I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 10952

Did Parental Involvement Laws Grow Teeth? The Effects of State Restrictions on Minors' Access to Abortion

Caitlin Myers
Daniel Ladd

AUGUST 2017

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 10952

Did Parental Involvement Laws Grow Teeth? The Effects of State Restrictions on Minors' Access to Abortion

Caitlin Myers
Middlebury College and IZA

Daniel Ladd
University of California, Irvine

AUGUST 2017

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Did Parental Involvement Laws Grow Teeth? The Effects of State Restrictions on Minors' Access to Abortion*

We compile data on the locations of abortion providers and enforcement of parental involvement laws to document dramatic increases in the distances minors must travel if they wish to obtain an abortion without involving a parent or judge. Between 1992 – the year the U.S. Supreme Court established the undue burden standard in *Planned Parenthood* v. *Casey* – and present, the average distance to a confidential abortion has increased from 55 to 454 miles. Using both double and triple-difference estimation strategies, we estimate the effects of parental involvement laws, and allow these effects to vary with the distances minors might travel to avoid them. Our results confirm previous findings that parental involvement laws did not increase teen births in the pre-*Casey* era, and provide new evidence that in more recent decades they have increased teen birth by an average of 3 percent. The estimated effects are increasing in avoidance distance to the point that a confidential abortion is more than a day's drive away, and also are 4 to 6 times greater in counties with high rates of poverty. We estimate that over the past 25 years, parental involvement laws have resulted in half a million additional teen births.

JEL Classification: I11, I12, J13
Keywords: abortion, fertility

Corresponding author:
Caitlin Knowles Myers
Department of Economics
Middlebury College
Middlebury, VT 05753
USA
E-mail: cmyers@middlebury.edu

* We received helpful feedback from Jillian Carr, Andy Hooper, and from seminar participants at IZA, Mid-dlebury College, and the 2017 Western Economic Association International Annual Conference. We also are grateful to Mark Anderson and Joseph Sabia for a helpful discussion of Florida policies. Funding was provided by Middlebury College.

1 Introduction

Since the landmark *Roe* v. *Wade* ruling in 1973, the Supreme Court has repeatedly grappled with the question of what regulations states can impose on abortion patients and providers. Two subsequent rulings, generally considered landmarks in their own right, provide additional guidance on this question. In *Planned Parenthood* v. *Casey* (1992) the Supreme Court crafted the undue burden standard, declaring that "an undue burden exists and therefore a provision of law is invalid if its purpose or effect is to place substantial obstacles in the path of a woman seeking an abortion." In *Whole Woman's Health* v. *Hellerstedt* (2016) the Court reaffirmed and clarified the evaluation of undue burden, emphasizing the long distances that Texas women had to travel to obtain abortions after the closures of more than half the clinics in that state.

The laws considered by the Court in *Casey* and *Whole Woman's Health* illustrate the shifting tactics of abortion opponents in the decades since *Roe*, from demand-side regulations aimed at the women seeking abortions to supply-side regulations aimed at providers. In *Whole Woman's Health*, the Court ruled that a Texas law that had shuttered more than half the clinics in the state imposed an undue burden by increasing travel distances to a decreasing number of clinics. Nearly 25 years earlier in *Casey*, however, the Court had largely upheld demand-side regulations in Pennsylvania, including a parental consent requirement for minors seeking abortions, declaring that they did not impose an undue burden.

This conclusion might further be supported by two previous empirical studies using national data and difference-in-difference research designs. Both provide credible evidence that parental involvement laws – a term that encompasses both parental consent and parental notification requirements – had little if any effect on teen births in the 1980s and early 1990s (Kane and Staiger, 1996; Levine, 2003). One explanation for this finding may be that teens practiced safer sex in response to parental involvement laws. Another is that that the laws had no teeth, and teens continued to obtain abortions at roughly similar rates, either choosing to involve a parent or traveling to a nearby state to avoid the law.

The first contribution of this paper is observe that the decades since *Casey* and this earlier empirical work have brought dramatic increases in the distances minors must travel to obtain a "confidential abortion," by which we mean an abortion without involving a parent or obtaining a judicial bypass. To document this trend, we combine an updated panel of legal coding for parental involvement laws with a newly-assembled panel of abortion provider locations to estimate county-level travel distance to obtain a confidential abortion. Figure 1 illustrates spatial variation in teens' access to confidential abortions in 1992 and 2015. In 1992 nearly half of all states were enforcing parental involvement laws. But because these states were fairly geographically dispersed, minors in many of them had to only travel a little farther to avoid the law by seeking an abortion at a clinic in a nearby state. In the intervening years, 13 more states began enforcing parental involvement laws, causing the map to close in on teens, particularly on those in the deep south and midwest. In 1992, 91 percent of teens in states with parental involvement laws lived within 250 miles of a confidential abortion destination; by 2015, 22 percent did. Over the same period, the average additional distance a minor living in a state with a parental involvement law had to travel to avoid it increased dramatically, from 114 miles in 1992 to 556 miles in 2015. If one wishes to look at these distances for the population of U.S. teens as a whole rather than on those living in states with a parental invovlement law, the average distance to a confidential abortion has increased from 55 miles in 1992 to 454 miles in 2015.

The second contribution of this paper is to estimate the effect of these increased travel costs on teen births. We combine our data on the changing abortion landscape with county-level natality files to estimate the causal impact of parental involvement laws on teen birthrates. The empirical specifications use a difference-in-difference strategy to compare changes in the teen birthrate in states that begin enforcing parental involvement law to those that do not. In addition to simply updating previous findings, our county-level information about the locations of abortion providers allows us to estimate heterogeneous policy effects, using double and triple-difference methodologies to test the hypothesis that the increase in travel

distance to avoid the laws caused them to grow teeth, in some cases decades after they were originally passed.

Like Kane and Staiger (1996) and Levine (2003), we do not find evidence that parental involvement laws increased teen birth rates between 1980 and 1992. But we find that parental involvement laws enforced since *Casey* increase births to teens by an average of 3 percent and resulted in half a million more teen births. We also find evidence that the impacts of parental involvement laws differ substantially with avoidance distance. A parental involvement law with a 400 mile avoidance distance – approximately a day's drive – has twice the estimated effects on teen birth rates than a parental involvement law with a 100 mile avoidance distance.

2 Theory and Evidence

The intensity of the debate surrounding parental involvement laws suggests that both advocates and opponents assume they impose a meaningful cost on minors wishing to terminate a pregnancy. There is substantial disagreement, however, on how minors' behaviors might change in response to such costs. Some advocates for parental involvement laws argue that when it becomes more difficult to obtain an abortion without parental knowledge, teens will abstain from sex or engage in safer sex, reducing the number of unintended pregnancies and births (see, eg., Wang, 2005). Opponents of parental involvement laws often respond that the demand for sex is inelastic with respect to abortion policy, and that the laws will not reduce unintended pregnancy but could reduce abortions and increase births to teens (see, eg., Nakashima, 1998). These two points of view correspond to two major competing theories in the scholarly literature: one that treats adolescent sexual behavior as the product of rational choice, and a second that argues that teens engage in foggy or magical thinking when it comes to sex, giving little consideration to the consequences of sexual activity (Levine, 2001; Kaye et al., 2009).

As outlined by Levine (2003), the net impact of parental involvement laws depends on

responses at different nodes of a fertility "decision tree" in which a young woman decide whether to have sex, whether and what form of contraception to use, and, if she becomes pregnant, whether to have an abortion. Parental involvement laws will have little effect at the first two nodes if teens do not base their sexual behavior on the availability of abortion, if teens would choose to voluntarily tell a parent regardless of the law, or if teens are not aware of the regulatory environment prior to seeking an abortion. In a survey of minors seeking abortions in states without parental involvement laws, Henshaw and Kost (1992) find that 61 percent of them voluntarily chose to involve a parent.[1] For the remaining 39 percent, parental involvement laws presumably would impose an additional cost to obtaining an abortion. Survey evidence, however suggests that this is a cost of which few teens were aware prior to seeking an abortion (Blum et al., 1987; Stone and Waszak, 1992).

The most credible empirical research attempting to identify the causal effects of parental involvement laws have adopted quasi-experimental research designs exploiting variation in state policies and the ages to which they apply. The evidence on sexual behavior and fertility has been mixed. Three studies provide evidence that parental involvement laws reduce risky sexual behavior among teens (Levine, 2003; Klick and Stratmann, 2008; Sabia and Anderson, 2016). In their review of the literature, however, Dennis et al. (2009) argue that Levine's research design is not fully convincing due to data limitations and the anomalous finding that the laws also increased sexual activity among older women. In addition, Colman et al. (2013) argue that Klick and Stratmann's results were biased by systematic underreporting of gonorrhea rates, the biomarker for risky sexual activity in the original paper. After conducting a replication exercise and introducing new evidence based on rates of chlamydia and self-reported sexual behaviors, Colman et al. (2013) conclude that there is no evidence that parental involvement laws affect teens' sexual behavior. Using a different data set and triple-difference research design, Sabia and Anderson (2016) find that parental involvement laws decrease the probability of unprotected sex by 1 to 2 percent. Regardless of whether

[1]Ralph et al. (2014) report an almost identical fraction in a survey of teens seeking abortions at a single clinic in 2008 in an unidentified state without a parental involvement law.

teens substitute not at all or only a little towards safer sex in response to these laws, much of the net effect on fertility will depend on whether pregnant teens forgo abortion due to the laws.

The essential difficulty in evaluating the effect at this second node in the fertility decision tree is the lack of reliable data on abortions by age and state of residence. There are two sources of national abortion data. The Centers for Disease Control and Prevention (CDC) collects voluntary abortion surveillance reports from state health agencies. In 2012, California, Maryland, and New Hampshire did not provide data, and the District of Columbia, Florida, Illinois, Iowa, Massachusetts, and Wisconsin did not provide complete data by maternal age and state of residence (CDC, 2015). The second source, the Guttmacher Institute, supplements the data collected and released by state health departments with information from their own survey of all known abortion providers in the United States (Jones and Jerman, 2014). The number of abortions reported to the CDC is about 70 percent of the number reported to Guttmacher, and includes states that do not report to the CDC (CDC, 2015). The Guttmacher data are therefore more complete, but the Institute cautions against the use of their estimates of abortions to minors by state of residence because they are made under the assumption that minors cross state lines to obtain abortions in the same proportion as adults (Dennis et al., 2009).

Both data sources have been used to estimate the effects of parental involvement laws. Haas-Wilson (1996) uses CDC data to estimate the effect of parental involvement laws on minors' abortions by state of occurrence. She finds that parental involvement laws caused a 17 percent reduction in the abortion rate. Levine (2003) adopts a similar strategy using Guttmacher estimates by state of residence. He finds that parental involvement laws led to a 15 to 22 percent decline in abortions by state of residence. If minors travel across state lines to avoid parental involvement laws, one would expect Haas-Wilson's estimates of effects by state of occurrence to be larger in magnitude than Levines by state of residence. The similarity in these two sets of results may arise from the fact that the Guttmacher Institute estimates

minors interstate travel to obtain abortions based on trends for adults; as a result, Levine's strategy would not adequately account for interstate travel to avoid parental involvement laws (Dennis et al., 2009).

Using more complete data for a handful of individual states, Cartoof and Klerman (1986) examined the effects of Massachusetts' 1981 parental involvement law. They find that it lead to a 43 percent reduction in minors obtaining abortions in-state, but that this was completely offset by minors obtaining abortions in nearby states. Joyce and Kaestner (2001) found that minors also traveled out of state to obtain abortions in response to Mississippi's parental involvement law. They did not observe the same effect in South Carolina, possibly because that law applied only to minors aged 16 and younger, a group that is more likely to involve parents regardless of the regulatory environment (Henshaw and Kost, 1992).[2]

Two studies apply difference-in-difference methodology to national data to estimate the effects of parental involvement laws on fertility, the final outcome of the fertility decision tree. Both Kane and Staiger (1996) and Levine (2003) conclude that there is little evidence that parental involvement laws have any net effect on teen birth rates. Colman et al. (2008) argue that using a woman's age at the time of birth, as in both of these earlier studies, leads to misclassification of the governing legal environment for many 18 year-olds because many older 17 year-olds will delay an abortion until their 18th birthday to avoid parental involvement. Joyce et al. (2006) obtain individual-level birth and abortion reporting data from the state of Texas that allow them to more precisely observe the age at which conceptions, abortions and births occurred. They estimate that Texas' parental involvement lead to a 4 percent increase in births to minors who were under age 17 and three-quarters at the time pregnancy occurred. They also find that abortions to minors declined by 16 percent, and that few minors traveled outside of Texas to obtain abortions. This may reflect the long travel distances due to Texas'

[2]Joyce and Kaestner (1996) estimate the effect of parental involvement laws in South Carolina and Tennessee using Virginia as a control. They do not find evidence that either law had substantial effects on minors' abortion rates. The South Carolina law applied only to minors aged 16 and older. According to multiple sources (see, eg., Merz et al. (1995) and Myers (2016b)), Tennessee's law was not enforced at the time the authors regard it as in effect. If correct, this likely explains why Joyce and Kaestner found no impact on teen abortion rates.

size and the enforcement of parental involvement laws in neighboring states.

A fourth study estimates the effects of parental involvement requirements in the early 1970s. In this earlier era, prior to key United States Supreme Court rulings in *Planned Parenthood* v. *Danforth* (1976) and *Bellotti* v. *Baird* (1979), common law precedent prohibited minors from providing consent to medical services, including abortion, absent a specific affirmative regulation by the state. Myers (2016a) finds that the ability to consent to abortion services in the early to mid-1970s decreased the probability of giving birth prior to age 19 by 15 percent. One potential contributing factor to this large effect is that few states permitted minors to consent to abortion in the early 1970s, making it more difficult to circumvent state laws by driving to a nearby state.

3 Data

We combine data from multiple sources that allow us to create a county-year panel of measures of abortion access and teen birth and abortion rates, as well as time-varying control variables for county-level demographic and economic conditions and state-level welfare and reproductive policies. Table 1 presents summary statistics for these data. We describe the variables used in our analysis in greater detail below. Additional information, including all necessary information to replicate the data creation process, is available in the Data Appendix and replication package.

We break the sample into two time periods: 1980-1992 and 1993-2014. The first period spans the years between the Supreme Court decisions in *Bellotti* v. *Baird* (1979), in which the Court held that minors do not have to secure parental consent absent a state requirement, and *Planned Parenthood* v. *Casey*, in which the Court clarified the conditions under which states could impose parental consent requirements. This first period also corresponds roughly to the policy periods considered by Kane and Staiger (1996) and Levine (2003). We will primarily focus on the post-*Casey* period covering the past quarter century of parental involvement

laws.

3.1 Teen birth rates

We obtain individual-level natality files from the NCHS (2017) for 1980-2015, and use these to construct county-level birth counts by age and race. To construct rates, we combine these birth counts with county-level estimates of population by age and by race from SEER (2016). Table 1 demonstrates the well-documented decline in teen birthrates in recent years (Finer and Zolna, 2016). Our research question does not seek to explain the decline, but to ask to what extent it might have been steeper absent parental involvement requirements.

3.2 Teen abortion rates

We obtain state-level estimates of abortions to teens agd 15-17 and 18-19 from the Guttmacher Institute. To estimate these rates, Guttmacher begins with data from the CDC, which compiles data on abortions by state of residence to women of all ages based on voluntary reporting by state agencies. Guttmacher augments these counts by contacting state agencies and also using information from their own surveys of abortion providers, which were conducted in 1988, 1992, 1996, 2000, 2005, 2008, 2010, and 2011. Guttmacher then estimates abortions by age using age distributions from the CDC surveillance report when available. For states with incomplete or no information on age, Guttmacher estimates abortions to teenagers using the national distribution or the distribution in nearby states.

We will interpret results using these data with caution as there are multiple reasons to be concerned about their reliability. First, the incomplete reporting of ages of abortion patients potentially affects all states due to interstate travel. Second, the Guttmacher estimation strategy assumes that teenagers travel to neighboring states to obtain abortions at the same rate as adults; our argument is that this assumption is not valid in states with parental involvement laws, something that Guttmacher also points out in its technical documentation (Kost and Maddow-Zimet, 2016).

3.3 Legal coding

Myers (2016b) presents a state-by-state review of reproductive policies from 1960 to 2015 that govern minors' access to contraception and abortion. This information is based on primary sources including legislative bills, annotated statutes, judicial rulings, and attorney general opinions augmented by secondary sources including advisory articles in state medical journals, newspaper accounts of enforcement actions, and snapshots of the regulatory environment provided by other secondary sources, the most comprehensive of which is Merz et al. (1995). Table 2 reproduces information from Myers (2016b) on the years in which a parental involvement law are enforced in each state from 1980 to 2015. We use this legal coding in the analysis in this paper.

Most of these laws require that prior to obtaining an abortion, a minor present evidence that one or both parents has been notified of or consented to the procedure, the union of which we refer to as parental "involvement." The provisions of parental involvement laws tend to be fairly similar across states, both because they must adhere to the guidelines established by Supreme Court rulings, and because state legislatures sometimes model new laws on regulations in other states that have withstood judicial scrutiny. All enforced parental involvement laws include judicial bypass option, whereby a judge can rule in a minor's interest or determine that she is sufficiently mature to make her own decision (Myers, 2016b). In all but two states, the law applies to minors under the age of eighteen. The exceptions are Delaware, where the law applies to minors under age sixteen, and South Carolina, where it applies to women under age seventeen. Six states (Delaware, Iowa, North Carolina, South Carolina, Virginia, and Wisconsin) allow another adult relative to receive the notification or provide consent in lieu of a parent. Five states (Delaware, Maine, Maryland, West Virginia, and, from 1985-1995, Wisconsin) allow for physician bypass whereby a specified health professional can receive notification or waive the parental involvement requirement under limited circumstances. In the empirical analysis that follows, we do not treat states allowing for physician bypass on the part of the abortion provider as binding parental involvement

laws.

3.4 Measures of minors' abortion access

To construct measures of minors' abortion access, we combine our panel of legal coding variables with information on the locations of abortion providers from 1980 to present. We construct this panel using three sources. The first is a confidential county-year panel of indicators of abortion provider locations maintained by the Guttmacher Institute and based on their periodic surveys of abortion providers (Guttmacher Institute, 2015a). We update this panel through the present using confidential data from Esmé Deprez (2016), a journalist for Bloomberg news who has been tracking abortion provider locations for a series of articles on national trends in abortion availability (Deprez, 2016a, 2013). We verified the clinic closures in the Deprez data, and updated these with information from Cunningham et al. (2017) on the closures of Texas abortion clinics following the enforcement of particularly stringent clinic regulations beginning in 2013. The resulting dataset is a county-year panel of indicators for the presence of any abortion provider from 1980 to present.[3]

We combine our data on state-level enforcement of parental involvement laws with county-level indicators for abortion providers, and use the Stata *geonear* (2010) module to identify the nearest abortion provider to each county according to the geodesic distance between 2010 county population centroids (United States Census Bureau, 2016). We then use the Stata *georoute* (2016) module to estimate (1) the travel distance from each county to the nearest abortion provider, and (2) the nearest abortion provider that was not subject to a parental involvement law.[4]

Figure 1 presents maps summarizing spatial variation in minors' abortion access in the United States in 1992 and 2015. These maps suggests substantial increases in distance

[3]We are unable to consistently observe the size of such providers; they include both large clinics and individual physicians who provide abortions.

[4]We identify the nearest provider using geodesic rather than travel distance because the latter is computationally prohibitive. We expect that this practicality makes little to no difference in the analysis. Geodesic and travel distance are highly correlated (with a correlation coefficient of 0.99) and we show in Appendix Table A1 that the results of the analysis are not sensitive to the choice of distance measure.

to obtain a confidential abortion that are largely concentrated in the south and midwest. Although several western and northeastern states enforce parental involvement laws (Table 2), most teens in these states live within 100 miles of an abortion provider in a neighboring state not subject to a parental involvement law. For instance, Pennsylvania enforces a parental involvement law, but neighboring New York, New Jersey, and Maryland do not; the average distance Pennsylvania teens must travel to avoid the state's parental involvement law is 71 miles. In contrast, the average teen living in Georgia– where all neighboring states also enforce parental involvement laws– would have to travel 649 miles to the Washington D.C. area to obtain a confidential abortion.

Figure 2 shows the effects of these changes on national averages, displaying trends in the number of states enforcing parental involvement laws on the left-hand axis and trends in our measures of minors' abortion access on the right-hand axis. In 1980, the year after *Bellotti* v. *Baird*, the average distance an American woman had to travel to locate an abortion provider was 14 miles, and no states had extant and broadly enforceable parental involvement statutes.[5] By 1992, the year of the *Planned Parenthood* v. *Casey* decision, closures of abortion clinics had caused the the distance the average American woman had to travel to obtain an abortion to increase to 18 miles. Minors were additionally impacted by parental involvement laws. The average minor living in the United States had to travel 55 miles to obtain a confidential abortion. Over the following 20 years, between 1992 and 2015 the abortion landscape changed much more dramatically for American teens. Abortion providers continued to close, causing the average distance to the nearest provider to increase to 24 miles. And the number of states enforcing parental involvement laws grew from 21 to 35. As the map closed in on teens, the average travel distance they would have to incur to obtain a confidential abortion grew substantially, reaching 454 miles in 2015.

We term the additional distances minors have to travel if they wish to avoid a parental involvement law the "avoidance distance." This is the difference between the distance to the

[5]Utah does appear to have continued to enforce a 1974 parental notification statute for minors who did not meet a mature minor standard.

nearest provider of a confidential abortion, and the nearest abortion provider. For teens living in states without parental involvement laws, the avoidance distance is generally zero, though it is positive for some teens for whom the nearest abortion provider is in a neighboring state with a parental involvement law. For teens living in states with parental involvement laws, the avoidance distance ranges from zero miles for teens living in counties where the nearest clinic is out of state, to 1,222 miles for teens living in Dade County at the southern tip of Florida. The average avoidance distance for minors living in states with parental involvement laws grew from 114 miles in 1992 to 556 miles in 2015.

3.5 Demographic and Economic Controls

Demographic and economic control variables are grouped and summarized in Table 1. These include county racial and ethnic composition from SEER (2016) and county-level urbanization, educational attainment, median household income, and poverty rates from the decennial Census (1980, 1990, 2000) and American Community Survey (Minnesota Population Center, 2011). We additionally include time-varying state-level controls for inequality with Gini coefficients provided by Voorheis (2014) and for the female unemployment rate and median wage calculated by the authors using data from the Current Population Survey (NBER, 2017) .

3.6 Policy Controls

We also control for additional state and federal policies that may influence fertility. These include two additional types of abortion policies: mandatory delay laws (Center for Reproductive Rights, 2015; Guttmacher Institute, 2015c; NARAL, 2015) and state Medicaid funding for abortions (Merz et al., 1995; Guttmacher Institute, 2016), as well as a control for the distance to the nearest abortion provider which we calculate as described previously. We also include controls for three types of contraceptive policies: insurance coverage of contraception ("contraceptive mandates") (Yordán, 2014), availability of emergency contraception over-

the-counter (Zuppann, 2013), and expanded Medicaid eligibility for family planning services (Kearney and Levine, 2009; Guttmacher Institute, 2015b; NARAL, 2015). Finally, we control for changes in welfare policy using data on welfare reform, maximum benefits and family caps (Moffitt, 2002; U.S. House of Representatives, 2012; Urban Institute 2015).

4 Empirical Strategy

We estimate the effects of access to abortion clinics using a difference-in-difference research design that exploits spatial and temporal variation in parental involvement laws. Because county-level births are discrete and occasionally equal to zero, we implement this difference-in-difference strategy with a Poisson model. Our most basic approach to estimating the effect of parental involvement laws on teen births are similar to earlier difference-in-difference designs relying on state-level policy variation (Kane and Staiger, 1996; Levine, 2003) :

$$E[BR_{c,s,t+1}|\text{parental involvement}_{s,t}, \boldsymbol{X_{cst}}, \boldsymbol{\upsilon_c}, \boldsymbol{\upsilon_t}, \boldsymbol{\upsilon_{s\times t}}] =$$
$$exp(\beta\text{parental involvement}_{st} + \boldsymbol{\gamma X_{cst}} + \boldsymbol{\upsilon_c} + \boldsymbol{\upsilon_t} + \boldsymbol{\upsilon_{s\times t}})$$

The outcome variable BR_{cst} is the birth rate for women aged 15–18 living in county c in state s in year t+1. The explanatory variable of interest in this specification is $parentalinvolvement_{st}$, which measures the proportion of year t that a parental involvement law was enforced in state s. The vector X_{cst} includes varying sets of time-varying county and state demographic, economic and policy conditions summarized in Table 1; υ_c includes county fixed effects, which control for unobserved county characteristics with time-invariant effects on birth rates; υ_t includes year fixed effects, which control for time-varying factors affecting birth rates in all counties in the same manner; and $\upsilon_{s\times t}$ controls for state linear time trends. All analyses allow errors to be correlated within counties over time when constructing standard-error estimates. This model can be expressed alternatively as estimating the natural log of the expected count

of births while controlling for the relevant population and constraining its coefficient to be equal to one.[6]

We are interested not only in the average effect of parental involvement laws on the teen birth rate (β_{pi}), but in whether any effect of parental involvement laws varies with the distances minors must travel if they wish to avoid involving a parent. To capture this potential heterogeneity, we estimate the following equation:

$$E[BR_{c,s,t+1}|\text{parental involvement}_{s,t},\ \text{avoidance distance}_{cst}, \boldsymbol{X_{cst}}, \boldsymbol{\upsilon_c}, \boldsymbol{\upsilon_t}, \boldsymbol{\upsilon_{s\times t}}] =$$
$$exp(\beta_0 \text{parental involvement}_{st} + \beta_1 \text{ avoidance distance}_{cst} + \beta_2 \text{ avoidance distance}^2_{cst} +$$
$$\boldsymbol{\gamma X_{cst}} + \boldsymbol{\upsilon_c} + \boldsymbol{\upsilon_t} + \boldsymbol{\upsilon_{s\times t}})$$

where $avoidancedistance_{cst}$ is the estimated travel distance to the nearest confidential abortion, which we define as an abortion not subject to a parental involvement requirement. Because all models control for distance to the nearest abortion provider and its square, the coefficients on *avoidancedistance* capture any additional effects of avoidance distance.

4.1 Credibility of the Research Design

The validity of this difference-in-difference approach relies crucially on the common trends assumption, which in this context is that absent any change in parental involvement policy, teen births would have trended similarly across counties. As summarized in Table 2, since 1980 parental involvement laws have been enacted in 37 geographically and culturally diverse states. We also control for a rich set of time-varying demographic and policy changes, including measures of poverty and inequality, distances to the nearest abortion provider, mandatory delay laws for minors seeking abortions, Medicaid coverage of abortion, Medicaid family-

[6]Appendix Figure A1 compares our primary set of results estimated using our preferred Poisson approach and weighted and ordinary least square models in which the outcome is log birth rates and we drop observations with zero births. The results for all three specifications are very similar.

planning expansions, contraceptive mandates, and the availability of emergency contraception over-the-counter. Moreover, we conduct several additional tests and checks for the validity of our approach.

In Table 3, we report the results of linear probability models that predict a policy change with lagged birthrates (Columns 1-2) and, alternately, lagged abortion rates (Columns 3-4). In neither case do we find evidence of large or statistically significant effects. A 1 percent increase in the teen birth rate predicts a 0.06 percentage point *decline* in the probability that a parental involvement law begins to be enforced in the following year ($p = 0.16$), and a 1 percent increase in the teen abortion rate predicts a 0.05 percentage point *increase* in the probability that a parental involvement law begins to be enforced ($p = 0.32$). If anything, these results suggest that subsequent estimates of increased births and decreased abortions are conservative in magnitude.

We also include state-linear time trends in all models in the paper; Appendix Table A2 demonstrates that the results are robust to the exclusion of these trends. And we also demonstrate that we do not observe evidence of an effect of parental involvement laws on 19 or 20 year-olds.

Perhaps the most convincing argument for causal identification is that the policy variation we exploit in Equation 2 arises not only from the enforcement of parental involvement laws within a minor's state of residence, but from the enforcement of these laws in other states, mitigating concerns that policy variation may be correlated with within-state trends in teen births. As a final check, we also estimate a triple-difference specification that includes state*x*year fixed effects. All variables that are constant within a given state and year – including the parental involvement law indicator – are collinear with these fixed effects and excluded from the model. Conditional on the statewide enforcement of a parental involvement law, variation in travel distances across counties within a state identify the effects of avoidance distances in a triple difference specification eliminating any correlated shocks occurring at a statewide level in any given year. Appendix Figure A2 shows that the effects of avoidance

distance conditional on a parental involvement law are extremely similar when estimated with a double or triple difference specification.[7] The triple-difference specifications are computationally intensive, less precise, and don't allow for the estimation of the average effect of a parental involvement law, however, so we will focus on double-difference specifications in Equations 1 and 2.

5 Results

Table 4 presents estimated coefficients for Equation 1 (Panel A). We first estimate these models for 1980-1992 to correspond roughly to the pre-*Casey* period examined by earlier authors adopting a similar research design (Columns 1-3). Like Kane and Staiger (1996) and Levine (2003), we do not find compelling evidence that parental involvement laws increased teen births in the 1980s and early 1990s, and again like both authors we in fact find suggestive evidence that parental involvement laws may have contributed to modest declines in teen births during these early years of enforcement. The results in Column 3, our preferred specification that includes the full set of control variables, suggest that parental involvement laws decreased teen births by 1.4 percent ($p = 0.084$) in the 1980s and 1990s.[8] When we estimate the same specifications for the 1993-2014 period, the results are quite different. The results in Column 3, which is the specification that we will continue to estimate for various sub-groups of women and counties, suggest that over the past 20 years parental involvement laws have caused a 2.8 percent increase ($p < 0.01$) in births to women aged 15 to 18.

In Panel B we add measures of avoidance distance – that is the additional distance a minor would have to travel beyond the nearest provider to find a provider not subject to a parental involvement law. These results suggest that the average effect of parental involvement laws in Panel A masks heterogeneity with respect to avoidance distances. We use these results to

[7] We estimate these models with a weighted OLS model because the triple-difference Poisson results did not converge. Double-difference Poisson and weighted OLS results also are extremely similar (see Appendix Figure A1).

[8] Through the discussion of the results, we calculate exact percent effects as $100 \times (exp(\beta) - 1)$.

estimate the effect of parental involvement laws at different avoidance distances. In the 1980s a parental involvement law with an avoidance distance of 100 miles is estimated to decrease teen births by 1.48 percent ($p = 0.05$).[9] The point estimates for this period suggest that the effect of parental involvement laws becomes positive at larger avoidance distances, but there is very little variation at larger distances during this period, and the estimates are imprecise.

Avoidance distances increased dramatically from 1992 to 2014, and the estimates for this period suggest that increased distances increased teen birth rates at a decreasing rate. To facilitate the interpretation of the quadratic results, Figure 3 graphs the estimated percent change in birth rates for parental involvement laws as a function of avoidance distance based on the estimates for 1993-2014 presented in Panel B of Table 4. Overall, the results suggest that parental involvement laws cause an increase in births up to an avoidance distance of about 800 miles, and that the largest effects are observed for laws with avoidance distances in the range of 200 to 700 miles. A parental involvement law with an avoidance distance of zero is estimated to increase the teen birthrate by a statistically-insignificant 1.6 percent ($p = 0.20$), while a parental involvement law with a 400-mile avoidance distance, roughly a day's drive, is estimated to increase the teen birthrate by 4.3 percent ($p < 0.01$).[10] Using these results to predict teen births, we estimate that there would have been 494,388 fewer births to teen moms in a counterfactual world in which no states enforced parental involvement laws after *Casey*.

The results in Figure 3 further suggest that the effects of avoidance distance are increasing at a decreasing rate, with the maximum effect of parental involvement laws observed at an avoidance distance of 400 miles. It may be the case that once avoidance distances reach a day's drive, additional increases are no longer relevant. However, that would suggest that the estimated effects in Figure 3 would flatten after about 400 miles rather than decreasing as observed. However, we note that the confidence intervals at distance greater than 600

[9] For the quadratic models, percent changes are calculated as $100(exp(\beta_1 \Delta X + \beta_2 \Delta X^2) - 1)$.

[10] The difference between these two marginal effects is statistically significant, with $p < 0.001$. This result also is similar in magnitude to the estimated effect of Texas' parental involvement law – one that had similar avoidance distances – obtained by Joyce et al. (2006).

are quite wide, and we cannot statistically distinguish between a declining effect and no additional effect at these large distances.

Another reason to be cautious in interpreting the results at high avoidance distances is that much of the variation beyond 700 miles is driven by the state of Florida, which enacted a parental involvement law in 2005 that would have made Washington D.C. the nearest destination for a confidential abortion for teens living in Florida and nearby states. However, this law required only notification by phone or that a minor bring in a letter from a parent, requirements that some Florida legislators suggested were inadequate and easy for teens to avoid (Haughney, 2011). In 2011, Florida enacted a revised and strengthened statute requiring that a minor bringing in a letter get that letter notarized and that parents received notification by mail rather than phone. The 2005-2011 law meets our standard of a parental involvement law, but the coding does seem to us to be ambiguous; Sabia and Anderson (2016) do not treat Florida as enforcing a parental involvement law at this time. Figure 3 also presents results estimated excluding Florida and nearby states where avoidance distances were substantially affected by Florida's legal coding.[11] Up to avoidance distances of about 600 miles, the estimated effects are indistinguishable from those based on the full sample; at longer distances they begin to deviate from those for the full sample of states, showing weaker evidence that large avoidance distances cause decreasing teen birth rates.

Given the wide confidence intervals and anecdotal evidence that the Florida policy was not fully binding for minors during the 2005-2011 period, we are reluctant to conduct inference at the upper ends of the distance distribution. In subsequent figures we limit the presentation of estimated results to ranges of avoidance distances of zero to 700 miles. Until 2005, when Florida began enforcing the first version of its parental notification law, less than 1 percent of teens living in states with parental involvement laws faced avoidance distances greater than this level.

[11] These states are Alabama, Georgia, Mississippi, and South Carolina.

5.1 Results by individual year of age

Figure 4 presents estimated percent effects by individual year of age, continuing to focus on the 1994-2014 period. The corresponding coefficients and standard errors can be found in Panel B of Table A3.

Because parental involvement laws apply to minors under age 18, some 18-year-old women were not subject to a parental involvement law at the time they learned they were pregnant, and others may have chosen to delay having an abortion until turning 18. These two facts predict that the effect of parental involvement laws would be lower for 18 year-olds than for younger teens. On the other hand, it may also be the case that younger teens are more likely to involve a parent in the decision to obtain an abortion regardless of whether this is required (Henshaw and Kost, 1992); this possibility suggests that the effect of parental involvement laws may be greater for 18-year-olds.

The point estimates in Figure 4 suggest that parental involvement laws increase births to teens at each year of age from 15 to 18, with larger effects for younger teens. However, the estimated effects are not statistically distinguishable.

We also include births to teens aged 19 and 20. Although these teens were not directly subject to a parental involvement law at the age they became pregnant, one still cannot regard this as a placebo test because older teens could be indirectly affected by parental involvement laws they experienced at an earlier age. The results do not provide evidence that parental involvement laws had a net impact on births to women aged 19 or 20. The estimated average effect of a parental involvement law with a 400-mile avoidance distance is estimated to increase births to 20 year-olds by less than half a percent, for instance, and the estimate is not statistically significant.

5.2 Results by race and ethnicity

Figure 5 presents results estimated separately for births to white, black and Hispanic teens. Table A4 presents the full set of coefficients and standard errors. The results suggest that

parental involvement laws increase births for both white and black teens, but the estimated effects are about twice as large for blacks than for whites. For instance, a parental involvement law with a 400 mile avoidance distance is estimated to increase births by 2.2 percent ($p = 0.01$) for white teens, and by 3.9 percent ($p < 0.01$) for black teens. The results do not provide evidence that parental involvement laws increase births for Hispanic teens; in fact, the estimated effects are negative, but they also are imprecise and lack statistical significance.

5.3 Heterogeneous effects by Poverty and Car Ownership

The results thus far suggest that parental involvement laws increase births to teens, and particularly do so for teens who must travel hundreds of miles if they wish to avoid involving a parent or judge in the decision to obtain an abortion. Such distances may seem especially daunting to teens who are poor and/or lack access to a car.

Whereas birth certificates record the teen mother's age, race, and ethnicity, there is no individual-level measure of socioeconomic status or car ownership.[12] To investigate the potential role of poverty, we divide counties into two groups according to their poverty status in the 2010 Census: the poorest 25 percent of United States counties, and the remainder of the country. We then estimate Equation 2, interacting all relevant policy variables– the indicator for parental involvement, avoidance distance, and travel distance to the nearest provider– with a variable indicating that the observed county is the poorest quartile of counties in the United States. To investigate the possible heterogeneous effects of access to a vehicle, we do the same using the fraction of households that own a vehicle, dividing counties into the 25 percent with the lowest car ownership and the rest of the country.[13]

Figure 6 graphs the estimated effects of parental involvement laws by poverty status. The results continue to suggest substantial and statistically significant effects of parental involvement laws in both the poorest counties as well as in the rest of the country. The

[12]Maternal education would serve as a proxy for socioeconomic status for older women, but not for teens aged 15-18 who are still of an age to attend secondary school.

[13]There is, of course, some overlap between poverty and car ownership. Fifty-six percent of the poorest counties also fall into the lowest car ownership quartile.

estimated effects, however, are much larger for the poorest counties than for the remainder of the country. A parental involvement law with an avoidance distance of 400 miles is estimated to increase teen births by 2.6 percent ($p = 0.001$) in the least poor three quartiles of counties, but by 11.9 percent ($p < 0.001$) in the poorest quartile.

Figure 7 graphs the estimated effects of parental involvement laws by car ownership, dividing counties into two groups: those in the lowest quartile of car ownership, and the rest of the country. At low avoidance distances, the estimated effects of parental involvement laws are extremely similar for both groups of counties. But the point estimates suggest that the effect of increased avoidance distances are greater for counties with low car ownership; by an avoidance distance of 200 miles, the point estimates suggest a substantially greater impact of parental involvement laws in counties with lower rates of car ownership. These estimates all are somewhat imprecise, however, and are not statistically significantly different.

6 Are the estimated effects plausible?

We have estimated that, on average, parental involvement laws enforced in the previous two decades increase teen births by 2.8 percent. Is the magnitude of this effect plausible?

One approach to this question is to estimate the corresponding reduction in abortions that would be necessary to generate this increase in births, assuming no change in pregnancy rates. Using abortion and birth rates for teens aged 15-17 in 2011 from Kost and Maddow-Zimet (2016), we estimate that a 2.8 percent reduction in births to teens aged 15–17 corresponds to a 5.7 percent decrease in abortions. Let us further assume that roughly 40 percent of teens would not voluntarily involve a parent in the decision to obtain an abortion, as found by Henshaw and Kost (1992) and Ralph et al. (2014). Then a 5.7 percent reduction in abortions suggests that about one in seven teens who would not voluntarily inform a parent of her abortion, continue rather than abort a pregnancy in the face of a parental involvement law.

A second, related approach to this question is to estimate the effects of parental involvement

laws on abortion rates. If teens do not adjust their sexual behavior in response to the abortion policy environment, we would expect the estimated reduction in abortions to correspond to the estimated increase in births. If teens do substitute towards less risky sexual behavior, as found by Sabia and Anderson (2016), we would expect fewer pregnancies and the estimated reduction in abortions to exceed the increase in births. As we discussed in the data section, we do not consider available abortion data appropriate for this purpose due to the lack of systematic and universal state surveillance of the age and state of residence of women seeking abortions. It is therefore with a note of caution that we estimate a state-level difference-in-difference specification of abortion outcomes corresponding to Equations 1 and 2.

These results are presented in Table 5. The results in Panel A suggest that parental involvement laws reduce abortions to 15-17 year olds by 11.9 percent ($p = 0.01$). We find no evidence of an effect for teens aged 18-19, who are above the age of majority and not subject to a parental involvement law. The results in Panel B, which add our measure of avoidance distance, suggest that the average estimated effect is mediated at longer travel distances. For instance, a parental involvement law with a 100 mile avoidance distance is estimated to decrease the abortion rate by 14.7 percent, while one with a 400 mile avoidance distance is estimated to decrease the abortion rate by 8.9 percent. At first glance, this appears to suggest that parental involvement laws with long avoidance distances have less effect. But one should keep in mind that the Guttmacher Institute cannot accurately account for interstate travel. One might just as well view this result as evidence of *greater* interstate travel in states with low avoidance distance, resulting in unobserved abortions occurring in neighboring states. The point we wish to emphasize is that the magnitudes of these observed effects are generally about twice as large as the reduction in abortions that would be required to generate our observed birth effects, again supporting the plausibility of these estimates.

7 Conclusion

Reviewing the broader literature on the impacts of parental involvement laws on sexual behavior and abortions, Dennis et al. (2009) conclude that to date the "the clearest documented impact of parental involvement laws is an increase in the number of minors traveling outside their home states to obtain abortion services." Making a similar observation, Republican members of congress have repeatedly introduced bills making it a federal crime to assist in the transportation of a minor across state lines to obtain an abortion, and to require providers to notify parents of such travel. In a press release concerning the most recent reintroduction of the Child Interstate Abortion Notification Act (CIANA), co-sponsor Marco Rubio promises that it would close the interstate travel "loophole and ensure minors are not transported across state lines to obtain abortions as a way of getting around states parental notification laws" (Rubio, 2011).

The results in this paper suggest that the "loophole" has been closing on its own, as increasing numbers of states enforce these laws. We have assembled a new panel of data on parental involvement laws and abortion provider locations to demonstrate that avoidance distances have increased from an average of 114 miles in 1992 to 556 miles by 2015. We estimate that over the past quarter-century, half a million teens gave birth as a result of parental involvement laws. We additionally observe evidence that the effects of these laws vary with the distances teens must travel if they wish to avoid the law by finding a provider in another state. A parental involvement law that teens must travel even 100 miles to avoid is estimated to lead to a statistically significant increase in births of about 2 percent; but those with avoidance distances of 200 to 600 miles are estimated to have effects that are as much as twice as large. We also find that parental involvement laws impact teens living in counties across the poverty spectrum, but observe particularly large effects for teens living in the poorest counties of the United States.

Both side of the abortion wars may view our findings as vindication. Those who are "pro-life" likely regard this as half a million lives saved, and those who are "pro-choice" as

half a million women becoming mothers before they are ready. Whether this is an "undue burden" remains a question for the courts.

References

Bellotti v. Baird. 443 U.S. 622, 1979.

Robert Blum, Michael Resnick, and Trisha Stark. The impact of a parental notification law on adolescent abortion decision-making. *American Journal of Public Health*, 77(5):619–620, 1987.

Virginia Cartoof and Lorraine Klerman. Parental consent for abortion: impact of the Massachusetts law. *American Journal of Public Health*, 76(4):397–400, 1986.

Center for Reproductive Rights. Mandatory delay and biased counseling for women seeking abortions. Technical report, 2015.

Centers for Disease Control and Prevention (CDC). Abortion surveillance– United States, 2012. Technical Report 64(10), 2015.

Silvie Colman, Ted Joyce, and Robert Kaestner. Misclassification bias and the estimated effect of parental involvement laws on adolescents' reproductive outcomes. *American Journal of Public Health*, 98(10):1881–1885, 2008.

Silvie Colman, Thomas S. Dee, and Ted Joyce. Do parental involvement laws deter risky teen sex? *Journal of Health Economics*, 32(5):873–880, 2013.

Scott Cunningham, Jason Lindo, Caitlin Myers, and Andrea Schlosser. How far is too far? New evidence on abortion clinic closures, access, and abortion. *NBER working paper series*, (23366), 2017.

Amanda Dennis, Stanley Henshaw, Theodore Joyce, Lawrence Finer, and Kelly Blanchard. *The Impact of Laws Requiring Parental Involvement for Abortion: A Literature Review*. The Guttmacher Institute, New York, 2009.

Esmé Deprez. Abortion clinics are closing at a record pace. *Bloomberg.com*, November 2013.

Esmé Deprez. The vanishing abortion clinic. *Bloomberg.com*, February 2016a.

Esmé Deprez. 2016 abortion clinic closures for academics. Confidential dataset provided to the authors, 2016b.

Lawrence Finer and Mia Zolna. Declines in unintended pregnancy in the United States, 20082011. *The New England journal of medicine*, 374(9):843–852, 2016.

Guttmacher Institute. County-level abortion providers, 1980-2011. Confidential dataset, 2015a.

Guttmacher Institute. Medicaid family planning eligibility expansions, as of June 1, 2015. Technical report, 2015b.

Guttmacher Institute. Counseling and waiting periods for abortion, as of June 1, 2015. Technical report, 2015c.

Guttmacher Institute. State funding of abortion under medicaid, as of September 1, 2016. Technical report, 2016.

Deborah Haas-Wilson. The impact of state abortion restrictions on minors' demand for abortions. *The Journal of Human Resources*, 31(1):140–158, 1996.

Kathleen Haughney. Abortion bill tightens parental notification requirements. *Orlando Sentinel*, March 2011.

Stanley Henshaw and Kathryn Kost. Parental involvement in minors' abortion decisions. *Family Planning Perspectives*, 24(5):196–207, 213, 1992.

Rachel K. Jones and Jenna Jerman. Abortion incidence and service availability in the United States, 2011. *Perspectives on Sexual and Reproductive Health*, 46(1):3–14, 2014.

Ted Joyce and Robert Kaestner. The impact of mandatory waiting periods and parental consent laws on the timing of abortion and state of occurrence among adolescents in Mississippi and South Carolina. *Journal of Policy Analysis and Management*, 20(2): 263–282, 2001.

Theodore Joyce and Robert Kaestner. State reproductive policies and adolescent pregnancy resolution: The case of parental involvement laws. *Journal of Health Economics*, 15(5): 579–607, 1996.

Theodore Joyce, Robert Kaestner, and Silvie Colman. Changes in abortions and births and the Texas parental notification law. *New England Journal of Medicine*, 354(10):1031–1038, 2006.

Thomas Kane and Douglas Staiger. Teen motherhood and abortion access. *The Quarterly Journal of Economics*, 111(2):467–506, 1996.

Kelleen Kaye, Katherine Suellentrop, and Corinna Sloup. *The Fog Zone: How misperceptions, magical thinking, and ambivalence put young adults at risk for unplanned pregnancy*. The National Campaign to Prevent Teen and Unplanned Pregnancy, Washington D.C., 2009.

Melissa Kearney and Phillip Levine. Subsidized contraception, fertility, and sexual behavior. *Review of Economic Statistics*, 91(1):137–151, 2009.

Jonathan Klick and Thomas Stratmann. Abortion access and risky sex among teens: Parental involvement laws and sexually transmitted diseases. *Journal of Law, Economics, and Organization*, 24(1):2–21, 2008.

Kathryn Kost and Isaac Maddow-Zimet. *U.S. Teenage Pregnancies, Births and Abortions, 2011: National Trends by Age, Race and Ethnicity*. The Guttmacher Institute, 2016.

Phillip Levine. Parental involvement laws and fertility behavior. *Journal of Health Economics*, 22(5):861–878, 2003.

Phillip B Levine. The sexual activity and birth-control use of American teenagers. In Jonathan Gruber, editor, *Risky behavior among youths: an economic analysis*, A National Bureau of Economic Research conference report. University of Chicago Press, Chicago, 2001.

Jon Merz, Catherine Jackson, and Jacob Klerman. Review of abortion policy: legality, medicaid funding, and parental involvement, 1967-1994. *Women's Rights Law Reporter*, 17 (1):1–61, 1995.

Minnesota Population Center. National historical geographic information system: Version 2.0, 2011.

Robert Moffitt. Moffitt welfare benefit files. Online files accessed August 9, 2012, 2002.

Caitlin Knowles Myers. The power of abortion policy: Re-examining the effects of young women's access to reproductive control. Forthcoming at the *Journal of Political Economy*, 2016a.

Caitlin Knowles Myers. Young women's access to abortion and contraception, 1960-2015. unpublished manuscript, 2016b.

Ellen Nakashima. Fewer teens receiving abortions in Virginia. *The Washington Post*, 1998.

NARAL. State profiles. Technical report, 2015.

National Bureau of Economic Research (NBER). Cps merged outgoing rotation groups, 1980-2015, 2017.

National Center for Health Statistics (NCHS). Natality all county files, 1980-2015, 2017.

Robert Picard. GEONEAR: Stata module to find nearest neighbors using geodetic distances. Statistical Software Components, Boston College Department of Economics, April 2010.

Planned Parenthood of Central Missouri v. Danforth. 428 U.S. 52, 1976.

Lauren Ralph, Heather Gould, Anne Baker, and Diana Foster. The role of parents and partners in minors' decisions to have an abortion and anticipated coping after abortion. *Journal of Adolescent Health*, 54:428–434, 2014.

Roe v. Wade. 410 U.S. 113, 1973.

Marco Rubio. Press release regarding the Child Interstate Abortion Notification Act, 2011.

Joseph J. Sabia and D. Mark Anderson. The effect of parental involvement laws on teen birth control use. *Journal of Health Economics*, 45:55–62, 2016.

Rebecca Stone and Cynthia Waszak. Adolescent knowledge and attitudes about abortion. *Family Planning Perspectives*, 24(2):52–57, 1992.

Surveillance, Epidemoiology, and End Results Program (SEER). SEER*Stat Database: Populations-State-level population files (1973-2014) Vintage 2014, 2016.

Planned Parenthood v. Casey. 505 U.S. 833, 1992.

Whole Woman's Health v. Hellerstedt. 579 U.S., 2016.

United States Census Bureau. Centers of population by county, 2010, 2016.

Urban Insitute. Welfare rules database. Online files accessed September 26, 2016.

U.S. House of Representatives Committee on Ways and Means. Green book, 1994-2012.

John Voorheis. State and metropolitan area income inequality in the United States: 1976-2012. Dataset provided by author with updates through 2014, 2014.

Susan Wang. Texas Parental Consent Law Heads to Governor's Desk. *Christian Post*, 2005.

Sylvain Weber and Martin Péclat. GEOROUTE: Stata module to calculate travel distance and travel time between two addresses or two geographical points. Statistical Software Components, Boston College Department of Economics, November 2016.

Monica Yordán. The effects of state contraceptive equity laws. 2014.

Andrew Zuppann. The impact of emergency contraception on dating and marriage. 2013.

Table 1
Summary Statistics

	1980-1992		1993-2014	
	mean	s.d.	mean	s.d.
Birth rate to women aged 15-18 (per 1,000 women)				
Total	44.695	19.913	31.223	16.461
White, non-Hispanic	32.488	15.278	20.174	13.071
Black, non-Hispanic	99.223	30.491	51.353	20.217
Hispanic	86.275	30.097	56.308	27.933
Key measures of minors' abortion access				
Parental involvement law (exposure)	0.155	0.349	0.570	0.493
Travel distance (100s miles)				
To nearest abortion clinic	0.165	0.308	0.198	0.360
To nearest confidential abortion clinic	0.348	0.625	2.004	2.503
Demographic and Economic Controls				
Fraction of population that is				
White, non-Hispanic	0.738	0.208	0.642	0.232
Black, non-Hispanic	0.131	0.143	0.136	0.142
Hispanic	0.095	0.142	0.162	0.177
Urbanized	0.613	0.403	0.693	0.375
In poverty	0.132	0.064	0.138	0.058
Fraction of persons aged 25+ with				
High school degree	0.717	0.102	0.829	0.074
College degree	0.185	0.077	0.262	0.100
Median household income (1,000 $2015)	5.299	1.369	5.961	1.532
Gini coefficient	0.427	0.036	0.496	0.034
Median wage for females ($2015)	13.697	1.651	15.695	1.760
Female unemployment rate	0.072	0.021	0.057	0.018
Welfare Policy Controls				
Max welfare benefit for family of 3 ($2015)	748.734	305.510	518.305	207.600
I(Welfare reform)	0.049	0.216	0.966	0.183
I(Family cap)	0.008	0.090	0.473	0.499
Contraception Policy Controls				
I(Medicaid family planning waiver)	0.001	0.035	0.521	0.499
I(Emergency contraception available OTC)	0.000	0.000	0.501	0.500
I(Contraceptive mandate)	0.000	0.000	0.360	0.480
Abortion Policy Controls				
I(Mandatory delay law)	0.014	0.117	0.371	0.483
I(Medicaid coverage for abortion)	0.389	0.487	0.393	0.488
Distance to nearest provider (100s miles)	0.165	0.308	0.198	0.360

Notes: Population-weighted summary statistics calculated for United States counties ($n = 3,142$) for 1980-1994 and 1995-2014. See Data Documentation Appendix for additional information.

Table 2
Dates of Enforcement of Parental Involvement Laws, 1980-2015

State	Years	State	Years
Alabama	1987-present	Montana[e]	
Alaska	2010-present	Nebraska	1981-1983; 1991-present
Arizona	1982-1987; 2003-present	Nevada	
Arkansas	1989-present	New Hampshire	2012-present
California		New Jersey	
Colorado	2003-present	New Mexico	
Connecticut[a]		New York	
Delaware[b]	1995-present	North Carolina	1995-present
D.C.		North Dakota	1981-present
Florida	2005-present	Ohio	1990-present
Georgia	1991-present	Oklahoma	2001-2002; 2004-present
Hawaii		Oregon	
Idaho	2000-2004; 2007-present	Pennsylvania	1994-present
Illinois	2013-present	Rhode Island	1982-present
Indiana	1982-present	South Carolina[f]	1990-present
Iowa	1997-present	South Dakota	1997-present
Kansas	1992-present	Tennessee	1992-1996; 2000-present
Kentucky	1989-present	Texas	2000-present
Louisiana	1981-present	Utah[g]	2006-present
Maine[c]		Vermont	
Maryland[d]		Virginia	1997-present
Massachusetts	1981-present	Washington	
Michigan	1991-present	West Virginia[h]	1984-present
Minnesota	1981-1986; 1990-present	Wisconsin[i]	1992-present
Mississippi	1993-present	Wyoming	1989-present
Missouri	1985-present		

Source: Myers (2016b).
[a] A Connecticut law enforced from 1990 to present requires that minors receive counseling prior to an abortion to encourage them to discuss the decision with a parent, but does not require parental involvement.
[b] A Delaware law enforced from 1995 to present requires parental notification for minors under age 16. Minors can also consult a licensed medical health care professional in lieu of a parent.
[c] A Maine law enforced from 1989 to present requires parental consent unless the providing physician judges the recipient meets a mature minor standard.
[d] A Maryland law enforced from 1992 to present requires parental notification unless the providing physician judges that the recipient meet a mature minor standard or that notification would not be in the best interest of the minor.
[e] Montana enforced a parental notification law for minors under age 16 from January 2013 through February 2014.
[f] The South Caroline law applies to women under age 17.
[g] A 1974 parental notification statute appears to have been enforced only for minors not meeting a mature minor standard until 2006, when a parental consent requirement was enacted.
[h] The West Virginia law requires parental notification unless an independent physician determines that the recipient meets a mature minor standard or that an abortion would be in her best interest.
[i] Wisconsin's 1985 law required providers to "strongly encourage" minors to consult a parent unless "the minor has a valid reason for not doing so." In 1992 the state passed a law requiring notification of a parent or other adult family member.

Table 3
Lagged outcomes do not predict parental involvement policy change

	(1)	(2)	(3)	(4)
log(birth rate, ages 15-18$_{t-1}$)	-0.064	-0.057		
	(0.042)	(0.040)		
log(abortion rate, ages 15-17$_{t-1}$)			0.027	0.050
			(0.039)	(0.050)
County FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
State Linear Time Trends	no	no	no	no
Additional Controls	no	yes	no	yes

Notes: Linear probability model in which the outcome indicates enforcement of a parental involvement law at time t. Observations are state-year cells for 1980-2015. Models in Columns 3-4 are estimated using only years in which the lagged teen abortion rate is available in the Guttmacher data. Additional controls include the full set of demographic, economic and policy controls listed in Table 1.

Table 4
Effect of Parental Involvement Laws on Teen Birth Rates, 1980-1992 and 1993-2014

	1980-1992			1993-2014		
	(1)	(2)	(3)	(1)	(2)	(3)
Panel A: Parental Involvement Law Indicator						
Parental Involvement Law	-0.015*	-0.014*	-0.014*	0.028***	0.029***	0.028***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Panel B: Avoidance Distance						
Parental Involvement Law	-0.010	-0.010	-0.010	0.011	0.016	0.015*
	(0.007)	(0.007)	(0.007)	(0.009)	(0.010)	(0.009)
Avoidance Distance (100s miles)	-0.003	-0.005	-0.006	0.018***	0.015***	0.014***
	(0.010)	(0.010)	(0.010)	(0.003)	(0.003)	(0.003)
Avoidance Distance^2	-0.001	0.000	0.002	-0.002***	-0.002***	-0.002***
	(0.005)	(0.004)	(0.004)	(0.000)	(0.000)	(0.000)
County FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
State Linear Time Trends	yes	yes	yes	yes	yes	yes
Distance to provider	yes	yes	yes	yes	yes	yes
Demographic & Economic controls	no	yes	yes	no	yes	yes
Welfare & Abortion Policy Controls	no	no	yes	no	no	yes

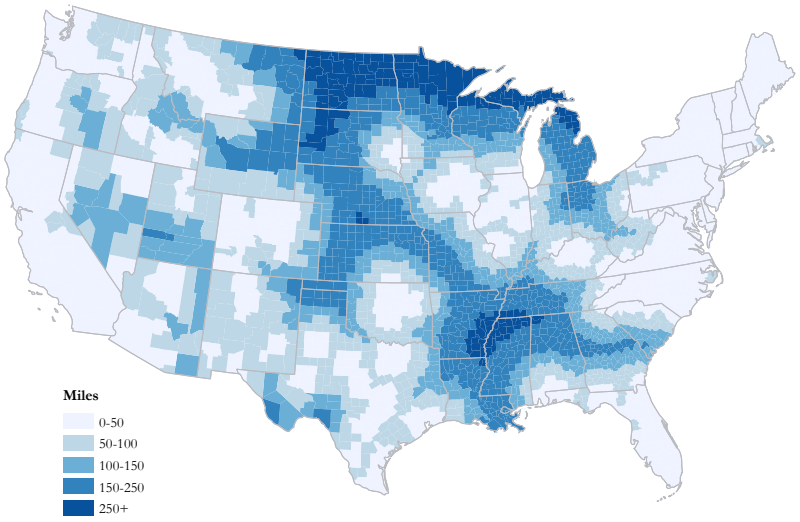
Notes: Estimated coefficients for Poisson models with county and year fixed effects and state linear time trends. Rates are based on county-level populations of women aged 15 to 18. Standard errors (in parentheses) allow errors to be correlated within counties over time. Outcomes are county-level births to women aged 15 to 18. Control variables are listed in Table 1.

Table 5
Effect of Parental Involvement Laws on Teen Abortion Rates

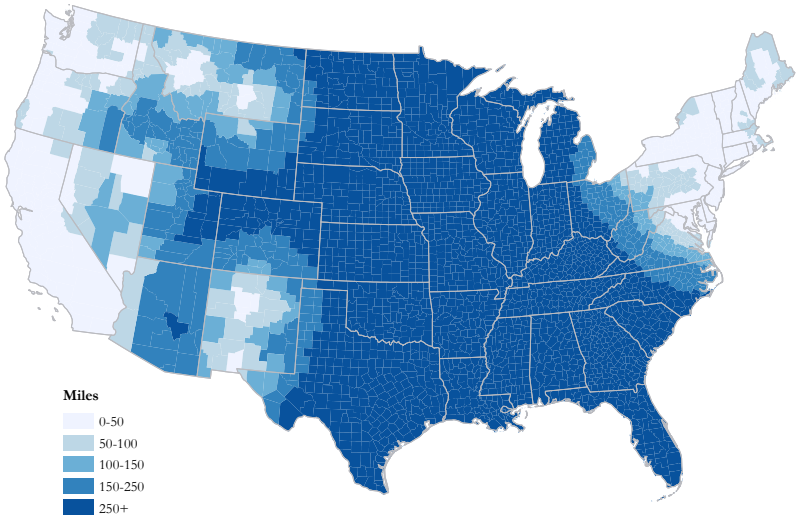
	Ages 15-17			Ages 18-19		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Parental Involvement Law Indicator						
Parental Involvement Law	-0.134***	-0.123***	-0.112***	-0.020	-0.003	0.009
	(0.045)	(0.042)	(0.039)	(0.045)	(0.040)	(0.041)
Panel B: Avoidance Distance						
Parental Involvement Law	-0.189**	-0.175**	-0.175***	-0.031	-0.026	-0.028
	(0.074)	(0.067)	(0.057)	(0.051)	(0.051)	(0.054)
Avoidance Distance (100s miles)	0.032	0.030	0.045	0.030	0.037	0.050
	(0.046)	(0.043)	(0.036)	(0.034)	(0.033)	(0.033)
Avoidance Distance^2	-0.002	-0.001	-0.003	-0.005	-0.006	-0.007*
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
County FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
State Linear Time Trends	yes	yes	yes	yes	yes	yes
Distance to provider	yes	yes	yes	yes	yes	yes
Demographic & Economic controls	no	yes	yes	no	yes	yes
Welfare & Abortion Policy Controls	no	no	yes	no	no	yes

Notes: Estimated coefficients for population-weighted OLS models with county and year fixed effects. The outcome variable is the logged abortion rate by state of residence to women of the indicated age. This outcome is obtained from the Guttmacher Institute and is available only in 1985, 1988, 1992, 1996, 2000, 2005, 2008, 2010, and 2011. Standard errors (in parentheses) allow errors to be correlated within counties over time. Control variables are listed in Table 1.

Figure 1
Spatial and temporal variation in the average travel distance to obtain a "confidential" abortion without parental involvement



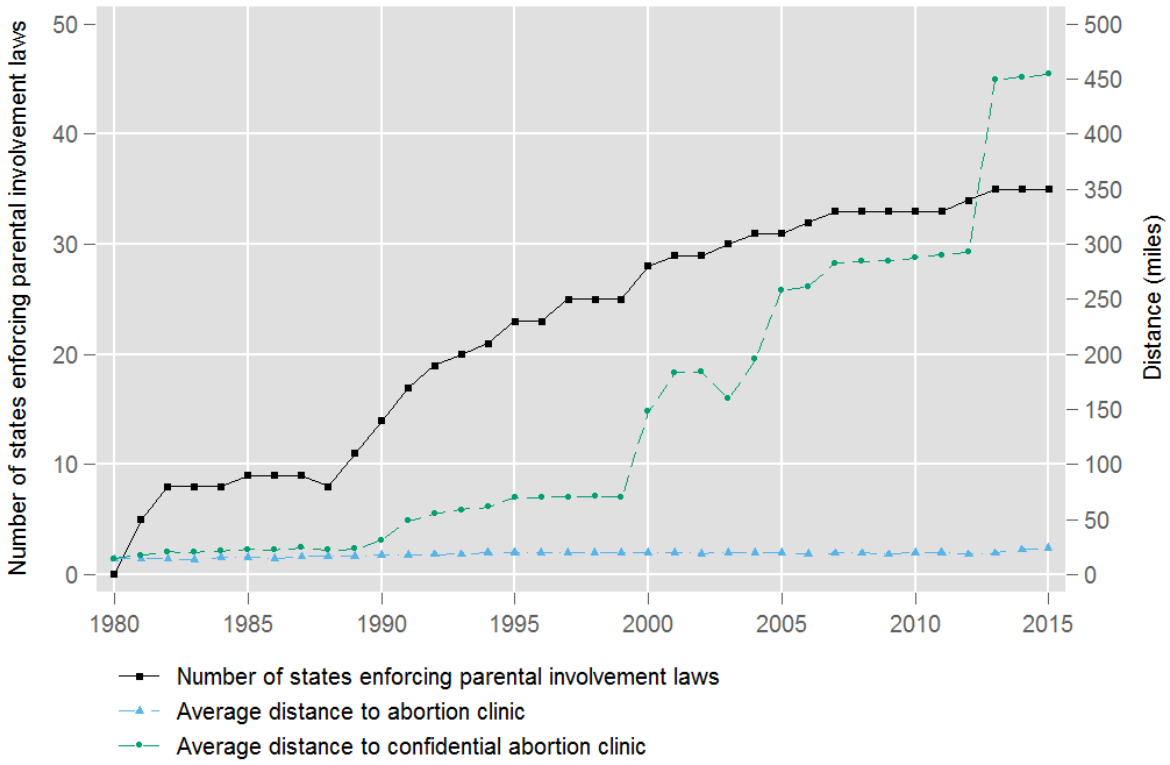
1992



2015

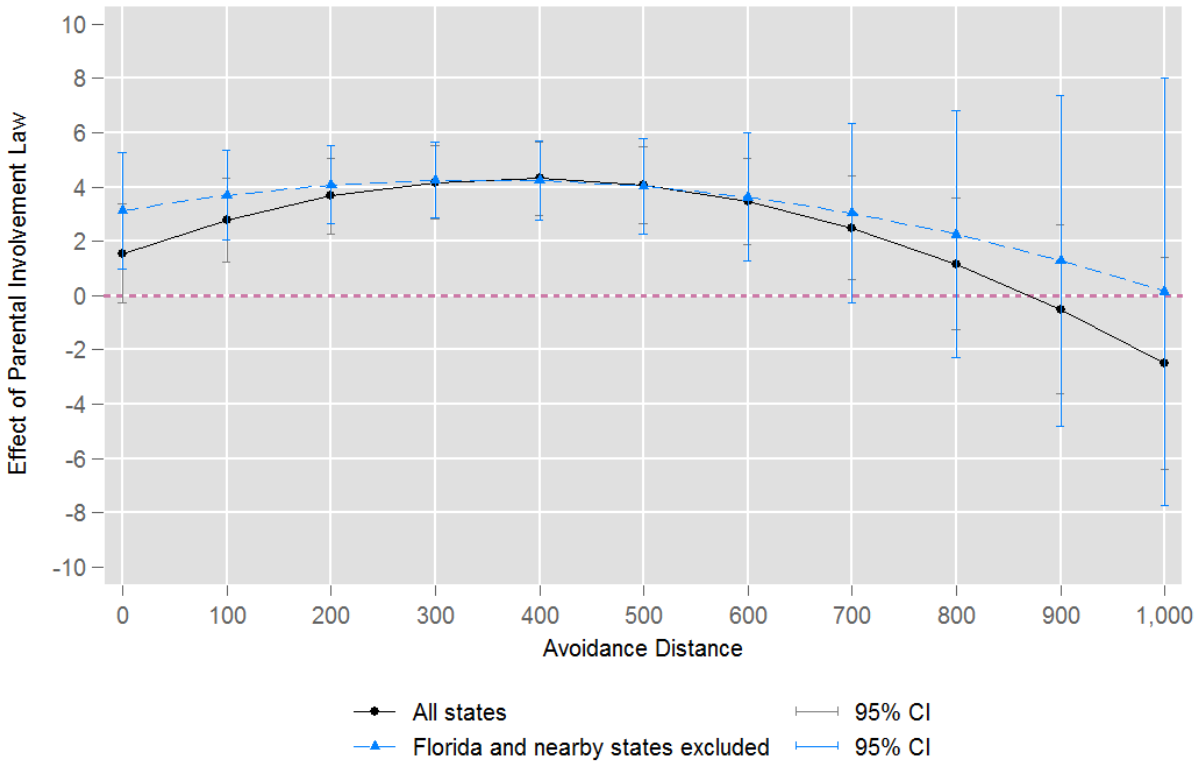
Notes: Average travel distances to the nearest county with an abortion provider not subject to a parental involvement law. Sources: The clinic operations data were compiled by the authors, and distances calculated as described in the text. Geographic coordinates of county population centroids were obtained from the United States Census Bureau (2016).

Figure 2
Parental Involvement Laws and Average Travel Distances, 1980-2015



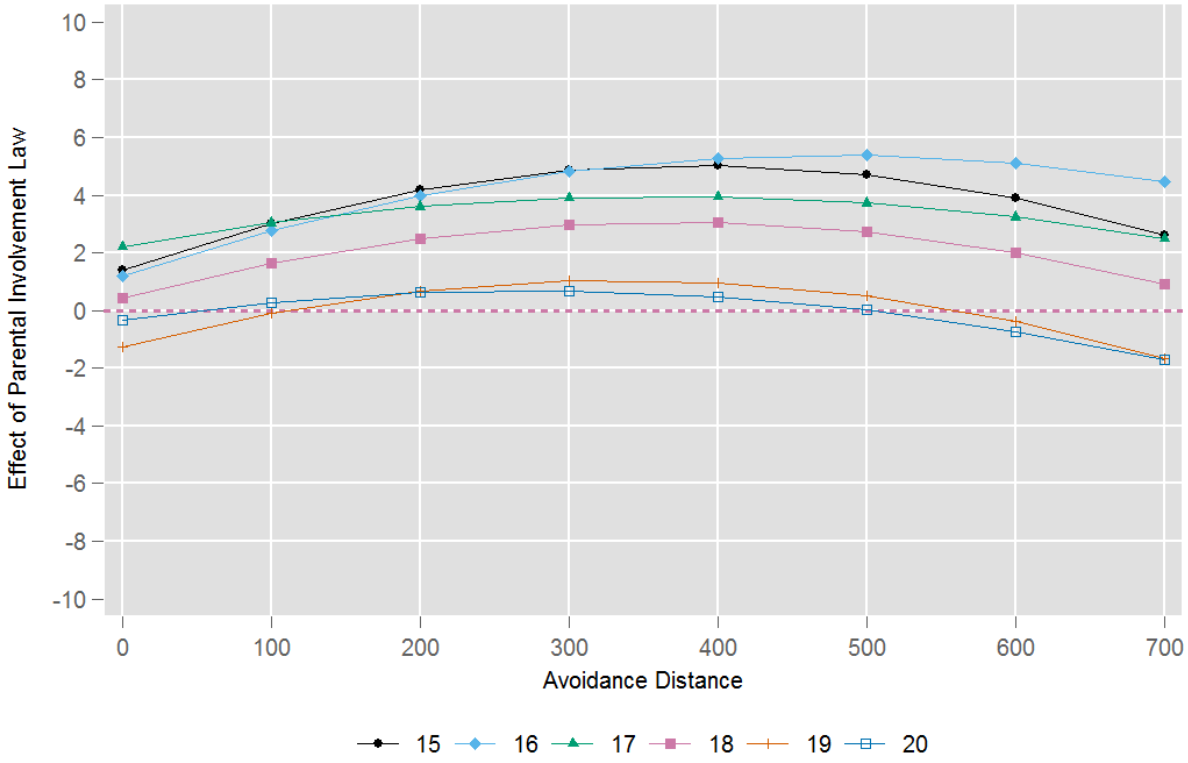
Notes: The left axis measures the total number of states that enforced a parental involvement law at any time in a given year. The right axis measures population-weighted average travel distances between the population centroids of each county and the nearest county with an abortion clinic and the nearest county with an abortion clinic that is not subject to a parental involvement law and can provide a "confidential" abortion. Sources: The clinic operations data were compiled by the authors as described in the text. Annual county-level population estimates were obtained from SEER (2016), and geographic coordinates of county population centroids were obtained from the United States Census Bureau (2016).

Figure 3
Estimated percent effect of parental involvement laws as a function of avoidance distance



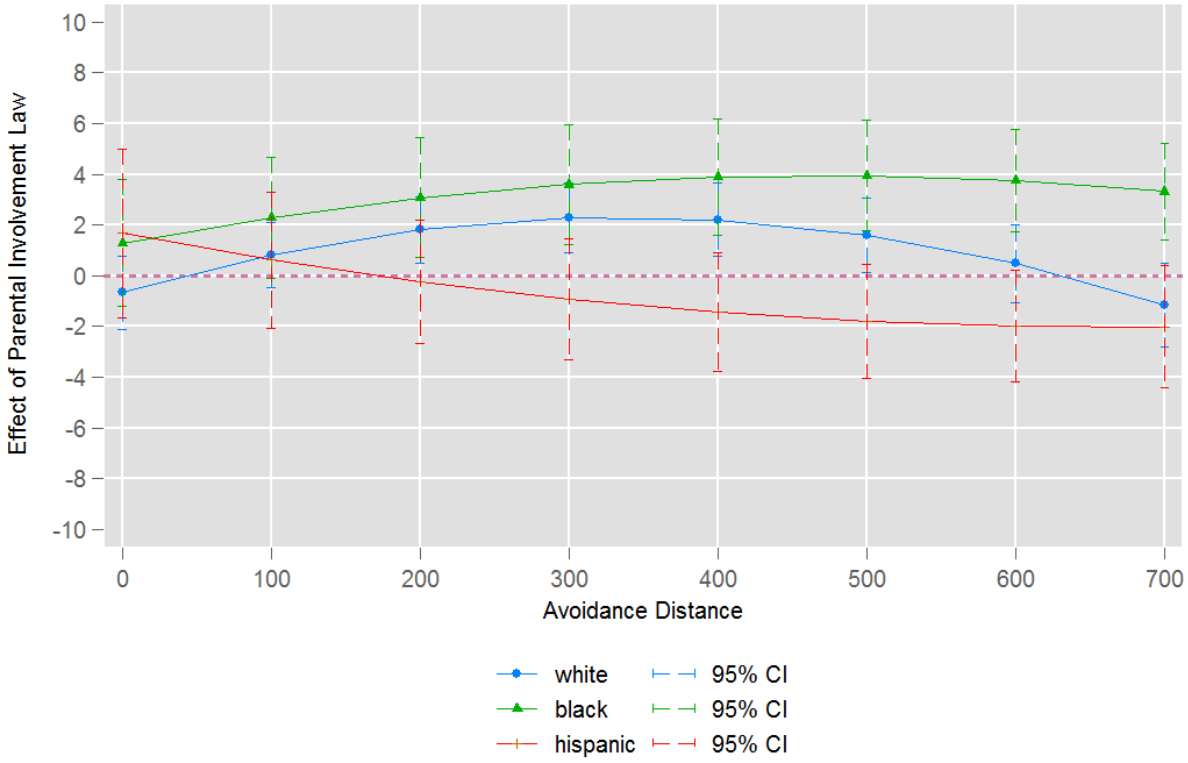
Notes: Estimated average percent effects and 95 percent confidence intervals based on the results in Column 6 of Table 4. Results excluding Florida and nearby states exclude Alabama, Florida, Georgia, Mississippi, and South Carolina from the analysis.

Figure 4
Estimated percent effect of parental involvement laws as a function of avoidance distance, by Age



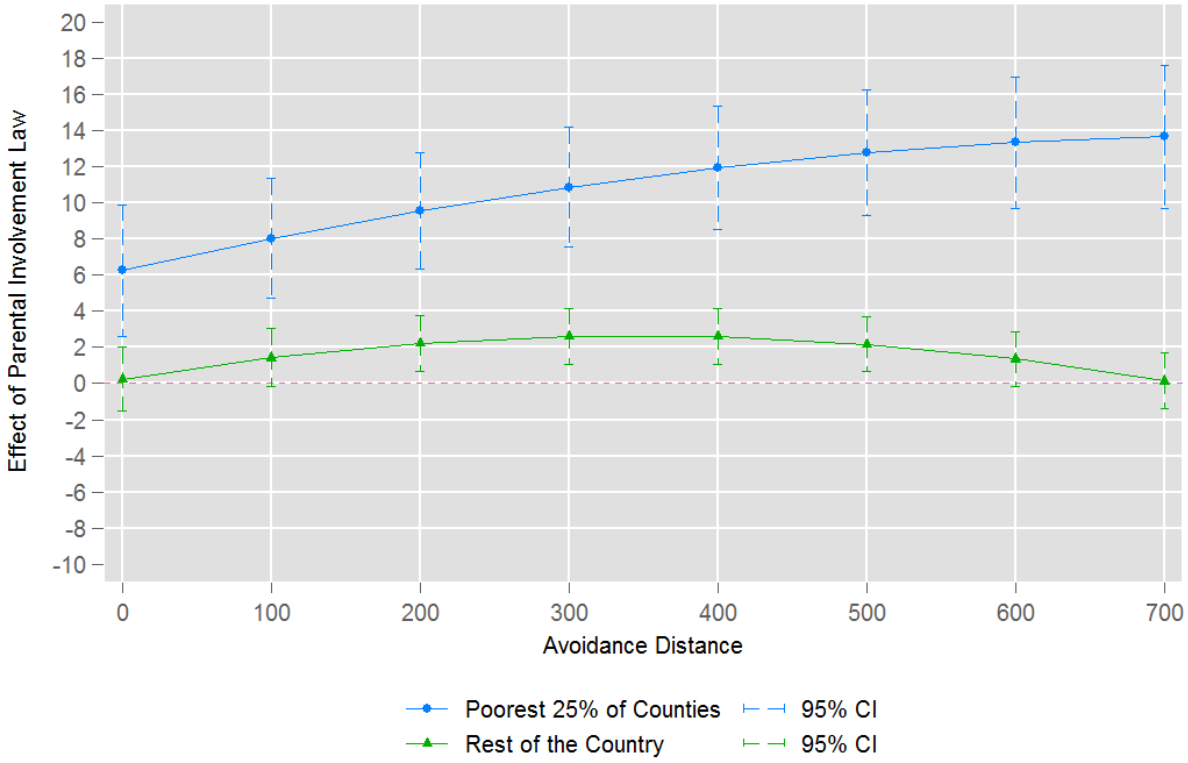
Notes: Estimated average percent effects and 95 percent confidence intervals by individual year of age at time of birth. All models include the full set of control variables, state and year fixed effects, and state-linear time trends. TableA3 reports coefficients and standard errors.

Figure 5
Estimated percent effect of parental involvement laws as a function of avoidance distance, by Race and Ethnicity



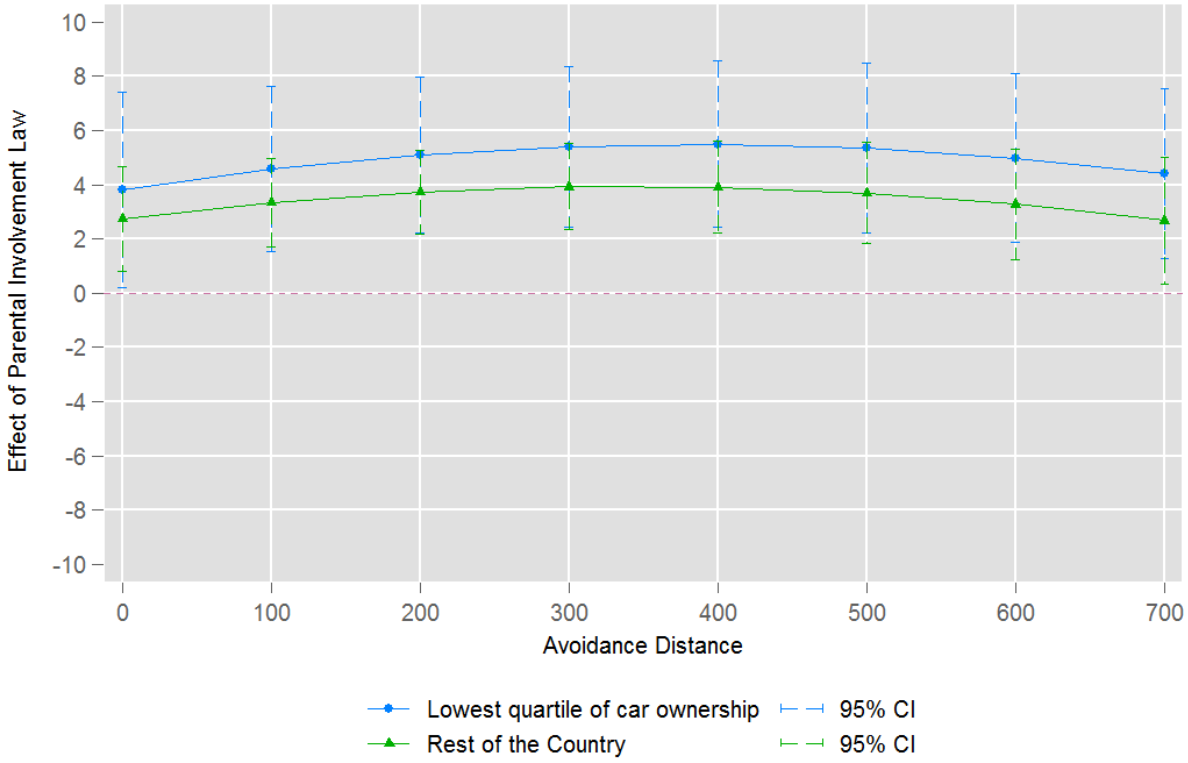
Notes: Estimated average percent effects and 95 percent confidence intervals by maternal race and ethnicity. All models include the full set of control variables, state and year fixed effects, and state-linear time trends. TableA4 reports coefficients and standard errors.

Figure 6
Estimated percent effect of parental involvement laws as a function of avoidance distance, by county poverty



Notes: Results of a specification corresponding to Column 6 of Table 4 that additionally allows for heterogeneous effects in the poorest quartile of United States Counties. Counties are classified according to their poverty quartile in the 2010 Census, and an indicator for the poorest quartile of counties is interacted with the key policy variables. All models include the full set of control variables, state and year fixed effects, and state-linear time trends.

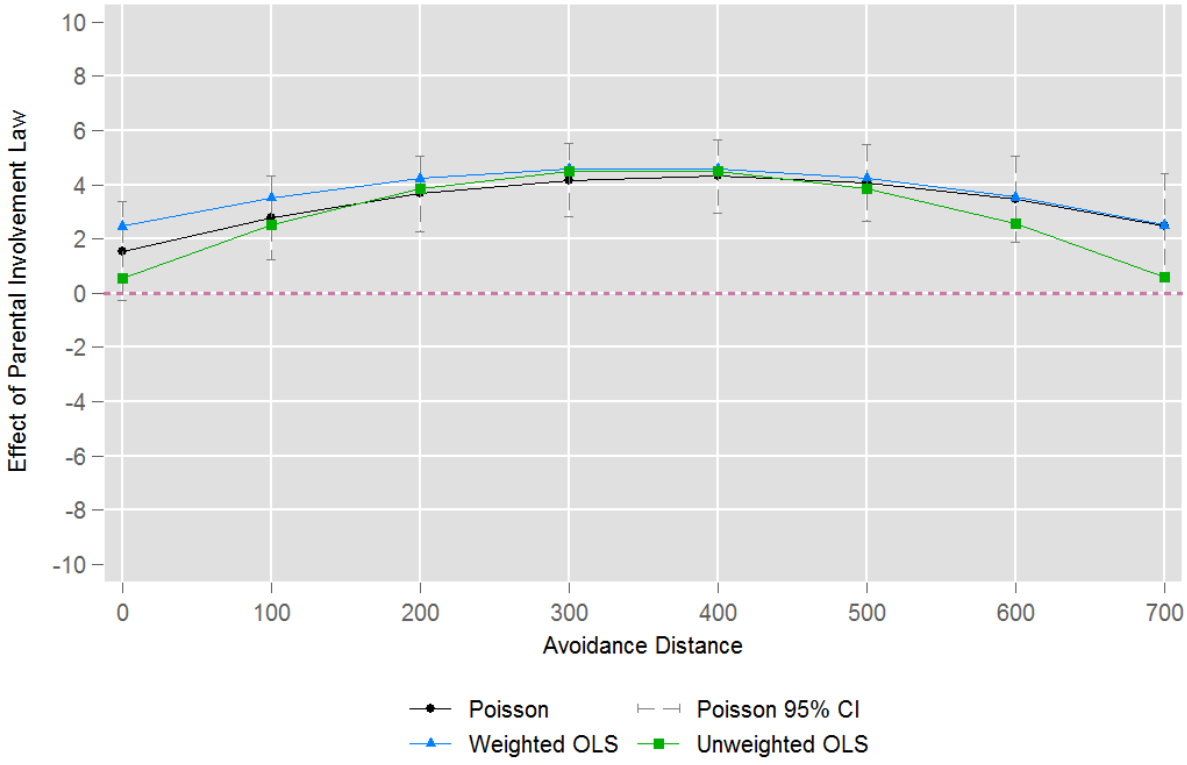
Figure 7
Estimated percent effect of parental involvement laws as a function of avoidance distance, by county car ownership



Notes: Results of a specification corresponding to Column 6 of Table 4 that additionally allows for heterogeneous effects in the lowest quartile of car ownership of United States counties. Counties are classified according to the percentage of households with a car in the 2010 Census, and an indicator for the lowest quartile of car ownership is interacted with the key policy variables. All models include the full set of control variables, state and year fixed effects, and state-linear time trends.

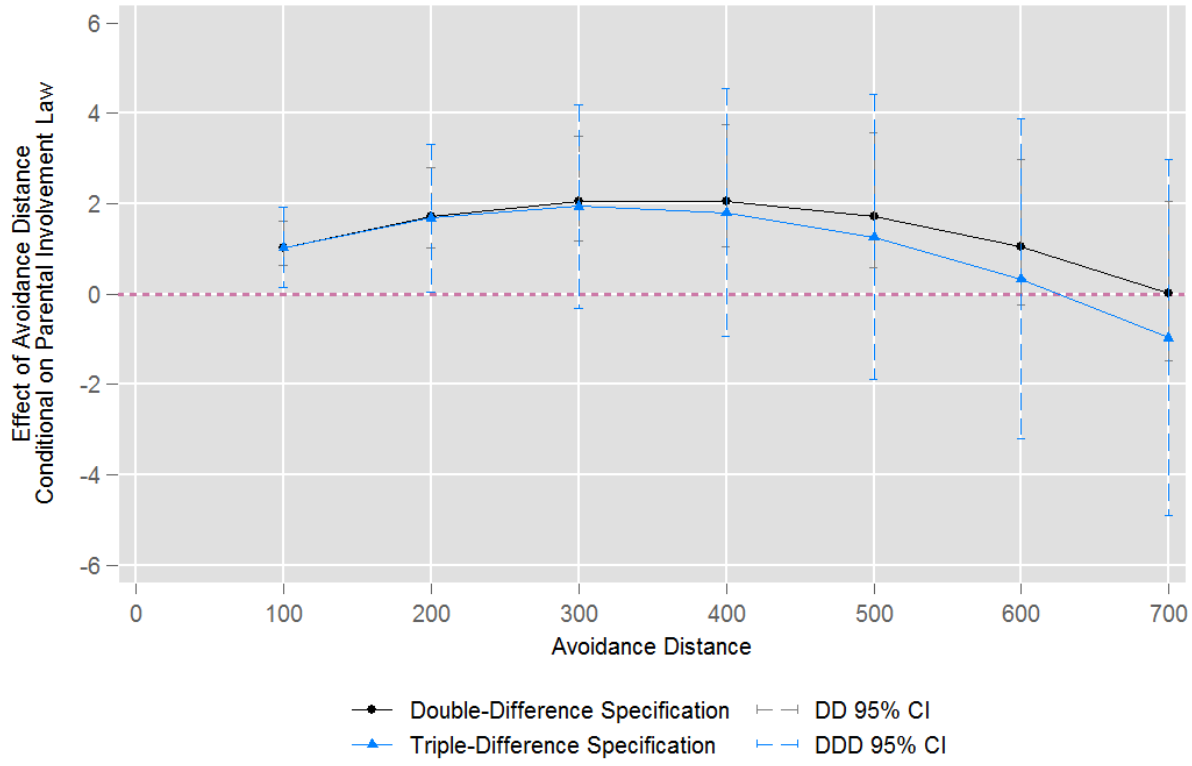
APPENDIX A: ROBUSTNESS CHECKS AND ADDITIONAL RESULTS

Figure A1
Estimated percent effect of parental involvement laws on teen birth rates,
Comparison of Poisson, Weighted OLS, and OLS estimates



Notes: Poisson results are the estimated average percent effects and 95 percent confidence intervals based on the results in Column 6 of Table 4. These also are graphed in Figure 3. Weighted OLS and Unweighted OLS results are based on Ordinary Least Squares models in which the logged birth rate is the outcome variables. Cells with zero reported births are excluded from the OLS models.

Figure A2
Comparison of Double and Triple-Difference Estimates of the Effects of Avoidance Distance on teen birth rates,
Weighted OLS Specifications



Notes: Average percent effects of a 100 mile increase in avoidance distance, *conditional* on enforcement of a parental involvement law. Weighted OLS models in which the outcome is the log of births to teens aged 15-18. All models include state$x$year fixed effects as well as the full set of control variables that vary at the county-year level.

Table A1
Effect of Parental Involvement Laws on Teen Birth Rates:
Table 4 Estimated with Geodesic Distances

	1980-1992			1993-2014		
	(1)	(2)	(3)	(1)	(2)	(3)
Panel A: Parental Involvement Law Indicator						
Parental Involvement Law	-0.015*	-0.014*	-0.014*	0.028***	0.029***	0.028***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Panel B: Avoidance Distance						
Parental Involvement Law	-0.009	-0.009	-0.009	0.012	0.017*	0.016*
	(0.007)	(0.007)	(0.007)	(0.009)	(0.010)	(0.009)
Avoidance Distance (100s miles)	-0.024*	-0.025*	-0.026*	0.021***	0.017***	0.016***
	(0.015)	(0.014)	(0.014)	(0.004)	(0.004)	(0.004)
Avoidance Distance^2	0.012	0.013	0.015*	-0.003***	-0.003***	-0.002***
	(0.009)	(0.009)	(0.009)	(0.000)	(0.000)	(0.000)
County FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
State Linear Time Trends	yes	yes	yes	yes	yes	yes
Demographic & Economic controls	no	yes	yes	no	yes	yes
Welfare & Abortion Policy Controls	no	no	yes	no	no	yes

Notes: Table 4 estimated using geodesic ("as the crow flies") distances rather than travel distances. See notes to Table 4.

Table A2
Effect of Parental Involvement Laws on Teen Birth Rates:
Table 4 Estimated without State Linear Time trends

	1980-1992			1993-2014		
	(1)	(2)	(3)	(1)	(2)	(3)
Panel A: Parental Involvement Law Indicator						
Parental Involvement Law	-0.038***	-0.009	-0.010	0.063***	0.056***	0.027***
	(0.012)	(0.010)	(0.010)	(0.017)	(0.014)	(0.010)
Panel B: Avoidance Distance						
Parental Involvement Law	-0.038**	-0.012	-0.010	-0.014	0.007	-0.001
	(0.016)	(0.015)	(0.014)	(0.017)	(0.014)	(0.011)
Avoidance Distance (100s miles)	-0.026*	-0.020	-0.013	0.056***	0.041***	0.032***
	(0.015)	(0.014)	(0.013)	(0.007)	(0.005)	(0.004)
Avoidance Distance^2	0.015**	0.013**	0.007	-0.006***	-0.004***	-0.004***
	(0.006)	(0.006)	(0.005)	(0.001)	(0.001)	(0.000)
County FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
State Linear Time Trends	no	no	no	no	no	no
Distance to provider	yes	yes	yes	yes	yes	yes
Demographic & Economic controls	no	yes	yes	no	yes	yes
Welfare & Abortion Policy Controls	no	no	yes	no	no	yes

Notes: Table 4 estimated without state-linear time trends. See notes to Table 4.

Table A3
Effect of Parental Involvement Laws on Birth Rates by Age

	Age					
	15	16	17	18	19	20
Panel A: Parental Involvement Law Indicator						
Parental Involvement Law	0.030**	0.035***	0.029***	0.015*	-0.005	-0.004
	(0.012)	(0.011)	(0.008)	(0.008)	(0.007)	(0.007)
Panel B: Avoidance Distance						
Parental Involvement Law	0.014	0.012	0.022*	0.004	-0.013	-0.003
	(0.017)	(0.015)	(0.011)	(0.009)	(0.008)	(0.009)
Avoidance Distance (100s miles)	0.018***	0.017***	0.009**	0.014***	0.014***	0.007**
	(0.007)	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)
Avoidance Distance^2	-0.002***	-0.002***	-0.001**	-0.002***	-0.002***	-0.001***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
County FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
State Linear Time Trends	yes	yes	yes	yes	yes	yes
All Controls	yes	yes	yes	yes	yes	yes

Notes: Table 4 estimated by individual year of age at birth. The results in Panel B are plotted in Figure 4.

Table A4
Effect of Parental Involvement Laws on Teen Birth Rates by Race and Ethnicity

	Race or Ethnicity			
	All	White	Black	Hispanic
Panel A: Parental Involvement Law Indicator				
Parental Involvement Law	0.028***	0.005	0.027***	-0.009
	(0.007)	(0.006)	(0.010)	(0.011)
Panel B: Avoidance Distance				
Parental Involvement Law	0.015*	-0.007	0.013	0.017
	(0.009)	(0.007)	(0.013)	(0.017)
Avoidance Distance (100s miles)	0.014***	0.018***	0.011***	-0.011
	(0.003)	(0.003)	(0.004)	(0.007)
Avoidance Distance^2	-0.002***	-0.003***	-0.001**	0.001
	(0.000)	(0.000)	(0.000)	(0.001)
County FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
State Linear Time Trends	yes	yes	yes	yes
All Controls	yes	yes	yes	yes

Notes: Table 4 estimated by race and ethnicity. The results in Panel B are plotted in Figure 5.