt but *were* trying to get pregnant are classified as not-unintended. Because of maternal uncertainty, these 504 births (less than 0.5 percent of the full sample) are not classified as either mistimed or unwanted.

Covariates. All models adjust for maternal characteristics that may impact the effect of a state mandate on the probability of unintended birth: age, education, race, ethnicity, marital status, number of prior live births, history of

abortion, urban/rural residence, and indicators for whether a mother smoked or drank alcohol 3 months before her pregnancy. Models also include state-level measures of the percentage of private-sector insured individuals that are enrolled in self-insured plans at establishments that offer health insurance from the Medical Expenditure Panel Survey Insurance Component (MEPS-IC)(Medical Expenditure Panel Survey 2016). To control for access to abortion services, models include the number of abortion providers per 1,000 women of reproductive age (15–44), constructed using data from the Guttmacher Institute Abortion Provider Census and the Current Population Survey (CPS) (U.S. Census Bureau 2006; Guttmacher Institute 2017a). Finally, models include four key health policies that may affect women’s access to prescription contraception preconception and that change over time: presence of a Medicaid family planning waiver, Medicaid coverage for childless adults above 100 percent of the federal poverty level (FPL), Medicaid/CHIP income eligibility thresholds for adolescents (% FPL), and Medicaid/CHIP income eligibility thresholds for parents (% FPL). These measures were constructed from review of reports by the National Governor’s Association, the Kaiser Family Foundation, the Guttmacher Institute, and state waivers (Guttmacher Institute 2017; Kaiser Family Foundation 2017; National Governors Association 2017).

State-level analyses include state-year means of the individual-level measures described above, the same state-level measures, and an indicator for the total number of births in each state-year. All aggregate measures are limited to the analytic sample of privately insured (or not privately insured) women.

Results

From 1997 to 2012, approximately 30 percent of births to privately insured women exposed to a mandate were unintended, compared to 32.7 percent among privately insured women not exposed to a mandate (Table 2). Among all privately insured women, mistimed births are more common than unwanted births (23.0–24.9 percent versus 6.6–7.5 percent). Both privately insured and not privately insured women exposed to mandates were more likely to reside in states with generous public coverage for family planning services, as indicated by the presence of family planning waivers and Medicaid coverage for childless adults, as well as higher income eligibility levels for Medicaid, than women not exposed to mandates. Compared to privately insured women, more births among not privately insured women are

Table 2: Characteristics of Recent Mothers, by State Mandate Sample, 1997–2012

	<i>Privately Insured</i>		<i>Not Privately Insured</i>	
	<i>Mandate</i>	<i>No Mandate</i>	<i>Mandate</i>	<i>No Mandate</i>
Unweighted <i>N</i>	51,419	158,545	41,984	115,437
Weighted <i>N</i>	2,812,442	7,524,801	1,894,972	4,384,074
<i>Birth characteristics</i>				
Unintended (%)	30.0	32.7	55.1	59.1
Mistimed (%)	23.0	24.9	41.6	43.5
Unwanted (%)	6.6	7.5	12.8	15.2
<i>Maternal characteristics</i>				
<i>Age (%)</i>				
Under 20	5.3	6.4	15.0	17.7
20–24	13.2	16.8	36.1	39.4
25–29	29.1	30.9	27.3	24.1
30–34	32.4	29.8	13.8	12.3
35 and over	20.0	16.0	7.8	6.5
<i>Education (%)</i>				
No high school	1.8	1.2	9.8	8.5
Some high school	5.2	6.3	24.3	26.2
High school graduate	19.1	24.8	37.6	40.6
Some college	26.2	27.3	21.7	19.2
College degree or more	47.7	40.4	6.7	5.5
<i>Race (%)</i>				
White	80.8	82.8	68.3	67.7
Black	9.2	11.0	18.9	22.9
Other	10.1	6.3	12.8	9.4
Hispanic ethnicity (%)	9.1	7.5	29.6	21.2
Married (%)	80.6	80.5	38.0	39.8
<i>Prior live births (%)</i>				
0	43.9	42.0	38.5	38.9
1	34.4	34.7	30.6	30.3
2	14.7	15.4	17.0	17.3
3 or more	7.0	7.9	13.8	13.5
Abortion history (%)	28.6	26.2	27.4	25.0
Smoked before pregnancy (%)	17.1	18.8	32.6	35.1
Drank before pregnancy (%)	60.6	54.1	41.2	39.8
<i>Place of residence (%)</i>				
Urban	15.4	37.8	12.6	38.4
Rural	7.5	18.6	9.5	21.5
Unknown	77.1	43.6	77.9	40.1
<i>State characteristics</i>				
Self-insured ESI (%)	54.6	51.2	55.8	52.2
Abortion providers per 1,000 WRA	0.03	0.02	0.03	0.02
Family planning waiver (%)	61.4	22.3	60.9	25.9

Continued

Table 2 Continued

	Privately Insured		Not Privately Insured	
	Mandate	No Mandate	Mandate	No Mandate
Adult Medicaid waiver (%)	41.7	17.7	39.3	16.3
Adolescent Medicaid eligibility (% FPL)	242.3	208.7	235.2	203.1
Parent Medicaid eligibility (% FPL)	175.4	112.8	179.3	104.1

Notes: Percentages may not sum to 100 due to rounding. ESI is employer-sponsored insurance. WRA is women of reproductive age and is defined as ages 15–44.
Source: Authors’ analysis of Pregnancy Risk Assessment Monitoring System (PRAMS) data.

unintended, and twice as many are unwanted. Table S2 reports descriptive statistics for the aggregated characteristics used in state-level analysis.

We find no effect of state prescription contraception insurance mandates on the probability of unintended, mistimed, or unwanted births in their year of implementation. Among privately insured women, mandates are associated with a 1.58 percentage-point decrease ($p < .01$) in the probability that a mother’s recent birth was unintended in the second year of implementation and a 1.24 percentage-point decrease ($p < .05$) in the third year of implementation (Table 3). Mandates are associated with decreased probability of mistimed birth by 1.37 and 1.29 percentage points ($p < .01$) in the second and third years of implementation, respectively, but had no effect on unwanted births.

Among our falsification sample of not privately insured women, mandates are associated with a 1.57 percentage-point decrease in the probability of unintended birth in the year of implementation and a 1.97 percentage-point decrease in the second year of implementation ($p < .05$). Mandates are associated with decreased probability of unwanted birth by 1.21 ($p < .05$) and 0.15 ($p < .10$) percentages points in the first and second years of implementation, respectively, but had no effect on mistimed births.

At the state level, mandates had no significant effect on the number of unintended births among privately insured women but are associated with a decrease of 614 mistimed births in the second year of implementation ($p < .10$) (Table 4). Among not privately insured women, mandates are associated with a 689 birth decrease in the number of unintended births in the first year of implementation and a 590 birth decrease in the second year ($p < .05$). Mandates are associated with the prevention of 405 unwanted births in the first year of implementation ($p < .10$).

Table 3: Marginal Effects of State Prescription Contraception Insurance Mandates on the Probability of Unintended, Mistimed, and Unwanted Births, with Mandate Implementation Lags, 1997–2012

	Implementation Year	Second Year of Implementation	Third Year of Implementation
Privately insured			
Unintended birth	–0.0085 (–0.0201, 0.0030)	–0.0158*** (–0.0252, –0.0064)	–0.0124** (–0.0235, –0.0013)
Mistimed birth	–0.0064 (–0.0164, 0.0036)	–0.0137*** (–0.0219, –0.0055)	–0.0129** (–0.0236, –0.0021)
Unwanted birth	–0.0009 (–0.0045, 0.0026)	–0.0005 (–0.0036, 0.0025)	0.0017 (–0.0013, 0.0048)
Not privately insured			
Unintended birth	–0.0157** (–0.0303, –0.0011)	–0.0197** (–0.0329, –0.0065)	–0.0035 (–0.0166, 0.0097)
Mistimed birth	–0.0030 (–0.0214, 0.0154)	–0.0079 (–0.0255, 0.0096)	0.0092 (–0.0192, 0.0211)
Unwanted birth	–0.0121** (–0.0241, –0.0002)	–0.0015* (–0.0236, 0.0006)	–0.00035 (–0.0179, 0.0010)

Notes: * $p < .10$ ** $p < .05$ *** $p < .01$ when standard errors are clustered at the state level; 95% confidence intervals reported in parentheses. Logistic regression models adjust for age, education, race, ethnicity, marital status, prior births, abortion history, smoking before pregnancy, drinking before pregnancy, urban/rural residence and the following state-level measures: rate of enrollment in self-insured plans, number of abortion providers per 1,000 women of reproductive age, presence of a Medicaid family planning waiver, presence of a Medicaid waiver to expand coverage to childless adults, Medicaid/CHIP eligibility level for children, and Medicaid/CHIP eligibility level for parents. All models include state fixed effects and year fixed effects and use PRAMS survey weights. Results are reported as marginal effects. Privately insured women $N = 209,964$; not privately insured women $N = 157,421$. Unadjusted results are reported in Appendix Table 3.

Source: Authors' analysis of Pregnancy Risk Assessment Monitoring System (PRAMS) data.

Table 4: Effects of State Prescription Contraception Insurance Mandates on the Number of Unintended, Mistimed, and Unwanted Births per State, with Mandate Implementation Lags, 1997–2012

	Implementation Year	Second Year of Implementation	Third Year of Implementation
Privately insured			
Unintended births	–487.00 (–1255.74, 281.74)	–662.90 (–1478.58, 152.78)	–482.09 (–1108.09, 143.92)
Mistimed births	–420.99 (–1039.54, 197.54)	–613.85* (–1230.14, 2.45)	–471.75 (–1062.73, 119.22)
Unwanted births	–18.61 (–327.38, 290.17)	–10.07 (–322.49, 302.35)	45.95 (–266.89, 358.79)
Not privately insured			
Unintended births	–688.91** (–1253.99, –123.84)	–590.26** (–1076.32, –104.19)	–98.72 (–614.02, 416.57)
Mistimed births	–274.00 (–608.71, 60.70)	–220.70 (–580.74, 139.34)	–35.99 (–519.72, 447.73)
Unwanted births	–404.74* (–833.03, 23.56)	–323.68 (–725.18, 77.82)	14.71 (–288.83, 318.26)

Source: Authors’ analysis of Pregnancy Risk Assessment Monitoring System (PRAMS) data.
Notes: * $p < .10$ ** $p < .05$ when standard errors are clustered at the state level; 95% confidence intervals reported in parentheses. Linear regression models adjust for state-aggregated measures of age, education, race, ethnicity, marital status, prior births, abortion history, smoking before pregnancy, drinking before pregnancy, urban/rural residence and the following state-level measures: rate of enrollment in self-insured plans, number of abortion providers per 1,000 women of reproductive age, presence of a Medicaid family planning waiver, presence of a Medicaid waiver to expand coverage to childless adults, Medicaid/CHIP eligibility level for children, and Medicaid/CHIP eligibility level for parents. All models include state fixed effects and year fixed effects and use PRAMS survey weights. $N = 277$ state-years. Unadjusted results are reported in Table S4.

Sensitivity Analysis

We estimate an event study model to test for pretrends that may have contributed to both the rate of unintended births and state decisions to implement mandates. Building from our individual-level model, the event study replaces the single dummy variable indicating the presence of a mandate in a state-month-year with a series of interaction terms between an indicator of *ever* implementing a mandate and a series of indicators for the year relative to mandate implementation. The year prior to mandate implementation is omitted as the reference year; the coefficient on each interaction term can be interpreted as the percentage-point change relative to the year prior to mandate implementation.

Our event study specification indicates a clear declining trend in the probability of unintended birth beginning in the year of mandate implementation and continuing through 5 or more years following implementation (Figure 1). This visual test does not suggest the presence of pretrends, and the estimates for pre-implementation years are not statistically significant individually or when tested jointly (Table S5).

We further test for heterogeneity in effects across states by estimating state-specific versions of our individual-level model. The sample for each state-specific model is limited to the state of interest and the control states without mandates; the timeframe is limited to a maximum of 5 years before and after mandate implementation. Figure S1 illustrates the variation across states in the unadjusted probability of unintended birth over time. We find similar variation in the effects of mandates across states. For example, while the probability of unintended birth decreased following mandate implementation in most states, it increased in both Arkansas and West Virginia (Table S6). Among states with a significant decline in the probability of unintended birth among private-insured recent mothers, the magnitude of the effect ranged from 1.89 percentage points in Michigan to 5.84 percentage points in New York.

Limitations

Our use of the PRAMS sample of recent mothers limits our analysis to only those pregnancies that resulted in a live birth. The retrospective nature of PRAMS may result in women reporting a different intendedness of their pregnancy after giving birth than how they felt when they first became pregnant (Santelli et al. 2003). PRAMS does not include data on a number of potential

Figure 1: Event Study of the Effect of State Prescription Contraception Insurance Mandates on the Probability of Unintended Birth among Privately Insured Women, 1997–2012

Notes: Bars represent 95% confidence intervals. Linear probability model adjusts for age, education, race, ethnicity, marital status, prior births, abortion history, smoking before pregnancy, drinking before pregnancy, urban/rural residence and the following state-level measures: rate of enrollment in self-insured plans, number of abortion providers per 1,000 women of reproductive age, presence of a Medicaid family planning waiver, presence of a Medicaid waiver to expand coverage to childless adults, Medicaid/CHIP eligibility level for children, and Medicaid/CHIP eligibility level for parents. Model includes state fixed effects and year fixed effects and uses PRAMS survey weights. Model includes states that ever implemented a mandate during the study period: AR, IL, ME, MI, NJ, NM, NY, NC, OR, WA, WV, an unweighted sample of 106,116 births. States are aligned based on the first full year of mandate implementation. Point estimates reflect the percentage-point change in the share of births reported to be unintended, compared to the year immediately prior to mandate implementation. Pretrends are not significant when tested using a joint *F*-test. Full results are presented in Table S5.

Source: Authors' analysis of Pregnancy Risk Assessment Monitoring System (PRAMS) data.

confounding characteristics of women, such as religion, political affiliation, or goals, and aspirations, which may contribute to omitted variable bias. Our constructed measure of women's exposure to a mandate, including imprecision of gestational age and the possibility that women may move across states between conception and delivery, may contribute to measurement error in our estimation. Limiting the sample to privately insured women assumes private insurance coverage is independent of the mandate, but a prior study found no evidence that women switch to private insurance following mandate implementation (Raissian and Lopoo 2014).

Our ability to draw causal inference from our results is weakened by the known limitations of difference-in-differences estimation (Bertrand, Duflo, and Mullainathan 2002; Ryan, Burgess, and Dimick 2015). In particular, our findings rely on the assumption of parallel premandate trends in unintended

birth among women in states with and without mandates. This assumption does not hold true if state decisions to implement mandates were driven by levels or trends in unintended birth. However, we do not find evidence of pre-trends among treated women in our event study specification.

By focusing on births, we are unable to analyze the effect of mandates directly on women's use of prescription contraceptive methods, the pathway through which we expect state mandates to effect unintended birth. We are also unable to analyze the extent to which declines in unintended birth are attributable to declines in unintended pregnancy rather than increases in abortion, important given Mulligan's 2015 finding that state mandates decreased abortion rates. Our results may understate the effect of state mandates on unintended births if access to abortion decreased independent of state mandates during this period in ways not captured by our measure of the number of abortion providers.

Finally, we are unable to capture the actual change in coverage of prescription contraceptives attributable to state mandates. Although we control for the percentage of private-sector insured individuals that are enrolled in self-insured plans at establishments that offer health insurance in each state-year, we cannot capture whether individual women are insured by self-insured plans. But prior studies have found that these plans often offer benefits equal to or greater than those mandated by the states in which they operate (Power and Ralston 1989; Krohm and Grossman 1990; Acs et al. 1996; Jensen, Roychoudhury, and Cherkin 1998b; Jensen et al. 1998a). Non-self-insured plans that operate in both mandate and nonmandate states may similarly choose to offer benefits equal to those mandated in some states in all of their markets. We are unable to measure the extent to which plans covered prescription contraceptives in state-years without mandates or the copayments required for newly covered prescription contraceptives, which may pose significant financial barriers to contraception access. Therefore, these results likely underestimate of the effect of state mandates on women who experienced a reduction in out-of-pocket costs for prescription contraceptives.

Discussion

The 1.58 percentage point decline in unintended births among privately insured women found here to be associated with the implementation of state mandates represents a 4.9 percent decline from the initial 32 percent level of unintended birth among privately insured women. This decline is largely achieved by the 1.37 percentage point decline in the probability of a mistimed

birth, a 5.7 percent decrease from the initial 24.4 percent level, as we did not observe a reduction in unwanted births. We estimate this effect to be associated with a 614 birth reduction in mistimed births, on average, per state. Though small in magnitude, our individual-level findings are robust to a number of specifications and represent a 5 percent decline from initial levels for these women. We therefore conclude that state mandates are associated with measurable reductions in the probability of unintended birth among privately insured women.

Our results for privately insured women can be considered in the context of state Medicaid family planning waivers, which allow states to expand eligibility for reproductive health and family planning services to low-income women who do not otherwise qualify for the Medicaid program. While not fully comparable due to differences in the specific policy intervention and the target population, both policies may reduce unintended births by reducing women's financial barriers to effective contraception. Prior analysis using PRAMS data found that family planning waivers in New York and Illinois reduced the probability of an unwanted birth by 5 percentage points, and a waiver in Oregon reduced the probability of an unintended birth by 12.6 percentage points (Adams, Galactionova, and Kenney 2015). While our finding that state mandates are associated with a 1.58 percentage-point reduction in the probability of unintended birth among privately insured women are much smaller than these estimates, women in our sample were nearly half as likely than those in the comparison study to experience an unintended birth prior to policy implementation (32 percent versus 60 percent). When compared to percent declines from the initial level of unintended birth, we find that state mandates are associated with a 5 percent decrease in unintended birth, compared to an 8 percent decrease for family planning waivers. This effect size is smaller, but still reasonable, given that the target population of privately insured women likely had better pre-intervention access to effective contraception.

Our observed effect on mistimed but not on unwanted birth may be due, in part, to women's specific pregnancy preferences. Women who *never* want to become pregnant are a small percentage of the total and may make different choices about contraception than women who plan to become pregnant in the future. They may be more willing, for example, to pay high out-of-pocket costs for prescription contraceptives, more likely to choose more effective methods such as LARC or sterilization, or more likely to choose abortion if they do become pregnant. Thus, state mandates would be expected to have

a smaller effect on unwanted births than on mistimed birth if these women are less sensitive to cost when making decisions about their reproductive health.

Our finding of reductions in unintended births and unwanted births among not privately insured women is unexpected. Mandates may have had a spillover effect on not privately insured women, particularly if they increased demand for prescription contraceptives to be carried by pharmacies and clinics. Alternatively, the difference in the timing of the effects for the two groups, with large effects observed for not privately insured women in the first year of mandate implementation versus no observed effects for privately insured women until 2 and 3 years into implementation, points to the possibility of different external factors affecting these trends. Not privately insured women may have experienced changes in unintended births during this time period that are attributable to factors not controlled for in this analysis, such as economic and labor market changes attributable to the Great Recession and changes in access to abortion attributable to Targeted Regulation of Abortion Providers (TRAP) laws and increased use of medical and nonhospital abortion (Pazol et al. 2013). Not privately insured women may be more sensitive to such changes due to their generally low-socioeconomic status. Changes in abortion access and use may be particularly relevant to the changes in unwanted, rather than mistimed, births observed for not privately insured women.

During our study period, both the overall abortion rate and the rate of unintended pregnancy were declining, while the percentage of unintended pregnancies ending in abortion was increasing (Pazol et al. 2013; Finer and Zolna 2016; Jatlaoui 2016). But studies of all women of reproductive age may overlook potential changes in the composition of women experiencing unintended pregnancy and abortion, and they may obscure possible increases in abortion among low-income and less educated women, who are also more likely to lack private insurance. Such women may also be disproportionately affected by policies that expand or limit access to abortion. Future research should explicitly study the relationship between abortion rates and unintended births across subgroups of women, and how both are shaped by increased access to contraceptives.

The increased magnitude of effects observed 1 year following mandate implementation is consistent with potential delays in the translation of policy into measurable effects. Insurance coverage of prescription contraceptives may be delayed until the beginning of a new plan year. Women seeking prescription contraception, particularly for the first time, may face nonfinancial barriers to access, including challenges obtaining an appointment or getting to

a clinic, not having a regular doctor, or difficulty accessing a pharmacy (Grindlay and Grossman 2016). Once women access care, the process of shifting from no contraceptive use to consistent use of a prescription method may take months. While this means that there is likely a delay in the point at which a woman is effectively using contraception, it also indicates that such policies may become more effective over time and evaluations should allow for time from implementation to full effect.

This study adds to the body of evidence indicating that reducing financial barriers to contraception is a successful policy tool for reducing the share and number of unintended births in the United States. As the contraception coverage requirement in the ACA is much more comprehensive than those previously implemented by states, it is likely to have a larger effect on decreasing unintended births than the findings reported here, particularly among women who had limited access to contraception prior to the ACA. As the current administration considers not only changes to the ACA, but also to funding for providers of family planning services, states looking to reduce unintended births should consider implementing or expanding policies to increase women's access to contraception.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the supporting information tab for this article:

Appendix SA1: Author Matrix.

Table S1: Excluded States.

Table S2: Characteristics of States, 1997–2012, by State Mandate Sample.

Table S3: Unadjusted Marginal Effects of State Prescription Contraception Insurance Mandates on the Probability of Unintended Birth, with Mandate Implementation Lags, 1997–2012.

Table S4: Unadjusted Effects of State Prescription Contraception Insurance Mandates on the Number of Unintended Births per State, with Mandate Implementation Lags, 1997–2012.

Table S5: Event Study of the effect of State Prescription Contraception Insurance Mandates on the Probability of Unintended Birth, 1997–2012.

Table S6: Marginal Effects of State Prescription Contraception Insurance Mandates on the Probability of Unintended Birth among

Privately-Insured Women, with Mandate Implementation Lags, by State, 1997–2012.

Figure S1: Unadjusted State Trends in Share of Births Reported to be Unintended, by Presence of a State Prescription Contraception Mandate, 1997–2012.