

**The Effect of Parental Involvement Laws on Teen  
Birth Control Use\***

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### **Abstract**

In Volume 32, Issue 5 of this journal, Colman, Dee, and Joyce (CDJ) used data from the National Youth Risk Behavior Surveys (NYRBS) and found that parental involvement (PI) laws had no effect on the probability that minors abstain from sex or use contraception. We re-examine this question, augmenting the NYRBS with data from the *State* Youth Risk Behavior Surveys (SYRBS), and use a variety of identification strategies to control for state-level time-varying unmeasured heterogeneity. Consistent with CDJ, we find that PI laws have no effect on minor teen females' abstinence decisions. However, when we exploit additional state policy variation unavailable to CDJ and use non-minor teens as a within-state control group, we find evidence to suggest that PI laws are associated with an increase in the probability that sexually active minor teen females use birth control.

**Keywords: Parental Involvement Laws; Teen Sexual Activity; Birth Control**

## I. Introduction

Parental involvement laws require a pregnant minor contemplating an abortion to notify or obtain the consent of one or more parents before an abortion can legally be performed. Such laws are expected to increase the expected costs of abortion to minor teens, which may generate spillover effects down “the fertility tree” that include an increase in sexual abstinence or birth control use (Levine 2003).<sup>1</sup> However, using data from the National Youth Risk Behavior Surveys (NYRBS) for the period 1991 through 2009, Colman, Dee, and Joyce (CDJ, 2013) found that PI laws had no effect on the probability that 15-to-17 year-olds remained sexually abstinent or used birth control.

While CDJ’s study raised important doubts about whether PI laws influence teen sexual behavior, a number of important questions remain. First, the NYRBS does not include data on a number of states that began enforcing parental involvement laws during the 1990s and 2000s. Second, because the NYRBS contains relatively small numbers of non-minor teens, CDJ were unable to exploit individuals ages 18 and older as an additional counterfactual. Lastly, because the NYRBS was not designed to be representative at the state level, many states contributed less than 100 and occasionally just dozens of observations in each year. This may lead to greater variance in estimates (Hansen, Rees, and Sabia 2014).<sup>2</sup>

Our study contributes to CDJ’s work by using data from a new source, the State Youth Risk Behavior Surveys (SYRBS). An important advantage of the SYRBS data is they contain

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<sup>1</sup> A number of studies have found that PI laws are associated with a decline in minor teen abortions (see, for example, Haas-Wilson (1996), Levine (2003), and Sabia and Rees (2012)). Levine (2003) and Sabia and Rees (2012) concluded that PI-induced reductions in abortions were driven by declines in pregnancy, while Joyce, Kaestner, and Colman (2006) found evidence that PI laws may have simply changed the timing of teen pregnancy. Levine (2013) and Klick and Stratman (2008) found evidence that PI laws were associated with reductions in unprotected sex, but CDJ called Klick and Stratman’s (2008) identification strategy and treatment of missing data into question.

<sup>2</sup> Moreover, if measurement error were correlated with enactment of PI laws, this could also lead to biased estimates.

data from a number of states that were not sampled in the NYRBS, but did change their PI laws, allowing us to exploit additional policy variation for identification. In addition, the SYRBS data contain hundreds, and sometimes thousands, of observations in each state and year, reducing measurement error in state-level estimates. Finally, to better disentangle policy impacts from state-level unmeasured heterogeneity, we control for state-specific linear time trends, use non-minor teens as an additional control group, and conduct falsification tests using enjoined PI laws.

## II. Data and Empirical Strategy

Our analysis uses repeated cross-sectional data on U.S. high school students from 1993 to 2011, first from the NYRBS, then from the SYRBS, and finally from the combined state and national surveys. The NYRBS is conducted biennially by the Centers for Disease Control and Prevention (CDC) and, when weighted, is representative of the population of U.S. high school students. The state surveys are also administered to high school students and contain most of the questions in the NYRBS. While the state surveys are coordinated by the CDC, they are usually conducted by state education and health agencies. Estimates from the state YRBS are designed to be representative at the state level, but recent research has utilized Census population estimates to ensure representation at the national level (Anderson 2010). Females ages 15 to 17 comprise our treatment group.<sup>3</sup>

Each of our four dependent variables is dichotomous in nature. *Sex* measures whether the respondent reported a positive number of sexual partners in the three months prior to the interview date. Then, conditional on engaging in sexual intercourse, *Birth Control* measures whether the respondent used any form of pregnancy prevention at most recent intercourse,

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<sup>3</sup> Our main findings are not sensitive to adding 13 and 14 year-old females to the treatment group.

*Condom* measures whether she used a condom at most recent intercourse, and *Pill* measures whether she used the birth control pill as the main form of birth control at recent intercourse.<sup>4</sup>

In the SYRBS sample, 35 percent of females ages 15 to 17 reported engaging in sexual intercourse in the previous three months (see Table 1). Similar proportions were reported in the national (.376) and combined state and national (.355) samples. As expected, rates of sexual activity were higher for those ages 18 and older (.545 to .558). Conditional on engaging in sexual activity, 86.2 percent reported using some form of contraception at most recent intercourse, 56 percent of 15 to 17 year-old females in the SYRBS reported condom use, and 22.3 percent reported use of the birth control pill at most recent intercourse.

We begin by restricting the sample to those ages 15 to 17 and estimate a difference-in-difference model in the spirit of CDJ:

$$Y_{ist} = \alpha + \delta PI Law_{st} + X_{it}\beta + Z_{st}\phi + \theta_s + \tau_t + \varepsilon_{ist} \quad (1)$$

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<sup>4</sup> The following survey items were used to code our four outcomes:

- (i) “During the past 3 months, with how many people did you have sexual intercourse?”
- (ii) “The last time you had sexual intercourse, did you or your partner use a condom?”
- (iii) “The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?”
  - (1) I have never had sexual intercourse;
  - (2) No method was used to prevent pregnancy;
  - (3) Birth control pills;
  - (4) Condoms;
  - (5) Depo-Provera (or any injectable birth control), Nuva Ring (or any birth control ring), Implanon (or any implant), or any IUD;
  - (6) Withdrawal;
  - (7) Some other method;
  - (8) Not sure.”

*Sex* is set equal to 1 if the respondent reports a positive number of partners in response to item (i) and 0 otherwise. Conditional on *Sex* = 1, *Condom* is set equal to 1 if the respondent answers “yes” to item (ii) and 0 otherwise; *Birth Control* is set equal to 1 if the respondent selects (1), (2), (3), (4), (5), or (7) from item (iii) and 0 otherwise; and *Pill* is set equal to 1 if the respondent selects (3) from item (iii) and 0 otherwise.

where  $i$  indexes the individual,  $s$  indexes the respondent's state of residence, and  $t$  indexes the survey year.  $PI\ Law_{st}$  is an indicator for whether state  $s$  is enforcing a parental involvement law; the vector  $X$  contains individual-level controls including age, race, and grade; the vector  $Z$  contains state-level economic and policy controls including the unemployment rate, real per capita income, state beer taxes, .08 BAC laws, zero tolerance laws, Medicaid funding restrictions for abortions, and requirements for mandatory information and waiting periods before an abortion may be legally performed.<sup>5</sup> Finally,  $\theta_s$  is a year-invariant state effect and  $\tau_t$  is a state-invariant year effect. Identification of  $\delta$  comes from within-state variation in PI laws.

In the first column of Table 2, we list the 14 states that changed binding PI laws during the 1993 to 2011 period. Of these 14 states, eleven contributed observations before and after their PI law went into effect in the National or State YRBS. A total of seven contributed identifying variation in the SYRBS. Three of these states (Iowa, South Dakota, and Wyoming) did not contribute identifying variation to the NYRBS. In the NYRBS, eight states contributed identifying variation; four of these states (Arizona, Colorado, Mississippi, and Tennessee) did not contribute identifying variation in the state YRBS.<sup>6</sup>

Estimates of  $\delta$  from equation (1) will only be unbiased in the absence of state-specific time-varying unobservables that are simultaneously correlated with the enforcement of PI laws

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<sup>5</sup> Due to concerns of multicollinearity between PI laws and the other abortion-related laws, we experimented with estimating our models with and without these controls. In general, the coefficient estimate on  $PI\ Law$  was not sensitive to whether or not these controls were included.

<sup>6</sup> In Appendix Table 1A, we show the number of 15-to-17 year-old females in each state-year cell in the NYRBS. With the exception of Texas (which, on average, contributed 671 observations per year), states in the NYRBS that changed their PI laws contributed, on average, 156 observations per state-year. A few of these states contributed only 30 to 50 observations per year. For instance, Colorado and North Carolina contributed only 37 and 53 observations in 1995, respectively. Moreover, when the NYRBS sample is conditioned on those who were sexually active, the average number of 15-to-17 year-old females per state-year cell falls to 48. Appendix Table 1B repeats this exercise using the SYRBS. In contrast to the NYRBS, the SYRBS contains an average of over 800 observations per state-year in states that changed their PI laws. Even after conditioning on sexual activity, there are still hundreds of observations per state and year.

and teen sexual behavior and in the absence of reverse causality.<sup>7</sup> We take a number of tacks to mitigate these possibilities. First, we control for other state abortion policies that could be implemented contemporaneously with PI laws. Second, we add state-specific linear time trends to the right-hand-side of equation (1). Third, we pool minor and non-minor teens and estimate a difference-in-difference-in-difference model of the following form:

$$\begin{aligned}
 Y_{ist} = & \pi + \delta_1 PI\ Law_{st} + \delta_2 UNDER18_i + \delta_3 PI\ Law_{st} * UNDER18_i \\
 & + \mathbf{X}_{it} \boldsymbol{\beta}_1 + \mathbf{X}_{it} * UNDER18_i \boldsymbol{\beta}_2 + \mathbf{Z}_{st} \boldsymbol{\varphi}_1 + \mathbf{Z}_{st} * UNDER18_i \boldsymbol{\varphi}_2 \\
 & + \theta_s + \theta_s * UNDER18_i + \tau_t + \tau_t * UNDER18_i + \varepsilon_{ist}
 \end{aligned} \tag{2}$$

where  $UNDER18_i$  is an indicator set equal to 1 if the respondent is under the age of 18. The coefficient of interest,  $\delta_3$ , is the effect of PI laws on 15 to 17 year-olds relative to those ages 18 and older. In some specifications, we also include state-by-year effects,  $\omega_{st}$ , to more flexibly control for state-specific time-varying shocks common to minor and non-minor females.

To further test the common trends assumption, we examine states that had passed PI policies, but had these laws enjoined by courts. Because enjoined laws are not enforced, they should not affect the cost of risky sex for minors, but may capture changes in state reproductive health sentiment correlated with teen sexual behavior. Thus, we re-estimate equation (2) using enjoined PI laws as a falsification test.

### III. Results

Columns (1) through (4) of Table 3 show results using the NYRBS. In Panel I, we present estimates of equation (1). These results, if taken at face value, suggest that PI laws are

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<sup>7</sup> To address the issue of reverse causality, we created lags of the state-year mean rates of the four sexual behavior outcomes of interest. In a series of state-level panel regressions, we regressed  $PI\ Law$  on these lags, the full set of state-level covariates, state and year fixed effects, and state-specific time trends. We found no evidence suggesting that lags in teen female sexual behavior predict that passage of PI laws.

associated with a 12.5 percent (.047/.376) percent *increase* in the probability of recent sexual activity (column 1), but no changes in the probabilities of condom use (column 2), pregnancy prevention (column 3) or birth control pill use (column 4). The inclusion of controls for state-specific linear time trends (Panel II) reduces the magnitudes of the estimated associations between PI laws and minor teen female sexual activity substantially and renders each of them statistically indistinguishable from zero, suggesting that failing to control for state-specific time-varying unobservables may upwardly bias estimates of PI effects.<sup>8</sup> A similar pattern of results is found when using a difference-in-difference-in-difference approach (equation 2) with high school students ages 18 and older serving as a within-state control group (Panels III and IV). Together, our findings in columns (1) through (4) are consistent CDJ and show that PI laws have no effect on sexual abstinence or birth control use.

In columns (5) through (8) of Table 3, we repeat our analyses using the SYRBS. Consistent with the NYRBS, baseline difference-in-difference estimates (Panel I) show that PI laws are associated with a marginally significant increase in the probability of sexual activity (column 4) and no changes in the probabilities of contraceptive use (columns 5 through 8). However, the inclusion of state-specific linear time trends (Panel II) again suggests that these estimates are upwardly biased. Importantly, in contrast to our own findings in the NYRBS, results from the SYRBS show that PI laws are associated with a 12.3 percent (.026/.211) *increase* in use of the birth control pill. Difference-in-difference-in-difference results (Panels III and IV) show that PI laws are associated with a statistically significant 3.8 to 4.2 percent increase

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<sup>8</sup> The finding in column (1) of Panel II does not appear to be driven by a substantial reduction in identifying variation. Auxiliary regressions of PI laws on state effects and year effects, and then state effects, year effects and state-specific linear time trends, suggest that the inclusion of state trends explains only a small share (< 5 percent) of the variation in PI laws.



in the probability of birth control use (column 7), which appears to be driven by increased use of the birth control pill (column 8).

What could explain differences in findings across the NYRBS and SYRBS? First, “unlucky” measurement error in contraceptive use in the NYRBS caused by small state-by-year cell sizes could be related to the adoption of PI laws, leading to downwardly biased estimates. However, when we restricted the NYRBS sample to those states that contributed at least 100 observations per state-year, the results were consistent with findings on the full sample, suggesting that measurement error is a likely explanation. A second explanation is that PI laws may have heterogeneous effects across the states sampled in the National and State YRBS. When we restricted the NYRBS and SYRBS samples to those observations that share common state-years, each dataset produced evidence consistent with contraceptive-enhancing effects of PI laws. These findings are consistent with the notion that the sources of identifying variation – and possible heterogeneous policy effects across states – are the likely explanations for differing PI law effects across datasets.

In Table 4, we take advantage of all of the policy variation available in the NYRBS and SYRBS by combining the surveys (see Anderson et al. Forthcoming).<sup>9</sup> We focus on our preferred specifications, difference-in-difference models with state-specific linear time trends (Panel I) and difference-in-difference-difference models with full state-by-year interactions (Panel II).<sup>10</sup> The findings generally suggest that PI laws are associated with increased use of the

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<sup>9</sup> We experimented with including the interaction term  $PI\ Law * NYRBS$  on the right-hand-side of the estimating equation, where  $NYRBS$  is equal to one if the respondent was part of the NYRBS sample and equal to zero if the respondent was part of the SYRBS sample. This interaction term was never statistically distinguishable from zero.

<sup>10</sup> Because the YRBS samples are unbalanced, we experimented with running our difference-in-difference-in-difference analyses on samples where states with missing years of data were excluded. The results, shown in the first two panels of Appendix Table 2, are consistent with those reported in Table 4. In addition, because some treated states have relatively few pre-treatment years of data available, the third (fourth) panel of Appendix Table 2

pill. Specifically, difference-in-difference-in-difference estimates show that PI laws are associated with a 4.8 percent (.041/.855) increase in the probability of contraceptive use, driven by an 11.8 percent (.025/.211) increase in the probability of pill use. The inclusion of controls for fully-interacted state and year effects (Panel II) confirms this pattern of results.<sup>11, 12, 13</sup>

In Panels III and IV, we replicate Panels I and II but weight our estimates to produce an average effect of PI laws on teen sexual behavior across the U.S. population. These results continue to show that PI laws are associated with an increase in contraceptive use, most likely through increasing use of the birth control pill.

In Table 5, we use states that had passed PI laws, but had these laws enjoined by the court, as an additional counterfactual. Across specifications, the results provide no evidence that enjoined PI laws are associated with statistically significant changes in minor teen female sexual behavior. In models that include both enforced and enjoined laws on the right hand-side of the regression (Panels II and III), the sign on each of these policies often differs. This pattern of findings suggests that the estimated policy impacts we obtain are not simply capturing state-specific changes in sentiment toward teen sexual activity.

## IV. Conclusion

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illustrates results where treated states with two (three) or fewer years of pre-PI law data available are dropped from the sample. In general, these results support the conclusions reached in Panel II of Table 4.

<sup>11</sup>The statistically significant effects for the *Birth Control* and *Pill* outcomes in Panel II of Table 4 remained statistically significant at the 5 percent level when using a wild cluster bootstrap procedure (Cameron et al. 2008).

<sup>12</sup>In addition to the outcomes reported in this paper, we explored the relationship between having had multiple sex partners and PI laws. We found little evidence to suggest that PI laws decrease the likelihood respondents reported having had more than one sexual partner in the past three months. When conditioning the birth control outcomes (*Birth Control*, *Condom*, and *Pill*) on having had multiple sex partners, we found some evidence from the National YRBS that PI laws are associated with an increase in any form of birth control and birth control pill use.

<sup>13</sup>In other results not reported, we estimated our models on the population of teen males in the National and State YRBS data sets. We found little consistent evidence that PI laws decreased the risky sexual behavior of males.

A recent study by CDJ casts doubt on the effectiveness of PI laws in inducing safer sex among minor teens. Using data from the NYRBS, they found that PI laws are associated with no changes in the probabilities of abstinence, condom use, or use of the birth control pill. We use data from a new source, the SYRBS, and re-investigate this research question with careful attention to the role of difficult-to-measure time-varying unmeasured heterogeneity at the state level. Consistent with CDJ, difference-in-difference-in-difference estimates show that PI laws have little effect on the probability of abstinence among 15 to 17 year-old females. However, after exploiting newly available policy variation available in the SYRBS, we find evidence PI laws may increase use of birth control among minor teen females. Our findings suggest that it is too soon to conclude that PI laws have no effect on teen contraceptive use.

There are a number of limitations to our study worthy of note. Because the YRBS lacks information on the respondent's age in days or months, some 18-year-old females we assume are unaffected by PI laws could be affected. If individuals ages 18 to 18.25 are affected by PI laws in the same way those under age 18 are, then our estimates may be considered lower-bound estimates. In addition, while our empirical approach better controls for common state-specific time shocks affecting minor and non-minor teens, we cannot rule out the possibility that implementation of PI laws is related to unmeasured state-level time shocks specific to minor teens. Finally, both the NYRBS and SYRBS are school-based surveys. If PI laws change the distribution of students who attend school, analyses using these data could be contaminated by sample selection bias.<sup>14</sup>

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<sup>14</sup> In unreported results, we used data drawn from the Current Population Survey and found no evidence that PI laws are associated with net changes in high school completion rates for 16-to-18 year-olds.

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**Table 1. Descriptive Statistics for Females in the National and State YRBS**

|                                  | National YRBS    |                  | State YRBS        |                  | Combined National and State YRBS |                  |
|----------------------------------|------------------|------------------|-------------------|------------------|----------------------------------|------------------|
|                                  | Ages<br>15-17    | Age<br>18+       | Ages<br>15-17     | Age<br>18+       | Ages<br>15-17                    | Age<br>18+       |
| <b><u>Sexual Behaviors</u></b>   |                  |                  |                   |                  |                                  |                  |
| <i>Sex</i>                       | .376<br>[51,607] | .558<br>[10,082] | .350<br>[230,578] | .545<br>[34,142] | .355<br>[282,185]                | .548<br>[44,224] |
| <i>Birth Control</i>             | .823<br>[18,610] | .798<br>[5,435]  | .862<br>[74,959]  | .853<br>[17,371] | .855<br>[93,569]                 | .840<br>[22,806] |
| <i>Condom</i>                    | .529<br>[19,121] | .455<br>[5,559]  | .560<br>[79,001]  | .473<br>[18,198] | .554<br>[98,122]                 | .469<br>[23,757] |
| <i>Pill</i>                      | .163<br>[18,610] | .230<br>[5,435]  | .223<br>[74,959]  | .308<br>[17,371] | .211<br>[93,569]                 | .289<br>[22,806] |
| <b><u>PI Laws</u></b>            |                  |                  |                   |                  |                                  |                  |
| <i>PI Law</i>                    | .518             | .554             | .535              | .585             | .532                             | .578             |
| <i>Enjoined PI Law</i>           | .279             | .240             | .179              | .175             | .197                             | .190             |
| <b><u>Controls</u></b>           |                  |                  |                   |                  |                                  |                  |
| <i>Age 15</i>                    | .305             | ...              | .351              | ...              | .342                             | ...              |
| <i>Age 16</i>                    | .346             | ...              | .351              | ...              | .350                             | ...              |
| <i>Age 17</i>                    | .349             | ...              | .298              | ...              | .308                             | ...              |
| <i>Age 18+</i>                   | ...              | 1.00             | ...               | 1.00             | ...                              | 1.00             |
| <i>White</i>                     | .411             | .364             | .651              | .653             | .607                             | .587             |
| <i>Black</i>                     | .237             | .262             | .133              | .148             | .152                             | .174             |
| <i>Other Race</i>                | .352             | .374             | .216              | .199             | .241                             | .239             |
| <i>Unemployment Rate</i>         | 6.19             | 6.10             | 5.99              | 5.97             | 6.03                             | 6.00             |
| <i>ln(Per Capita Income)</i>     | 10.3             | 10.2             | 10.3              | 10.3             | 10.3                             | 10.3             |
| <i>Beer Taxes (2000 dollars)</i> | .268             | .278             | .229              | .241             | .236                             | .249             |
| <i>BAC .08</i>                   | .641             | .614             | .708              | .689             | .696                             | .672             |
| <i>Medicaid Restrict</i>         | .654             | .699             | .658              | .710             | .658                             | .708             |
| <i>Waiting Period</i>            | .264             | .286             | .262              | .307             | .262                             | .302             |

Notes: Means are based on unweighted data from the National and State YRBS (1993-2011). Sample sizes are in brackets.

**Table 2A. Changes in Binding Parental Involvement Laws, 1993-2011**

| <i>State</i>                  | <i>Year of PI Law Change</i>   |
|-------------------------------|--------------------------------|
| Arizona <sup>N</sup>          | 2003                           |
| Colorado <sup>N</sup>         | 2003, 2004 <sup>1</sup>        |
| Idaho                         | 1997                           |
| Iowa <sup>S</sup>             | 1997                           |
| Kentucky                      | 1994                           |
| Mississippi <sup>N,S</sup>    | 1993                           |
| North Carolina <sup>N,S</sup> | 1995                           |
| Oklahoma <sup>N,S</sup>       | 2001, 2006                     |
| Pennsylvania <sup>N</sup>     | 1994                           |
| South Dakota <sup>S</sup>     | 1998                           |
| Tennessee <sup>N</sup>        | 1992, 1997 <sup>1</sup> , 1999 |
| Texas <sup>N,S</sup>          | 2001                           |
| Virginia                      | 1997                           |
| Wyoming <sup>S</sup>          | 1998                           |

<sup>1</sup> Parental involvement law enjoined by the Courts in these years and hence were unenforced. In all other years listed, PI laws were enacted.

<sup>2</sup> Laws were only effective for 7 months in the year 1996.

<sup>N</sup> Data available before and after PI law change in National YRBS.

<sup>S</sup> Data available before and after PI law change in State YRBS.

**Table 2B. Changes in Binding Parental Involvement Laws, 1993-2011**

| <i>State</i>               | <i>Years Enjoined by Courts and Unenforced</i> |
|----------------------------|--|
| Alaska                     | 1997-2011                                      |
| Arizona <sup>N</sup>       | 1993-2003                                      |
| California                 | 1996-2011 <sup>2</sup>                         |
| Colorado <sup>N</sup>      | 1993-2003                                      |
| Idaho                      | 2005-2007                                      |
| Kentucky                   | 1993-1994                                      |
| Mississippi <sup>N,S</sup> | 1993   |
| Montana                    | 1995-2011                                      |
| New Jersey                 | 1999-2011                                      |
| Oklahoma <sup>N,S</sup>    | 2002-2006                                      |
| Pennsylvania <sup>N</sup>  | 1993-1994                                      |
| South Dakota <sup>S</sup>  | 1993-1998                                      |
| Tennessee <sup>N</sup>     | 1996-1999                                      |

<sup>1</sup> Parental involvement law enjoined by the Courts in these years and hence were unenforced. In all other years listed, PI laws were enacted.

<sup>2</sup> Laws were only effective for 7 months in the year 1996.

<sup>N</sup> Data available before and after PI law change in National YRBS.

<sup>S</sup> Data available before and after PI law change in State YRBS.

**Table 3. Estimates of the Relationship Between PI Laws and Sexual Behaviors of Minor Teen Females, 1993-2011**

|   | National YRBS    |                      |                 |                 | State YRBS      |                      |                 |                  |
|---|------------------|----------------------|-----------------|-----------------|-----------------|----------------------|-----------------|------------------|
|   | <i>Sex</i>       | <i>Birth Control</i> | <i>Condom</i>   | <i>Pill</i>     | <i>Sex</i>      | <i>Birth Control</i> | <i>Condom</i>   | <i>Pill</i>      |
|   | (1)              | (2)                  | (3)             | (4)             | (5)             | (6)                  | (7)             | (8)              |
| Panel I: Difference-in-difference estimates (15-to-17 year-old females)   |                  |                      |                 |                 |                 |                      |                 |                  |
| <i>PI Law</i>   | .047**<br>(.022) | -.013<br>(.009)      | .002<br>(.017)  | -.016<br>(.015) | .023*<br>(.013) | .011<br>(.008)       | .024<br>(.020)  | -.011<br>(.016)  |
| N   | 51,607           | 18,610               | 19,121          | 18,610          | 230,578         | 74,959               | 79,001          | 74,959           |
| Panel II: Difference-in-difference estimates with state-specific linear time trends (15-to-17 year-old females)                                       |                  |                      |                 |                 |                 |                      |                 |                  |
| <i>PI Law</i>   | -.006<br>(.021)  | -.005<br>(.020)      | -.015<br>(.026) | .005<br>(.020)  | .010<br>(.011)  | -.007<br>(.016)      | .026<br>(.022)  | .026**<br>(.010) |
| N   | 51,607           | 18,610               | 19,121          | 18,610          | 230,578         | 74,959               | 79,001          | 74,959           |
| Panel III: Difference-in-difference-in-difference estimates (15-to-17 year-old females versus 18+ year-old females)                                   |                  |                      |                 |                 |                 |                      |                 |                  |
| <i>PI Law</i>   | .003<br>(.023)   | .015<br>(.018)       | -.000<br>(.030) | -.004<br>(.033) | .026<br>(.037)  | .032*<br>(.017)      | -.006<br>(.026) | .024<br>(.018)   |
| N   | 61,689           | 24,045               | 24,680          | 24,045          | 264,720         | 92,330               | 97,199          | 92,330           |
| Panel IV: Difference-in-difference-in-difference estimates with state-by-year interactions<br>(15-to-17 year-old females versus 18+ year-old females) |                  |                      |                 |                 |                 |                      |                 |                  |
| <i>PI Law</i>   | .006<br>(.024)   | .026<br>(.018)       | .007<br>(.030)  | -.001<br>(.033) | .027<br>(.038)  | .035*<br>(.018)      | -.003<br>(.026) | .025<br>(.017)   |
| N   | 61,689           | 24,045               | 24,680          | 24,045          | 264,720         | 92,330               | 97,199          | 92,330           |

\*\*\*Significant at 1% level \*\*Significant at 5% level \*Significant at 10% level

Notes: Estimates are generated using data from the National YRBS (1993-2011) for columns (1)-(4) and from the State YRBS (1993-2011) for columns (5)-(8). All models control for age, race/ethnicity, the unemployment rate, per capita state income, alcohol policies (beer taxes, BAC.08), abortion policies (mandatory information and waiting periods and Medicaid funding restrictions for abortion), and state and year fixed effects. Standard errors, corrected for clustering at the state level, are in parentheses.

**Table 4. Estimates of the Relationship Between PI Laws and Sexual Behaviors of Minor Teen Females in Combined National and State YRBS, 1993-2011**

|  | <i>Sex</i>     | <i>Birth Control</i> | <i>Condom</i>   | <i>Pill</i>      |
|--|----------------|----------------------|-----------------|------------------|
|  | (1)            | (2)                  | (3)             | (4)              |
| Panel I: Difference-in-difference estimates with state-specific linear time trends<br>(15-to-17 year-old females)  |                |                      |                 |                  |
| <i>PI Law</i>  | .015<br>(.012) | .014<br>(.014)       | -.007<br>(.013) | .020<br>(.013)   |
| N  | 282,185        | 93,569               | 98,122          | 93,569           |
| Panel II: Difference-in-difference-in-difference estimates with state-by-year interactions<br>(15-to-17 year-old females versus 18+ year-old females)          |                |                      |                 |                  |
| <i>PI Law</i>  | .003<br>(.017) | .041***<br>(.011)    | .017<br>(.017)  | .025**<br>(.010) |
| N  | 326,409        | 116,375              | 121,879         | 116,375          |
| Panel III: Weighted difference-in-difference estimates with state-specific linear time trends<br>(15-to-17 year-old females)                                   |                |                      |                 |                  |
| <i>PI Law</i>  | .005<br>(.018) | .041<br>(.024)       | -.016<br>(.018) | .017<br>(.012)   |
| N  | 282,185        | 93,569               | 98,122          | 93,569           |
| Panel IV: Weighted difference-in-difference-in-difference estimates with state-by-year<br>interactions (15-to-17 year-old females versus 18+ year-old females) |                |                      |                 |                  |
| <i>PI Law</i>  | .021<br>(.016) | .041***<br>(.014)    | .041<br>(.024)  | .032<br>(.023)   |
| N  | 326,409        | 116,375              | 121,879         | 116,375          |

\*\*\*Significant at 1% level \*\*Significant at 5% level \*Significant at 10% level

Notes: Estimates are generated using data from the National and State YRBS (1993-2011). All models control for age, race/ethnicity, the unemployment rate, per capita state income, alcohol policies (beer taxes, BAC.08), abortion policies (mandatory information and waiting periods and Medicaid funding restrictions for abortion), and state and year fixed effects. Standard errors, corrected for clustering at the state level, are in parentheses.



**Table 5. Estimates of the Relationship Between Enjoined PI Laws and Sexual Behaviors of Minor Teen Females in Combined National and State YRBS, 1993-2011**

|   | <i>Sex</i>      | <i>Birth Control</i> | <i>Condom</i>   | <i>Pill</i>     |
|---|-----------------|----------------------|-----------------|-----------------|
|   | (1)             | (2)                  | (3)             | (4)             |
| Panel I: Difference-in-difference estimates with state-specific linear time trends and enjoined PI law (15-to-17 year-old females)                                      |                 |                      |                 |                 |
| <i>Enjoined PI Law</i>  | -.024<br>(.021) | -.001<br>(.016)      | .011<br>(.017)  | .006<br>(.015)  |
| N   | 282,185         | 93,569               | 98,122          | 93,569          |
| Panel II: Difference-in-difference estimates with state-specific linear time trends and enjoined PI law (15-to-17 year-old females)                                     |                 |                      |                 |                 |
| <i>PI Law</i>   | .007<br>(.015)  | .016<br>(.016)       | -.004<br>(.014) | .027*<br>(.014) |
| <i>Enjoined PI Law</i>  | -.021<br>(.022) | .007<br>(.018)       | .009<br>(.018)  | .018<br>(.015)  |
| N   | 282,185         | 93,569               | 98,122          | 93,569          |
| Panel III: Difference-in-difference-in-difference estimates with state-by-year interactions and enjoined PI law (15-to-17 year-old females versus 18+ year-old females) |                 |                      |                 |                 |
| <i>PI Law</i>   | -.010<br>(.019) | .040***<br>(.014)    | .030*<br>(.018) | .016<br>(.011)  |
| <i>Enjoined PI Law</i>  | -.043<br>(.030) | -.004<br>(.023)      | .040<br>(.024)  | -.027<br>(.024) |
| N   | 326,409         | 116,375              | 121,879         | 116,375         |

\*\*\*Significant at 1% level \*\*Significant at 5% level \*Significant at 10% level

Notes: Estimates are generated using data from the National and State YRBS (1993-2011). All models control for age, race/ethnicity, the unemployment rate, per capita state income, alcohol policies (beer taxes, BAC.08), abortion policies (mandatory information and waiting periods and Medicaid funding restrictions for abortion), and state and year fixed effects. Standard errors, corrected for clustering at the state level, are in parentheses.

**Appendix Table 1A. Number of 15-to-17 Year-Old Females by State-Year: National YRBS**

|                | 1993 | 1995 | 1997 | 1999 | 2001 | 2003 | 2005 | 2007 | 2009  | 2011 |
|----------------|------|------|------|------|------|------|------|------|-------|------|
| Alabama        | 296  | 39   | 265  | 20   | 124  | 229  | ...  | 197  | 381   | 113  |
| Arizona        | 183  | ...  | 397  | 54   | 148  | 142  | 104  | 197  | 108   | 381  |
| Arkansas       | 171  | 110  | 131  | ...  | ...  | 88   | ...  | 140  | 102   | ...  |
| California     | 769  | 404  | 766  | 971  | 795  | 624  | 651  | 799  | 1,050 | 635  |
| Colorado       | 88   | 37   | 94   | ...  | 212  | ...  | ...  | ...  | 82    | 80   |
| Connecticut    | ...  | ...  | 73   | ...  | ...  | ...  | 108  | ...  | ...   | ...  |
| Delaware       | ...  | 35   | ...  | ...  | ...  | 148  | ...  | ...  | ...   | 69   |
| D.C.           | ...  | 224  | ...  | ...  | ...  | ...  | ...  | ...  | ...   | 115  |
| Florida        | 201  | 225  | 236  | 354  | 440  | 520  | 188  | 290  | 69    | 544  |
| Georgia        | 338  | 175  | 141  | 313  | 184  | ...  | 491  | 132  | 442   | 43   |
| Hawaii         | ...  | ...  | ...  | 124  | ...  | ...  | ...  | ...  | 96    | ...  |
| Idaho          | ...  | ...  | ...  | ...  | ...  | ...  | 86   | ...  | ...   | 102  |
| Illinois       | 304  | 45   | ...  | 45   | 218  | 111  | 163  | 189  | ...   | 373  |
| Indiana        | ...  | ...  | ...  | ...  | 74   | 179  | 73   | 159  | ...   | 103  |
| Iowa           | ...  | 102  | 348  | ...  | ...  | ...  | 91   | 88   | ...   | ...  |
| Kansas         | 63   | ...  | 72   | ...  | ...  | 119  | 112  | ...  | 67    | 109  |
| Kentucky       | ...  | ...  | ...  | ...  | ...  | ...  | 198  | 122  | ...   | 78   |
| Louisiana      | ...  | 107  | 211  | 150  | ...  | 63   | ...  | ...  | ...   | ...  |
| Maine          | 95   | 55   | 93   | 77   | 73   | 74   | ...  | ...  | ...   | ...  |
| Maryland       | 56   | ...  | 259  | ...  | ...  | 87   | ...  | ...  | ...   | ...  |
| Massachusetts  | 111  | 104  | 659  | ...  | 102  | 85   | 97   | 262  | ...   | 120  |
| Michigan       | 53   | 457  | 185  | 197  | 124  | 147  | 97   | 115  | 118   | 217  |
| Minnesota      | 116  | ...  | ...  | ...  | ...  | ...  | 35   | ...  | 73    | ...  |
| Mississippi    | 137  | 179  | 135  | 257  | 128  | ...  | ...  | 136  | ...   | 33   |
| Missouri       | 86   | 222  | ...  | 334  | 190  | 88   | 41   | 137  | 38    | 121  |
| Montana        | ...  | ...  | ...  | ...  | 67   | ...  | ...  | ...  | ...   | ...  |
| Nebraska       | 156  | ...  | ...  | ...  | ...  | ...  | ...  | ...  | ...   | ...  |
| Nevada         | ...  | ...  | ...  | ...  | 96   | ...  | ...  | ...  | 170   | 59   |
| New Hampshire  | ...  | ...  | ...  | ...  | ...  | ...  | ...  | ...  | ...   | ...  |
| New Jersey     | ...  | ...  | 262  | 67   | 97   | 125  | 118  | 292  | 187   | 49   |
| New Mexico     | 267  | ...  | 100  | ...  | 59   | 35   | ...  | 67   | 216   | ...  |
| New York       | 449  | 192  | 107  | 258  | 113  | 335  | 187  | 275  | 463   | 228  |
| North Carolina | 107  | 53   | 125  | 205  | 206  | ...  | 217  | 227  | ...   | 426  |
| Ohio           | 137  | 184  | 183  | 201  | 86   | 121  | 112  | ...  | ...   | ...  |
| Oklahoma       | ...  | ...  | 87   | ...  | 151  | ...  | 86   | 129  | ...   | ...  |
| Oregon         | 64   | ...  | ...  | ...  | 59   | ...  | 110  | ...  | 97    | ...  |
| Pennsylvania   | 144  | 263  | 62   | 178  | ...  | 74   | 154  | 75   | 398   | 146  |
| Rhode Island   | ...  | ...  | ...  | 26   | ...  | ...  | ...  | ...  | ...   | ...  |
| South Carolina | 148  | ...  | 197  | 316  | ...  | 361  | 107  | ...  | ...   | ...  |
| South Dakota   | ...  | ...  | ...  | ...  | ...  | 107  | ...  | ...  | ...   | ...  |
| Tennessee      | 277  | 155  | 231  | 61   | 248  | ...  | 164  | 45   | ...   | 117  |
| Texas          | 912  | 576  | 372  | 927  | 733  | 927  | 644  | 514  | 472   | 637  |
| Vermont        | ...  | ...  | ...  | ...  | ...  | 24   | ...  | ...  | ...   | ...  |
| Virginia       | ...  | 6    | ...  | 246  | ...  | 77   | 137  | 181  | 28    | 66   |
| Washington     | 148  | 29   | 26   | ...  | 13   | ...  | 31   | ...  | 104   | 65   |
| West Virginia  | 120  | ...  | ...  | ...  | 104  | ...  | 86   | 88   | 175   | 90   |
| Wisconsin      | ...  | ...  | 81   | 219  | 92   | 65   | 103  | 70   | 225   | 247  |

**Appendix Table 1B. Number of 15-to-17 Year-Old Females by State-Year: State YRBS**

|                | 1993  | 1995  | 1997  | 1999  | 2001  | 2003  | 2005  | 2007  | 2009  | 2011  |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Alabama        | ...   | ...   | ...   | ...   | ...   | 403   | 335   | ...   | 502   | 517   |
| Alaska         | ...   | 594   | ...   | ...   | ...   | 492   | ...   | 435   | 465   | 482   |
| Arizona        | ...   | ...   | ...   | ...   | ...   | ...   | 697   | 604   | 484   | 629   |
| Arkansas       | ...   | 887   | 841   | 542   | 675   | ...   | 594   | 606   | 603   | 496   |
| Colorado       | ...   | ...   | ...   | ...   | ...   | ...   | 473   | ...   | 469   | 460   |
| Connecticut    | ...   | ...   | 685   | ...   | ...   | ...   | ...   | 687   | 831   | 695   |
| Delaware       | ...   | ...   | ...   | 900   | 1,048 | 1,125 | 1,010 | 897   | 786   | 801   |
| Florida        | ...   | ...   | ...   | ...   | 1,424 | 1,572 | 1,729 | ...   | 2,047 | 2,277 |
| Illinois       | 1,572 | 1,267 | ...   | ...   | ...   | ...   | ...   | 844   | ...   | 1,169 |
| Indiana        | ...   | ...   | ...   | ...   | ...   | 672   | 540   | 932   | 538   | 1,032 |
| Iowa           | ...   | ...   | 615   | ...   | ...   | ...   | 558   | 599   | ...   | 611   |
| Kansas         | ...   | ...   | ...   | ...   | ...   | ...   | 627   | 670   | 776   | 719   |
| Kentucky       | ...   | ...   | 630   | ...   | ...   | 572   | ...   | 1,341 | 674   | 554   |
| Maine          | ...   | 511   | 663   | ...   | 452   | 571   | 483   | 502   | 2,901 | 3,004 |
| Massachusetts  | ...   | ...   | ...   | ...   | ...   | 1,230 | 1,279 | 1,078 | 973   | 969   |
| Michigan       | ...   | ...   | 1,646 | 988   | 1,282 | 1,191 | 1,204 | 1,228 | 1,095 | 1,426 |
| Mississippi    | 522   | 501   | 612   | 622   | 654   | 543   | ...   | 590   | 656   | 686   |
| Missouri       | ...   | 1,865 | 610   | 670   | 686   | 540   | 804   | 609   | 630   | ...   |
| Montana        | 851   | 930   | 916   | 1,032 | 915   | 970   | 1,114 | 1,391 | 612   | 1,509 |
| Nebraska       | 1,170 | ...   | ...   | ...   | ...   | 1,028 | 1,298 | ...   | ...   | ...   |
| Nevada         | 794   | 604   | 569   | 678   | 580   | 789   | 628   | 674   | 788   | ...   |
| New Hampshire  | 1,089 | 844   | ...   | ...   | ...   | 521   | 482   | 617   | 524   | 484   |
| New Jersey     | ...   | ...   | ...   | ...   | 781   | ...   | 563   | ...   | 714   | 611   |
| New Mexico     | ...   | ...   | ...   | ...   | ...   | ...   | 1,903 | 866   | 1,623 | 1,849 |
| New York       | ...   | ...   | 1,320 | 1,251 | ...   | 3,258 | 3,398 | 4,605 | 5,006 | 4,245 |
| North Carolina | 945   | 744   | ...   | ...   | ...   | 883   | 1,477 | 1,224 | 2,096 | 829   |
| North Dakota   | ...   | 585   | ...   | ...   | 564   | 602   | 549   | 617   | 616   | ...   |
| Ohio           | 936   | ...   | 720   | 687   | ...   | 484   | 532   | 936   | ...   | 500   |
| Oklahoma       | ...   | ...   | ...   | ...   | ...   | 508   | 755   | 978   | 530   | 438   |
| Pennsylvania   | ...   | ...   | ...   | ...   | ...   | ...   | ...   | ...   | 746   | ...   |
| Rhode Island   | ...   | ...   | 569   | ...   | 508   | 629   | 946   | 752   | 1,156 | 1,300 |
| South Carolina | 1,737 | 1,997 | 2,040 | 1,704 | ...   | ...   | 501   | 522   | 367   | 415   |
| South Dakota   | 504   | 454   | 587   | 644   | 614   | 686   | 541   | 597   | 769   | 600   |
| Tennessee      | 1,301 | ...   | ...   | ...   | ...   | 754   | 521   | 758   | 784   | 935   |
| Texas          | ...   | ...   | ...   | ...   | 2,697 | ...   | 1,582 | 1,208 | 1,182 | 1,383 |
| Vermont        | ...   | ...   | ...   | ...   | 2,596 | 2,159 | 2,665 | 2,367 | ...   | 3,009 |
| West Virginia  | 1,034 | 838   | 701   | 558   | ...   | 723   | 508   | 585   | 576   | 813   |
| Wisconsin      | 1,221 | ...   | 499   | 487   | 831   | 814   | 877   | 767   | 886   | 1,051 |
| Wyoming        | ...   | 621   | 736   | 635   | 981   | 547   | 838   | 799   | 1,079 | 871   |

**Appendix Table 2. Sensitivity of Combined National and State YRBS Results to Sample Selection**

|   | <i>Sex</i>                     | <i>Contraception/<br/>Sex</i> | <i>Condoms/Sex</i> | <i>Birth Control<br/>Pill/Sex</i> |
|---|--------------------------------|-------------------------------|--------------------|-----------------------------------|
|   | (1)                            | (2)                           | (3)                | (4)                               |
| Panel I: Difference-in-difference-in-difference estimates with state-by-year interactions (15-to-17 Year-Old Females versus 18+ Year-Old Females) and including only states with <b>two or fewer</b> missing years of data      |                                |                               |                    |                                   |
| <i>PI Law</i>   | .021<br>(.020)                 | .046***<br>(.012)             | .030<br>(.019)     | .021**<br>(.010)                  |
| N   | 268,188                        | 96,333                        | 101,061            | 96,333                            |
| Treated states in sample that contribute to identification  | AZ, MS, NC, PA, SD, TN, TX, WY |                               |                    |                                   |
| Panel II: Difference-in-difference-in-difference estimates with state-by-year interactions (15-to-17 year-old females versus 18+ year-old females) and including only states with <b>one or fewer</b> missing years of data     |                                |                               |                    |                                   |
| <i>PI Law</i>   | .019<br>(.018)                 | .042***<br>(.011)             | .031<br>(.019)     | .022*<br>(.012)                   |
| N   | 234,438                        | 83,963                        | 88,313             | 83,963                            |
| Treated states in sample that contribute to identification  | AZ, MS, NC, PA, SD, TN, TX, WY |                               |                    |                                   |
| Panel III: Difference-in-difference-in-difference estimates with state-by-year interactions (15-to-17 year-old females versus 18+ year-old females) and dropping treated states with <b>two or fewer</b> years of pre-PIL data  |                                |                               |                    |                                   |
| <i>PI Law</i>   | -.008<br>(.019)                | .031***<br>(.010)             | .022<br>(.019)     | .025<br>(.015)                    |
| N   | 292,796                        | 104,665                       | 108,182            | 104,665                           |
| Treated states in sample that contribute to identification  | AZ, CO, OK, SD, TN, TX         |                               |                    |                                   |
| Panel IV: Difference-in-difference-in-difference estimates with state-by-year interactions (15-to-17 year-old females versus 18+ year-old females) and dropping treated states with <b>three or fewer</b> years of pre-PIL data |                                |                               |                    |                                   |
| <i>PI Law</i>   | -.015<br>(.020)                | .025**<br>(.011)              | .020<br>(.019)     | .025*<br>(.014)                   |
| N   | 278,097                        | 99,196                        | 102,582            | 99,196                            |
| Treated states in sample that contribute to identification  | AZ, CO, OK, TX                 |                               |                    |                                   |

\*\*\*Significant at 1% level \*\*Significant at 5% level \*Significant at 10% level

Notes: Estimates are generated using data from the national and state YRBS (1993-2011). All models control for age, race/ethnicity, the unemployment rate, per capita state income, alcohol policies (beer taxes, BAC.08), abortion policies (mandatory information and waiting periods and Medicaid funding restrictions for abortion), and state and year fixed effects. Standard errors, corrected for clustering at the state level, are in parentheses.