Parental Involvement Laws, Sexual Activity, and Youth Suicide[*]

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Abstract

Using state-level data on suicides from the period 1987 through 2003, we find that the adoption of a parental involvement law is associated with a 15 to 25 percent reduction in suicides committed by females between the ages 15 and 17. In contrast, the adoption of a parental involvement law is not associated with a reduction in the number of suicides committed by older females or by males belonging to the same age group. These results are consistent with the hypothesis that parental involvement laws increase the expected cost of having unprotected sex, and, as a consequence, serve to protect young females from depression and what have been termed "stressful life events" such as conflict with a parent or an abortion. Using microdata drawn from the National Longitudinal Study of Adolescent Health, we find that sexually active females are at increased risk of having thoughts of suicide and of attempting suicide, but there is little evidence of a similar relationship for male adolescents.

JEL: I18, I10, J13
Keywords: abortion, suicide, parental involvement

I. Introduction

There is strong evidence that parental involvement laws, which require a parent's notification or consent before a minor can obtain an abortion, reduce abortions, pregnancies and gonorrhea infections (Levine 2003; Klick and Strattman 2008). This evidence is consistent with the hypothesis that parental involvement laws represent an important increase in the expected cost of having sexual intercourse, and raises the possibility that their implementation could help minors avoid the potentially acute psychological trauma associated with having to manage an unwanted pregnancy or being infected with a sexually transmitted disease.

The current study explores the relationship between parental involvement laws and suicides among 15 through 17 year-old females. Despite the fact that restricting the access of minors to abortion services is often promoted on the grounds that it will protect their emotional health (see, for example, Quinn 2000), there have been no previous attempts to estimate the relationship between parental involvement laws and what has been called "the ultimate expression of despair," nor has there been an exploration of the relationship between parental involvement laws and alternative measures of psychological wellbeing.[1] Moreover, the current study is one of only a handful to examine the relationship between suicides and an easily-manipulated policy.[2] As such, we hope that it will provide additional guidance as to how best to combat suicide, the third-leading cause of death among teenagers.[3]

[1] The phrase "the ultimate expression of despair" is from Reading (2004, p. 155). The full quote is: "[s]uicide, of course, represents the ultimate expression of despair, the absolute ability to foresee a tolerable future for oneself." Suicide and mental health are clearly linked. In fact, there is evidence that the majority of teens who commit suicide suffer from either manic depressive disorder or major depression (Shaffer et al. 1996).

[2] Others include Jones et al. (1992) and Birckmayer and Hemenway (1999), who examined the effects of the minimum legal drinking age on suicides; Markowitz et al. (2003) and Carpenter (2004), who examined the effects of other alcohol-related policies; and Klick and Markowitz (2006), who examined the effect of laws mandating

Using state-level data for the years 1987 through 2003, we find that the adoption of a parental involvement law is associated with a 15 to 25 percent reduction in the number of suicides committed by 15 through 17 year-old females. There is little evidence of a similar relationship among older females, who are not covered by parental involvement laws. Moreover, we find that the adoption of a parental involvement law is unrelated to the number of suicides committed by young males, a result that is consistent with evidence that becoming sexually active imposes greater psychological costs on female adolescents than on their male counterparts (Hallfors et al. 2004; Sabia and Rees 2008).

Having established a negative relationship between parental consent laws and suicides among 15 through 17 year-old females using state-level data, we turn next to an analysis of microdata drawn from the National Longitudinal Study of Adolescent Health (Add Health). Specifically, we use the Add Health data to examine the effect of sexual behavior on having thoughts of suicide and attempting suicide using an instrumental variables approach. Our estimates suggest that sexual activity in general, and risky sexual behavior in particular, is associated with an increase in the probability that female adolescents had suicidal thoughts and an increase in the probability that they attempted suicide. In contrast, we find no evidence that sexually active males were at greater risk of having suicidal thoughts or attempting suicide than their counterparts who refrained from sexual activity. This pattern of results provides support for the hypothesis that parental involvement laws reduce suicides among 15 through 17 year-old females through discouraging sexual activity and risky sexual behavior.

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insurance companies to offer some form of mental health benefits. See also Gunnell et al. (2000) and Burgess et al. (2004).

[3] The Center for Disease Control and Prevention estimates that 11.8 percent of deaths to 15 through 19 year-olds are caused by suicide (Center for Disease Control and Prevention 2008).

II. Background

As of July 2009, 34 states had instituted and were enforcing a parental involvement law. Another 7 states had passed a parental involvement law but could not enforce it as the result of a court order. Most parental involvement laws require minors to notify, or obtain the consent of, one parent; three states require that both parents be notified or give their consent; and 6 states allow the notification or consent of other adult relatives such as a grandparent.[4]

Parental involvement laws can be thought of as increasing the expected cost of having sex, and, in theory, their adoption could result in a reduction in the number of minors who are sexually active and an increase in contraceptive use conditional on sexual activity (Levine 2003). Evidence of the relationship between parental involvement laws and a variety of outcomes is provided by Levine (2003) and Klick and Strattman (2008). Levine used state-level data from 1985 through 1996, a period when many parental involvement laws came into effect. He found that the adoption of a parental involvement law was associated with a 15 to 20 percent reduction in abortions obtained by 15 through 17 year-old females, and a 9 percent reduction in pregnancies to this same group.[5] Turning to microdata from the National Survey of Family Growth, Levine (2003) also estimated the effect of parental involvement laws on sexual activity and contraceptive use. The results, although not sufficiently precise to be definitive, suggested that most of the 9 percent reduction in pregnancies could be attributed to more consistent use of contraception. Klick and Strattman (2008) used state-level data from 1981 through 1998 to explore the effect of parental involvement laws on teen gonorrhea rates. These authors argued

[4] This paragraph is based on information available in Dennis et al. (2009). More details on parental consent laws in the United States can be found in Dennis et al. (2009).

[5] Levine (2003) also found evidence that the adoption of a parental consent law led to much smaller declines in abortions and pregnancies among 18 through 19 year-olds. These estimates could, at least in part, reflect the influence of unobservables at the state level.

that gonorrhea rates can be thought of as a proxy for risky sex (i.e., sex without a condom). They found that the adoption of a parental involvement law was associated with a 20 percent reduction in the gonorrhea rate among Hispanic females under the age of 20, and a 12 percent reduction among white females under the age of 20.[6]

If parental involvement laws discourage minors from having risky sex, could they also have the effect of promoting emotional health? Recent studies provide evidence that female adolescents who become sexually active at an early age are more likely to suffer from the symptoms of depression than their counterparts who abstain from having sex (Hallfors et al. 2004; Sabia and Rees 2008), and evidence that the effect of sexual activity on depressive symptomology is less pronounced if contraception is used (Sabia and Rees 2008).[7] Other researchers have focused on the relationship between having multiple sex partners and psychological wellbeing. For instance, Howard et al. (2004) found that that having multiple sex partners was associated with substance use; and Hallfors et al. (2005) found that adolescent females who had multiple sex partners were 10 times more likely to more likely to develop the symptoms of major depression than their counterparts who remained sexually abstinent (but found no evidence of a similar relationship between having multiple sex partners and depression among male adolescents).

Not surprisingly, adolescents who exhibit the symptoms of depression are at increased risk of committing and attempting suicide (Lewinsohn et al. 1994; Cutler, Glaeser, and Norberg 2001; Moscicki 2001; Fergusson, Beautrais, and Horwood 2003). Moreover, there is evidence that suicide among adolescents and young adults is frequently triggered by what have been

[6] No effect was found for black teens.

[7] Adolescent males, on the other hand, seem to weather becoming sexually active with more equanimity, and may even experience an increase in self-esteem upon losing their virginity (Sabia and Rees 2008).

termed "stressful life events" such as the breakup of a romantic relationship (De Wilde et al. 1992; Brent et al. 1993; Beautrais et al. 1997; Johnson et al. 2002), conflict with a parent or sibling (Brent et al. 1993; Johnson et al. 2002), an abortion (Gissler, Hemminki, and Lonnqvist 1996; Gissler et al. 2005), or having a baby (Gissler, Hemminki, and Lonnqvist 1996).[8] This evidence is consistent with the economic model of suicide developed by Hamermesh and Soss (1974) in which negative shocks to happiness may reduce expected lifetime utility to the point where an individual will decide to take his or her own life. Even if a shock is perceived to be temporary, an individual who discounts the future more heavily when faced with an immediate, as opposed to a future, tradeoff may commit suicide at the prospect of having to cope with an acutely "painful state in the present" (Cutler, Glaeser and Norberg 2001, p. 235).[9] If, through discouraging teens from engaging in risky sexual behavior, parental involvement laws protect against depression and stressful events such as experiencing an unwanted pregnancy, then it is possible that their adoption led to fewer suicides. The empirical analysis below explores this hypothesis. [If we want to talk about how these laws could induce more conflict with parents, increasing depression, etc., here might be the place to do it.]

III. Analysis of State-Level Data

Our analysis begins with an examination of yearly data at the state level on suicides committed by 15 through 17 year-old females during the period 1987 through 2003. These data

[8] Other stressful or traumatic events that are associated with adolescent suicide include changes in residence (Quin et al. 2009), and legal problems (Beautrais et al. 1997).

[9] Such an individual is said to have "time-inconsistent preferences." There is a fair amount of evidence to support the hypothesis that preferences are time inconsistent (O'Donoghue and Rabin 2001, p. 41), and, in particular, it seems appropriate to ascribe time-inconsistent preferences to teens.

come from the Center for Disease Control Mortality Reports and are available online.[10] We assume that the number of suicides committed in state *s* and time *t* (S_{st}) is related to the presence of a parental involvement law by the following equation:

$$(1) \quad S_{st} = \alpha + \delta PI_{st} + \beta_1' \mathbf{X}_{st} + \beta_2' \mathbf{A}_{st} + \beta_3' D_{st} + \theta_s + \tau_t + \varepsilon_{st},$$

where PI_{st} is an indicator equal to 1 if state *s* had adopted and was enforcing a parental consent or parental notification law at time *t* and equal to 0 otherwise; $\boldsymbol{X}_{st}$ is a vector of state-specific, time-varying demographic controls including the high school graduation rate, divorce rate, poverty rate, unemployment rate, $\boldsymbol{A}_{st}$ is a vector of state abortion policies, including whether the state allows Medicaid funding abortions and whether the state has a mandatory waiting period before a pregnant woman may have an abortion, $\boldsymbol{D}_{st}$ is a vector of alcohol policies including beer taxes, minimum legal drinking age laws, zero tolerance laws, and a mandatory jail sentence law for first offense of driving under the influence and the population of 15 through 17 year-old females in s; θ_s is a year-invariant state effect; and τ_t is a state-invariant year effect.[11] If $\exp(\varepsilon_{st})$

[10] See the following web addresses: http://webappa.cdc.gov/sasweb/ncipc/mortrate9.htmland http://webappa.cdc.gov/sasweb/ncipc/mortrate10_sy.html. Appendix Table 1 shows descriptive statistics for the outcome variables used in the analysis. Over the period 1987 through 2003, the typical state saw an average of 3.75 suicides per year among 15 through 17 year-old females. The corresponding figure for males in this age group was 13.1. The average female suicide rate per 10,000 females was 0.431, while for males the comparable rate was 1.49 per 100,000. Prior to 1990, a number of states did not report the number of suicides committed by 16 or 17 year-olds. In 1987 22 states did not report information on suicides committed by 16 and 17 year-olds; in 1988 22 states did not report information on suicides committed by 16 and 17 year-olds; and in 1989 29 states did not report information on committed by 16 and 17 year-olds. These observations were dropped from the primary empirical analysis, although there is reason to believe that during the period 1987 through 1989 some states did not provide a suicide count when no suicides occurred during the year. Below we show that treating missing suicide counts as 0s does not appreciably alter our results.

[11] When a parental involvement law was in effect for less than a full year, PI_{st} is a fraction. The data on parental involvement laws were drawn from Bitler and Zavodney (2002), Levine (2003), and a search of state legal statues and newspaper articles. Appendix Table 2 shows parental involvement laws by state and the years in which they were in effect. Forty-two percent of states had a parental involvement law in effect at some time during the period

follows a gamma distribution with mean of 1 and variance σ, then (1) represents a negative binomial model. If σ is assumed to equal 0, then the negative binomial reduces to the Poisson regression model, which is designed, and commonly used, for count data (Grootendorst 2002).

Columns (1) and (2) of Table 1 presents negative binomial and Poisson estimates of δ, respectively, controlling for state effects, year effects, and other state abortion policies. They suggest that the adoption of a parental involvement law is associated with a 17.3 percent decrease in suicides among 15 through 17 year-old females.[12] Controlling for state alcohol policies (columns 3 and 4) has very little impact on the magnitude or precision of these estimates; likewise, adding the demographic vector of controls, $\boldsymbol{X_{st}}$ to the estimating equation has very impact on our estimates of δ.[13]

Next we explore the robustness of the estimated relationship between parental involvements laws and suicides committed by 15 through 17 year-old females documented in Table 1. Because Poisson regressions consistently produce nearly identical point estimates and standard errors, we focus on estimates of δ from Poisson regressions.

Column (1) of Table 2 shows what happens when PI_{st} is replaced with its lagged value, PI_{st-1}. The estimated coefficient of PI_{st-1} remains negative, but is reduced in magnitude and is no longer statistically significant at conventional levels. When both PI_{st} and PI_{st-1} are included on

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under study (1987 through 2003). Unemployment and poverty data were collected from the Bureau of Labor Statistics and education data were obtained from the National Center for Education Statistics.

[12] If b is the estimated Poisson or negative binomial coefficient, then [exp(b) -1] x 100 can be interpreted as the average percent change in $E(S_{st})$ from a one unit change in x_{it},, the covariate of interest. In column (1), the estimated Poisson coefficient of PS_{st} is -0.155, and $(e^{-.155} - 1) \times 100 = 16.8$. In column (2), the estimated binomial coefficient of PI_{st} is 0.173, and $(e^{-.173} - 1) \times 100 = 16.8$. Although Tables 1-5 present estimated Poisson and negative binomial coefficients, these coefficients are converted to percent changes when the results are discussed in the text. These regressions are weighted using the square root of the population of females ages 15 though 17 in state *s* at time *t*, and the standard errors are corrected for clustering at the state level.

[13] Information on Medicaid funding restrictions and mandatory waiting periods were updated from Bitler and Zavodny (2002). Alcohol policies were updated from Eisenberg (2004) and the Beer Institute (web address). Means of the control variables are shown in Appendix Table 3.

the right-hand side of the estimating equation simultaneously, the estimated coefficient of PI_{st} is negative, statistically significant, and quite large in absolute magnitude; the estimated coefficient of PI_{st-1} is positive, insignificant, and much smaller (column 2). This pattern of results suggests that the adoption of a parental involvement law results in a substantial and immediate reduction in suicides, but that after the first year its impact wanes. Summing the estimated coefficients of PI_{st} and PI_{st-1} implies a "long-run" reduction in suicides of 15.6 percent ($\chi^2 = 4.1$; p-value = 0.04).

In the final two columns of Table 2, show estimates of equation (1) when state-specific time trends are introduced. Neither state-specific linear (column 3) nor quadratic (column 4) time trends seem to explain the relationship between parental involvement laws and suicides among 15 through 17 year-old females. In fact, the estimated coefficient of PI_{st} actually increases by more than a third when quadratic time trends are included on right-hand side of the estimation equation. According to this estimate, the adoption of a parental involvement law is associated with an almost 25 percent reduction in suicides committed by 15 through 17 year-old females.

Falsification Tests

The estimates of δ presented thus far are suggestive, but could arguably be due to time-varying unobservables at the state level correlated with both the adoption of a parental involvement law and suicides. To explore this possibility, we estimate equation (1) using suicides in state *s* at time *t* among females ages 18 through 21 and among females ages 22

through 24 as alternative dependent variables.[14] Young adult females represent a natural comparison group because parental involvement laws apply exclusively to minors and therefore should not affect their behavior. They are, however, close enough in age to minors to be influenced by the same unobservables.

The results of this exercise are presented in columns (1) and (2) of Table 3. They provide little evidence that parental involvement laws are related to suicides committed by females over the age of 17. The adoption of a parental involvement law is associated with a statistically insignificant and small (less than one percent) decease in suicides committed by females ages 18 though 21; it is associated with a six percent *increase* in suicides committed by females ages 22 through 24. These estimates are significantly different from the estimate of δ in column (6) of Table 1 at the 0.10 and 0.05 levels, respectively. Difference-in-difference-in-difference estimates in the first two columns of Table 4 confirm this. They suggest that if an unobservable were driving the results presented in Tables 1 and 2, it would have to be largely unrelated to suicides committed by young adult females.

As noted in the introduction, Hallfors et al. (2004) and Sabia and Rees (2008) found that becoming sexually active imposes greater psychological costs on female adolescents than on their male counterparts. This result suggests that males could serve as a second comparison group. If the adoption of a parental involvement law were associated with large changes in suicides committed by males of any age, it would call into question a causal interpretation of the estimates presented in Tables 1 and 2.

Columns (3), (4) and (5) of Table 3 and present estimates of equation (1) in which the dependent variable is equal to the number of suicides committed by males ages 15 though 17,

[14] When the dependent variable is suicides among females ages 18 through 21, we control for the population of females ages 18 through 21 in state *s* at year *t*. When the dependent variable is suicides among females ages 22 through 24, we control for the population of females in this age group.

ages 18 though 21, and ages 22 through 24, respectively.[15] These estimates, which are significantly different from the estimate of δ in column (6) of Table 1 at conventional levels (see columns 3-5 of Table 4), provide little evidence that parental involvement laws are related to suicides committed by males. Thus, they are consistent with the argument that adolescent males are largely immune to the psychological consequences of early sexual activity and bolster the case for interpreting the relationship between parental involvement laws and suicides among females ages 15 through 17 as casual.

Additional Robustness Checks

Time Trends and Suicide Measure. In this section we continue to explore the robustness of the relationship between parental involvement laws and suicides committed by 15 through 17 year-old females. Table 5 shows the sensitivity of triple-difference estimates to additional controls for state time trends.). In columns (1) and (2),we control for state-specific linear and quadratic time trends, respectively. In columns (3) and (4) of Table 5 we present estimates in which the suicide rate per 10,000 population serves as the dependent variable controlling for state-specific linear and quadratic time trends, respectively.[16] These triple-difference estimates continue to show a strong negative relationship between parental involvement laws and suicides among females ages 15 through 17.[17]

[15] When the dependent variable is suicides among males ages 15 through 17, we control for the population of males ages 18 through 21 in state *s* at year *t*. Likewise, when the dependent variable is suicides among males ages 18 through 21 or ages 22 through 24, we control for the population of males in the corresponding age group.

[16] The linear regressions are weighted by the state population and the standard errors are corrected for clustering at the state level.

[17] Although the Poisson triple-difference estimates using males ages 15 through 17 as the control group are statistically significant, the corresponding estimates from the linear regression model are not. Estimates from the linear regression model are quite similar in magnitude to those obtained using Poisson estimation: the adoption of a

Finally, in column (5), we present triple-difference estimates of the relationship between the suicide rate among 15 through 17 year-old females and parental involvement laws in which the state and year dummies are interacted. That is, we present estimates of

$$(2) \quad SuicideRate_{stj} = \alpha_j + \delta_j PI_{st} + \beta_j' X_{sj} + \lambda_j' \theta_s + \rho_j \tau_t + \omega_{st} + \varepsilon_{stj},$$

where *j* indexes group (for instance, 15 through 17 year-old females versus females ages 18 through 21), and ω_{st} represents the interaction of the state and year fixed effects. In this regression framework, the source of the identifying variation is differences in the suicide rate between 15 through 17 year-olds and the comparison group, controlling in the most flexible fashion possible for state-specific trends in suicides common to both 15 through17 year-old females and the comparison group.

Although the estimated relationship between parental involvement laws and suicides is less precise when this specification is adopted, the estimates reported in column (5) of Table 5 are nearly identical in terms of magnitude as those reported in columns (3) and (4).[18] They suggest that the adoption of a parental involvement laws reduces the suicide rate among 15 through 17 year-old females on the order of 5.7 to 11.0 percent, with a median estimate of approximately 10 percent.

Coding Choice. It is often difficult to pinpoint (and code) when a particular parental involvement law came into effect. Although Levine (2003) and Bitler and Zavodny (2002) coded parental involvement laws in 36 states and the District of Columbia identically, they

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parental involvement enforcement law is associated with a 10.5 to 11.0 percent decline in the suicide rate among 15 through 17 year-old females.

[18] While we attempted to estimate this model using a Poisson, the likelihood function would not converge.

disagreed with regard to the correct coding of parental involvement laws in 14 states.[19] For instance, according to Bitler and Zavodny (2002), Montana never enforced a parental involvement law passed in 1991. In contrast, Levine (2003) coded Montana as having begun to enforce this law in 1991. To take another example, Levine coded Iowa as having enforced a parental involvement law throughout 1996, while Bitler and Zavodny coded the law as coming into effect on July 1, 1997. To ensure that our results were not sensitive to such differences, we compare estimates of the effect of parental involvement laws as coded by Levin (2003) to estimates of the effect of parental involvement laws as coded by Bitler and Zavodny (2002).[20] This comparison suggests that our basic findings are robust to minor differences in how parental involvement laws are coded.

The first two columns of Table 6 show estimates of δ using the Levine coding. In column (1), the number of suicides committed by 15 through 17 year-old females in state *s* at time *t* serves as the dependent variable; in column (2), the number of suicides committed by 18 through 21 year-old females serves as the dependent variable. The adoption of a parental involvement law is associated with 16 percent fewer suicides among females ages 15 through 17, and a 9 percent *increase* in suicides committed by females in the second age group. The difference between these estimates is statistically significant at the 0.05 level, as shown by the triple-difference estimate in column (3).

In columns (4) and (5) of Table 6 we present the corresponding estimates using the Bitler and Zavodny coding, which is much closer to our own. The adoption of a parental involvement

[19] It should be noted that Klick and Strattman (2008) used Bitler and Zavodny's (2002) coding of parental involvement laws.

[20] As noted, the estimates presented in Tables 1 through 5 used information drawn from Bitler and Zavodney (2002), Levine (2003), and a search of state statues and newspaper articles. We found that when Bitler and Zavodney (2002) and Levine (2003) disagreed, the evidence pointed toward the coding proposed by Bitler and Zavodny (2002) in 13 of the 14 cases.

law is associated with an almost 18 percent decrease in suicides committed by 15 through 17 year-old females, although it is also associated with a small (less than 1 percent) decrease in suicides committed by 18 through 21 year-old females. The difference between these estimates is significant at the 0.10 level, as shown in the triple difference estimate in column (6).

Finally, we address a second issue having to do with coding. In both 1987 and 1988, 22 states did not provide information on suicides committed by 16 and 17 year-olds. In 1989, 29 states did not provide information on suicides committed by 16 and 17 year-olds. Up to now, we have dealt with this issue by dropping these observations from the analysis. In Table 7 we present estimates of equation (1) coding the missing suicide counts as 0s.

There is some justification for this alternative approach to dealing with the issue of missing suicide counts. Using the available data, we calculate that there was an average of 1.5 suicides committed per year by 16 year-old females in states that provided incomplete information on suicides during the period 1987 through 1989. In contrast, there was an average of 2.9 suicides committed per year by 16 year-old females in the remaining states. Likewise, there was an average of 1.7 suicides committed per year by 17 year-old females in states that provided incomplete information on suicides during the period 1987 through 1989, whereas there was an average of 2.9 suicides per year committed by 17 year-old females in states that provided complete data.[21] We view these results as evidence that some states may have failed to report information on suicides when no suicides occurred.

[21] There was an average of 2.45 suicides committed by 16 year-old males in states that provided incomplete information on suicides during the period 1987 through 1989; there was an average of 6.19 suicides committed by 16 year-old males in the remaining states during the same period. There was an average of 2.31 suicides committed by 17 year-old males in states that provided incomplete information on suicides during the period 1987 through 1989; there was an average of 7.92 suicides committed by 17 year-old males in the remaining states during the same period.

When the missing suicide counts are coded as 0s, the adoption of a parental involvement law is associated with a 19 percent decrease in the number of suicides committed by 15 through 17 year-old females (column 1, Table 7), but there is also evidence that the adoption of a parental involvement law is associated with a much smaller decrease in suicides committed by females ages 18 through 21 (column 2, Table 7). And, in fact, the adoption of a parental involvement law is associated with small (insignificant) *increases* in the number of suicides committed by females ages 22 through 24 (column 3) and males ages 15 through 17 (column 4).. Difference-in-difference-in-difference estimates show that the effect of parental involvement laws on suicides of 15-to-17 year-old females documented in column (1) is statistically significantly different from the estimated effect on females ages 22 through 24 (see column 6) and males ages 15 through 17 (see column 7), though not statistically indistinguishable from the effect on females ages 18 through 21 (p-value = 0.25; see column 5).

Taken together, our findings in Tables 1-7 suggest robust evidence that the enforcement of parental involvement laws significantly reduce suicides of 15-50-17 year-old females.

IV. Analysis of Micro Data

Thus far, the analysis has focused on documenting the relationship between parental involvement laws and suicides. The remainder of the paper is devoted to an exploration of what might be considered the most likely mechanism behind such a relationship. Specifically, using data on middle and high school students from Wave I of the National Longitudinal Study of Adolescent Health (Add Health), we estimate the effect of sexual activity on having thoughts of suicide and attempting suicide.[22]

[22] The Add Health was conducted by the Carolina Population Center at the University of North Carolina at Chapel Hill. The Add Health data collection effort began with the identification of more than 26,000 schools in the United

Previous authors have found that sexually active adolescents are more likely to contemplate suicide and are more likely to attempt suicide than their counterparts who refrain from sexual activity (Hallfors et al. 2004; Sabia 2006).[23] We begin our analysis of the Add Health data by replicating this basic result. Table 8 presents estimates of the following model using ordinary least squares (OLS):

$$(3) \qquad SuicidalThoughts_i = \alpha + \gamma SEX_i + \beta' \mathbf{X}_i + \varepsilon_i,$$

where, *Suicidal Thoughts*$_i$ is a dichotomous variable equal to 1 if respondent answered yes to the following question: "[d]uring the past 12 months, did you ever seriously think about committing suicide?" and is equal to 0 otherwise; SEX_i was equal to 1 if the respondent was sexually active when surveyed, and equal to 0 otherwise;[24] and X_i is a vector of controls.[25] Table 7 also presents estimates of (3) in which *Suicidal Thoughts*$_i$ is replaced by a dichotomous variable equal to 1 if the respondent attempted suicide in the 12 months prior to being interviewed, and is equal to 0 otherwise.

States that served 11th graders and had an enrollment of at least 30 students. Eighty high schools were chosen from this population with unequal probability based on their size, region of the country, level of urbanization, type (public vs. private), and racial mix. Most were then matched with a junior high or middle school from the same community, bringing the total number of participating schools to 132. From the student rosters of these 132 schools, a core sample was randomly chosen to be administered the Adolescent Health Wave I (baseline) in-home survey, which was conducted between April and December of 1995 and produced a nationally representative sample of students in grades 7 through 12. For more information on the Add Health data collection effort, see Harris et al. (2008).

[23] Sabia (2006) also estimated a model with individual fixed effects. The relationship between thoughts of suicide and sexual activity was not statistically significant with the introduction of fixed effects.

[24] Respondents were asked, "[h]ave you ever had sexual intercourse? When we say sexual intercourse, we mean when a male inserts his penis into a female's vagina."

[25] These include: age, race, household income, marital status of the respondent's parents, parental educational attainment, religious affiliation, the respondent's Peabody Picture and Vocabulary Test score, a measure of urbanicity, school size, the respondent's score on a puberty scale, and indicators of physical health.

Estimates of (3) confirm that sexually active adolescents are in fact at increased risk of contemplating and attempting suicide. Among female respondents, sexual activity is associated with a 0.069 to 0.089 increase in the probability of having had thoughts of suicide and a 0.041 to 0.053 increase in the probability of having attempted suicide; among male respondents, sexual activity is associated with a 0.045 to 0.046 increase in the probability of having had thoughts of suicide and a 0.019 to 0.020 increase in the probability of having attempted suicide. These estimates, which are of comparable magnitude to those reported by Hallfors et al. (2004) and Sabia (2006), could reflect a causal relationship, but could also be due to an individual-level unobservable such as the degree to which an individual discounts the future.

In order to distinguish between these hypotheses, we identify a set of instruments, Z_i, which are assumed to be uncorrelated with the error term of equation (3) and related to sexual activity by the following equation:

$$SEX_i = \alpha + \beta'\mathbf{X}_i + \varphi'\mathbf{Z}_i + u_i. \quad (4)$$

Our instruments are: (i) the per-capita number of family planning clinics in the respondent's county of residence, (ii) an indicator for whether the respondent lived in a state that mandated HIV education and was enrolled in a school that provided family planning services, and (iii) a measure of physical maturity.[26] If the respondent was female, physical maturity is measured by

[26] The first two of these instruments were used by Sabia and Rees (2008). According to these authors, the availability of family planning services can be thought of as reducing the conditional probability of experiencing a pregnancy or sexually transmitted infection, and therefore as reducing the expected cost of having intercourse. In addition, the availability of such services may reduce the stigma costs of sex (Sabia 2007)..

age of menarche.[27] If the respondent was male, physical maturity is measured by their score on a 5-point scale.[28]

The first column of Table 9 reports OLS estimates of equation (4) restricting the sample to female respondents. All three of instruments are strong predictors of sexual activity. In fact, a joint test of significance shows that they easily satisfy the standard suggested by Staiger and Stock (1997). In columns (2) and (3) of Table 8, we report the relationship between the instruments and the second-stage outcomes controlling for sexual activity. None are individually or jointly significant predictors of suicidal thoughts or suicide attempts. Nor is there evidence that, controlling for sexual activity, any of the instruments are related to a depression indicator derived from the Center for Epidemiological Studies Depression scale (column 4).[29] Overidentification tests lend further support to the hypothesis that the instruments are valid (Table 10).

[27] There is strong evidence that age of menarche is a related to the timing of first intercourse. Researchers such as Averett, Rees, and Argys (2002), Phinney et al. (1990), Sabia and Rees (forthcoming), Soefer et al. (1985), and Zabin et al. (1986) have documented a positive relationship between age of menarche and age at first intercourse, and Phinney et al. (1990) and Presser (1978) found that age of menarche is related to the dating behavior of adolescent females.

[28] Sabia and Rees (2009) provide more detail with regard to how this scale was contructed. They show that the score on this scale is strongly related to the likelihood that a male adolescent is sexually active.

[29] This indicator is equal to 1 if the respondent scored above a "cutoff" on the Center for Epidemiological Studies Depression (CES-D) Scale, and equal to 0 otherwise. Originally developed by Radloff (1977), the CES-D Scale is a widely-used measure of depressive symptomatology. The Adolescent Health study administered 18 of the 20 items that typically comprise the CES-D Scale. Respondents were instructed to indicate the frequency with they had experienced certain feelings or emotions during the past week, including how often they felt "too tired to do things," how often they felt "fearful," and how often they "talked less than usual." Possible responses were "rarely or none of the time" (= 0); "some or a little of the time" (= 1); "occasionally or a moderate amount of the time" (= 2); and "most or all of the time" (= 3). Following Duncan and Rees (2005), responses to the 18 items were summed to produce a score of between 0 and 54, which was adjusted to correspond to the original 20-item CES-D Scale. Following Roberts et al. (1991), we construct a variable equal to 1 if a male respondent scored above 22 on the CES-D Scale, and equal to 0 otherwise. For females a cut-point of 24 was employed. The CES-D Scale is often dichotomized in this fashion by psychologists and medical researchers. A dichotomized version of the CES-D was employed by Sabia and Rees (2008).

The remaining columns of Table 9 report evidence with regard to the relevance and exogeneity of the instruments when the sample is restricted to male respondents. The instruments are clearly not as strongly related to male sexual activity as they are to female sexual activity. In fact, only the estimated coefficient of the respondent's score on the physical maturity scale is statistically significant at conventional levels. Nevertheless, the F-statistic from the joint test of significance is well above 10 (the standard suggested by Staiger and Stock), and there is no evidence that, controlling for sexual activity, the instruments are related to the second-stage outcomes.

Second-stage estimates are reported in Table 9 by the gender of the respondent.[30] When the sample is restricted to female respondents, these estimates suggest that sexual activity is associated with a 0.157 increase in the probability of serious suicidal thoughts (column 2) and a 0.134 increase in the probability of suicide attempts (column 7). When the sample is restricted females under the age of 18 (the age group for whom parental involvement laws are binding) sexual activity is still positively related to having thoughts of suicide and to having attempted suicide in the past year (column 3), and in the case of suicidal thoughts, is somewhat larger in magnitude.

In order to examine the effects of having risky as compared to protected sex, we replace the variable SEX_i with either $UPSEX_i$ (equal to 1 if the respondent had engaged in sex without birth control at most recent intercourse and equal to 0 if the respondent had never had sex) or $PSEX_i$ (equal to 1 if the respondent had used some form of birth control at most recent intercourse and equal to 0 if the respondent had never had sex).[31] The results of this exercise

[30] Table 9 presents two-stage least squares (2SLS) estimates. Instrumental variable probit and bivariate probit models produce are qualitatively similar to the 2SLS estimates presented in Table 9.

[31] These variables were based on answers to the question, "[d]id you or your partner use any method of birth control when you had sexual intercourse most recently?"

provide some evidence that, among female adolescents, the effect of having unprotected sex is larger than that of having sex with birth control. Although the estimated coefficient of $UPSEX_i$ is not statistically significant when the outcome is having had thoughts of suicide, it is almost 30 percent larger than the estimated coefficient of $PSEX_i$. When the outcome is having attempted suicide, the estimated coefficient of $UPSEX_i$ is almost twice the size of the estimated coefficient of $PSEX_i$, although the difference between these estimates is not quite significant at conventional levels.

The second panel of Table 9 reports second-stage estimates for male respondents. Although imprecise, they indicate that sexually active males are no more likely to have had thoughts of suicide or to have attempted suicide than their counterparts who refrained from having sex. In fact, the estimated coefficient of the sex variable is actually negative in some specifications. This pattern of results is consistent with previous research showing that sexual activity is more detrimental to the mental health of females than it is to the mental health of males and is also consistent with the results presented in Tables 1through 7 showing that the adoption of a parental involvement law impacts suicides committed by females minors, but not by male minors.

VII. Conclusions

Both opponents and proponents of restricting the access of minors to abortion services frame the debate in terms of psychological wellbeing. For instance, according to the National Conference of Catholic Bishops,

> The need for protecting minors is compelling. Abortion can involve life-long emotional and physical trauma for women, particularly young girls. In such situations, the love and support of families is critical and needs to

> be encouraged. Parents should not be kept in the dark when the welfare of their children and their unborn grandchildren is at stake" (Quinn 2000).

In contrast, Planned Parenthood argues that:

> For a variety of reasons, including fear of abuse, teenagers frequently feel they cannot tell their parents about their unintended pregnancies or desire to have an abortion…Teenagers who cannot tell their parents must either travel out of those states or obtain approval through a court or some other alternative process. The resulting delay increases the physical and emotional health risks to the teenager, since the earlier an abortion is, the safer it is" (Planned Parenthood 2008).

Despite these claims, we know of no previous study that has examined the relationship between parental involvement laws, which require a parent's notification or consent before a minor can obtain an abortion, and the psychological wellbeing of minors.

Using yearly data at the state level for the period 1987 through 2003, the current study finds evidence that the adoption of a parental involvement law is associated with a reduction in the number of suicides committed by female minors on the order of 15 to 25 percent. In contrast, there is little evidence that the adoption of a parental involvement law is associated with reductions suicides committed by older females or by males, a pattern of results that lends support to the hypothesis that the relationship between parental involvement laws and suicides committed by female minors is causal.

In addition, using microdata from Add Health, we find evidence that adolescent sex—particularly risky sex without contraception—increases risks of suicidal thoughts and suicide attempts among adolescent females, but not males. Taken together, our results are consistent with the hypothesis that parental involvement laws raise the expected cost of becoming sexually active, and with evidence that the cost of becoming sexually active falls primarily on young females as opposed to their male counterparts. We conclude that the imposition of parental

involvement laws has benefits that go beyond simply reducing pregnancies and abortions among minor teen females.

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Table 1. Estimated Effect of Parental Involvement Laws on Number of Suicides of 15-to-17 Year-Old Females, 1987-2003

	Controls for Abortion Policies		Controls for Abortion and Alcohol Policies		Controls for Abortion and Alcohol Policies and Demographics	
	(1)	(2)	(3)	(4)	(5)	(6)
Parental Involvement Law	-0.155**	-0.155**	-0.173***	-0.173***	-0.167***	-0.167***
	(0.079)	(0.079)	(0.061)	(0.062)	(0.057)	(0.057)
State Effects?	Y	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y	Y
Negative Binomial or Poisson?	NB	P	NB	P	NB	P
N	794	794	794	794	794	794

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

Notes: All regressions are weighted using the square root of the population of females aged 15-to-17 in the state.
Standard errors corrected for clustering on the state are in parentheses.

Table 2. Sensitivity of Poisson Estimates to Lagged Parental Involvement and State Time Trends

	(1)	(2)	(3)	(4)
Parental Involvement Law	--	-0.336**	-0.160*	-0.222*
		(0.154)	(0.093)	(0.131)
Lag [Parental Involvement Law]	-0.111	0.191	--	--
	(0.078)	(0.186)		
State Effects?	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y
Linear State Time Trends?	N	N	Y	N
Quadratic State Time Trends?	N	N	N	Y
N	794	794	794	794

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

Notes: All regressions are weighted using the square root of the population of females aged 15-to-17 in the state. Standard errors corrected for clustering on the state are in parentheses.

Table 3. Poisson Estimates of Effect of Parental Involvement Laws on Number of Suicides of Older Females and Males

	(1)	(2)	(3)	(4)	(5)
	Females Aged 18-21	Females Aged 22-24	Males Aged 15-17	Males Aged 18-21	Males Aged 22-24
Parental Involvement Law	-0.006	0.060	0.060	0.006	-0.008
	(0.078)	(0.064)	(0.046)	(0.036)	(0.038)
State Effects?	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y
N	760	775	841	843	853

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

Notes: All regressions are weighted using the square root of the relevant age-specific population in the state.
Standard errors corrected for clustering on the state are in parentheses. All models include the full set of controls in Table 1.

Table 4. Triple-Difference Estimates of Effect of Parental Involvement Laws on Number of Suicides of Females Aged 15-to-17

	(1)	(2)	(3)	(4)	(5)
	Controls: Females Aged 18-21	Controls: Females Aged 22-24	Controls: Males Aged 15-17	Controls: Males Aged 18-21	Controls: Males Aged 22-24
Parental Involvement Law	-0.161*	-0.227**	-0.227***	-0.172**	-0.159**
	(0.091)	(0.092)	(0.081)	(0.073)	(0.066)
State Effects?	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y
N	1,554	1,569	1,635	1,637	1,647

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

Notes: All Poisson regressions are weighted using the square root of the relavant age-specific population in the state.
Standard errors corrected for clustering on the state are in parentheses. All models include the full set of controls in Table 1.

Table 5. Robustness of Triple-Difference Estimates to Use of Suicide Rates and Inclusion of State-Specific Trends

	Poisson		*Rates*		
	Linear Time Trends (1)	Quadratic Time Trends (2)	Linear Time Trends (3)	Quadratic Time Trends (4)	State*Year Dummies (5)
	Control Group: Females Aged 18-21				
Parental Involvement Law	-0.197**	-0.176**	-0.059*	-0.060*	-0.057
	(0.087)	(0.085)	(0.033)	(0.033)	(0.046)
N	1,554	1,554	1,554	1,554	1,554
	Control Group: Females Aged 22-24				
Parental Involvement Law	-0.256**	-0.218**	-0.095**	-0.097**	-0.097*
	(0.109)	(0.106)	(0.042)	(0.043)	(0.058)
	1,569	1,569	1,569	1,569	1,569
	Control Group: Males Aged 15-17				
Parental Involvement Law	-0.248***	-0.246***	-0.105	-0.108	-0.110
	(0.087)	(0.089)	(0.070)	(0.070)	(0.096)
N	1,635	1,635	1,635	1,635	1,635
State Effects?	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y
N	1,734	1,734	1,734	1,734	1,734

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

Notes: All regressions are weighted using the relevant age-specific state population. Standard errors corrected for clustering on the state are in parentheses. All models include the set of controls listed in Table 1, but Rate regressions omit the population variable on the right-hand side of the estimating equation.

Table 6. Robustness of Estimates to Coding of Parental Involvement Law

	Levine PI Coding (1987-2001)			Bitler-Zavodney PI Coding (1987-2003)		
	Females Aged 15-17	Females Aged 18-21	Controls: Females Aged 18-21	Females Aged 15-17	Females Aged 18-21	Controls: Females Aged 18-21
	DD	DD	DDD	DD	DD	DDD
	(1)	(2)	(3)	(4)	(5)	(6)
Parental Involvement Law	-0.150*	0.087	-0.238**	-0.165***	-0.007	-0.158*
	(0.088)	(0.071)	(0.099)	(0.057)	(0.078)	(0.091)
State Effects?	Y	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y	Y
N	692	658	1,350	794	760	1,554

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

Notes: All regressions are weighted using the square root of the relavant age-specific population in the state.
Standard errors corrected for clustering on the state are in parentheses. All models include the full set of controls in Table 1.

Table 7. Robustness of Estimates to Coding of Number of Suicides

	Females Aged 15-17	Females Aged 18-21	Females Aged 22-24	Males Aged 15-17	Controls: Females Aged 18-21	Controls: Females Aged 22-24	Controls: Males Aged 15-17
	DD	DD	DD	DD	DDD	DDD	DDD
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Parental Involvement Law	-0.178***	-0.055	0.081	0.048	-0.122	-0.258**	-0.225***
	(0.057)	(0.103)	(0.077)	(0.044)	(0.106)	(0.107)	(0.077)
	Y	Y	Y	Y	Y	Y	Y
	Y	Y	Y	Y	Y	Y	Y
	867	867	867	867	1,734	1,734	1,734

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

Notes: All regressions are weighted using the square root of the relavant age-specific population in the state.
Standard errors corrected for clustering on the state are in parentheses. All models include the full set of controls in Table 1.

Table 8. Cross-Section Estimates of Relationship Between Adolescent Sexual Activity and Suicide

	Females		*Males*	
	(1)	(2)	(3)	(4)
	Suicidal Thoughts	Suicide Attempt	Suicidal Thoughts	Suicide Attempt
Sexually Active (No Controls)	0.069***	0.041***	0.046***	0.019***
	(0.009)	(0.006)	(0.008)	(0.004)
Sexually Active (Full Controls)	0.089***	0.053***	0.045***	0.020***
	(0.010)	(0.007)	(0.008)	(0.004)
Mean (SD) of Dependent Variable	0.167 (0.372)	0.055 (0.229)	0.102 (0.313)	0.023 (0.151)
Mean (SD) Sexually Active	0.394 (0.489)	0.394 (0.489)	0.427 (0.495)	0.427 (0.595)
N	9,757	9,754	9,597	9,595

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

Notes: All estimates are from unweighted regressions of teens aged 13-19 drawn from Wave I of the National Longitudinal Study of Adolescent Health. Standard errors corrected for clustering on the school are in parentheses. Models with full controls include controls for age, race, religion, household income, parent's educational attainment, parent's marital status, school size, urbanicity, region, height, weight, and number of biological siblings.

Table 9. Evidence on Relevance and Exogeneity of Instruments

	Females				*Males*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Sexually Active	Suicidal Thoughts	Suicide Attempt	Depression	Sexually Active	Suicidal Thoughts	Suicide Attempt	Depression
Age of Menarche	-0.039***	-0.004	-0.003	-0.005	--	--	--	--
	(0.004)	(0.004)	(0.002)	(0.003)				
Contraceptive-Inclusive Sex Education	0.046***	0.008	0.011	0.008	0.021	-0.004	-0.000	-0.003
	(0.018)	(0.014)	(0.008)	(0.008)	(0.015)	(0.007)	(0.004)	(0.008)
Per-capita family planning service providers in county	0.062**	-0.024	-0.002	0.001	0.035	-0.010	-0.008*	0.002
	(0.024)	(0.015)	(0.010)	(0.010)	(0.023)	(0.009)	(0.004)	(0.014)
Male Puberty Index	--	--	--	--	0.051***	0.000	-0.000	-0.005
					(0.005)	(0.004)	(0.002)	(0.005)
Sexually Active	--	0.095***	0.054***	0.090***	--	0.044***	0.019***	0.024***
		(0.010)	(0.007)	(0.009)		(0.008)	(0.005)	(0.008)
Joint F-stat on instruments	F = 44.3	F = 1.25	F = 1.02	F = 0.99	F = 37.4	F = 0.84	F = 1.27	F = 0.41
p-value	p = 0.00	p = 0.30	p = 0.39	p = 0.40	p = 0.00	p = 0.47	p = 0.29	p = 0.75
N	7,750	7,750	7,747	7,731	8,170	8,170	8,168	8,140

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

Notes: All estimates are from unweighted regressions of teens aged 13-19 drawn from Wave I of the National Longitudinal Study of Adolescent Health. Standard errors corrected for clustering on the school are in parentheses. All models include controls for age, race, religion, household income, parent's educational attainment, parent's marital status, school size, urbanicity, region, height, weight, and number of biological siblings.

Table 10. Estimated Effect of Adolescent Sexual Activity on Suicidal Thoughts and Suicide Attempts

	Suicidal Thoughts					Suicide Attempt				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	TSLS	TSLS: ≤ 17-years-old	TSLS: Unprotected Sex	TSLS: Safer Sex	OLS	TSLS	TSLS: ≤ 17-years-old	TSLS: Unprotected Sex	TSLS: Safer Sex
	Panel I: Females									
Sexually Active	0.096***	0.157*	0.198**	0.188	0.145	0.056***	0.134***	0.122**	0.182**	0.096*
	(0.011)	(0.087)	(0.088)	(0.148)	(0.093)	(0.007)	(0.051)	(0.063)	(0.086)	(0.054)
F-stat on first-stage instruments		F = 44.3	F = 38.1	F = 11.2	F = 34.3		F = 44.1	F = 37.8	F = 11.2	F = 34.2
J-stat on Hansen overid test		J = 2.75	J = 2.33	J = 1.36	J = 2.33		J = 1.07	J = 0.956	J = 0.802	J = 2.33
p-value on overid test		p = 0.25	p = 0.31	p = 0.51	p = 0.31		p = 0.59	p = 0.62	p = 0.67	p= 0.31
N	7,750	7,750	6,460	5,748	6,565	7,747	7,747	1,530	5,745	6,564
	Panel I: Males									
Sexually Active	0.044***	0.069	0.040	-0.109	0.121	0.019***	0.004	-0.010	-0.020	0.007
	(0.008)	(0.081)	(0.078)	(0.214)	(0.086)	(0.005)	(0.040)	(0.044)	(0.120)	(0.041)
F-stat on first-stage instruments		F = 37.4	F = 27.0	F = 4.4	F = 42.2		F = 37.4	F = 27.0	F = 4.4	F = 42.3
J-stat on Hansen overid test		J = 1.95	J = 1.51	J = 1.43	J = 0.470		J = 1.89	J = 2.96	J = 1.58	J = 1.95
p-value on overid test		p = 0.38	p = 0.47	p = 0.49	p = 0.79		p = 0.39	p = 0.23	p = 0.45	p = 0.38
N	8,170	8,170	6,690	5,757	7,055	8,168	8,168	6,688	5,755	7,053

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

Notes: All estimates are from unweighted regressions of teenagers drawn from Wave I of the National Longitudinal Study of Adolescent Health Standard errors corrected for clustering on the school are in parentheses. All models include controls for age, race, religion, household income, parent's educational attainment, parent's marital status, school size, urbanicity, region, height, weight, and number of biological siblings. For females, the instruments are age of menarche, the presence of a state mandated school-based contraceptive-include sex education program, and per-capita number of family planning service providers in the respondent's county of residence. For males, the instruments include a puberty index measuring underarm hair growth, the presence of a state mandated contraceptive-inclusive sex education program, and per-capital number of family planning service providers in the respondent's county of residence.

Appendix Table 1: Means and Standard Deviations of Dependent Variables (1987 - 2003)

Variable Name	Definition	Mean (StD)
Dependent Variables		
FSUICIDE1517	Number of Suicides of Females Aged 15-to-17	3.75 (4.17)
SRATE1517	Number of Suicides of Females Aged 15-to-17 per 10,000 Females	0.418 (0.431)
FSUICIDE1821	Number of Suicides of Females Aged 18-to-21	5.33 (6.03)
FSUICIDE2224	Number of Suicides of Females Aged 22-to-24	4.63 (5.19)
MSUICIDE1517	Number of Suicides of Males Aged 15-to-17	13.9 (12.7)
MSUICIDE1821	Number of Suicides of Males Aged 18-to-21	34.5 (32.3)
MSUICIDE2224	Number of Suicides of Males Aged 22-to-24	27.9 (27.8)
N		867

Appendix Table 2. States Enforcing Parental Involvement Laws, 1987-2003

State	Years in Effect	State	Years in Effect
Alabama	1987-2003	Nebraska	1991-2003
Arizona	2003	North Carolina	1995-2003
Arkansas	1989-2003	North Dakota	1987-2003
Colorado	2003	Ohio	1990-2003
Delaware*	1997-2003	Oklahoma	2001
Georgia	1991-2003	Pennsylvania	1994-2003
Idaho	1997-2003	Rhode Island	1987-2003
Indiana	1987-2003	South Carolina	1990-2003
Iowa	1997-2003	South Dakota	1998-2003
Kansas	1992-2003	Tennessee	1992-1996; 1999-2003
Kentucky	1994-2003	Texas	1999-2003
Louisiana	1987-2003	Utah	1987-2003
Massachusetts	1987-2003	Virginia	1997-2003
Michigan	1991-2003	West Virginia	1987-2003
Minnesota	1990-2003	Wisconsin	1992-2003
Mississippi	1993-2003	Wyoming	1989-2003
Missouri	1987-2003		

Note: States with parental involvement provisions that allow specified health professionals to waive parental involvement under certain circumstances not involving judicial procedures are not included as enforcement states.
*Law only in effect for those aged 16 and younger.

Appendix Table 3: Means and Standard Deviations of Independent Variables (1987 - 2003)

Variable Name	Definition	Mean (StD)
Independent Variables		
PINVOLVE	Parental consent or parental notification law in effect and enforced	0.416 (0.487)
DELAY	Mandatory waiting period prior to abortion	0.130 (0.357)
MEDABORT	Restrictions on Medicaid funding for abortion	0.702 (0.457)
UNEMRATE	State unemployment rate	5.37 (1.57)
POVRATE	Natural log of state poverty rate	2.50 (0.306)
GRADRATE	State high school graduation rate	0.739 (0.087)
DIVRATE	State divorce rate	4.59 (1.38)
POPULATION	State population	107,049 (116,759)
BEERTAX	Real state beer tax (in 2000 cents)	29.4 (23.1)
ZEROTOL	Zero tolerance drinking law in effect	0.519 (0.490)
JAIL1ST	A mandatory jail sentence for first conviction of driving under the influence (can usually be replaced by community service)	0.318 (0.466)
State Effects	Dummy variable equal to one for each state	---
Year Effects	Dummy variable equal to one for each year	---
Number of states[1]		51
N		867

[1]Includes the District of Columbia