

SPECIAL ARTICLE

Changes in Abortions and Births and the Texas Parental Notification Law

Theodore Joyce, Ph.D., Robert Kaestner, Ph.D., and Silvie Colman, B.B.A.

ABSTRACT

BACKGROUND

On January 1, 2000, Texas began enforcement of a law that requires physicians to notify a parent of a minor child seeking an abortion at least 48 hours before the procedure.

METHODS

We assessed changes in the rates in Texas of abortions and births (events per 1000 age-specific population) before enforcement of the parental notification law (1998 to 1999) and after enforcement (2000 to 2002). We did this by comparing the rate changes among minors 15 to 17 years of age at the time of conception (i.e., those who were subject to the law) with those of teens 18 years of age at the time of conception (i.e., those who were not subject to the law).

RESULTS

After enforcement of the law, abortion rates fell by 11 percent among 15-year-olds (rate ratio, 0.89; 95 percent confidence interval, 0.83 to 0.94), 20 percent among 16-year-olds (rate ratio, 0.80; 95 percent confidence interval, 0.76 to 0.85), and 16 percent among 17-year-olds (rate ratio 0.84; 95 percent confidence interval, 0.80 to 0.87), relative to the rates among 18-year-olds. Among the subgroup of minors 17.50 to 17.74 years of age at the time of conception (who would have been subject to the parental notification law in early pregnancy), birth rates rose by 4 percent relative to those of teens 18.00 to 18.24 years of age (rate ratio, 1.04; 95 percent confidence interval, 1.00 to 1.08). The adjusted odds ratio for having an abortion after 12 weeks' gestation among minors 17.50 to 17.74 years of age as compared with 18-year-olds was 1.34 (95 percent confidence interval, 1.10 to 1.62).

CONCLUSIONS

The Texas parental notification law was associated with a decline in abortion rates among minors from 15 to 17 years of age. It was also associated with increased birth rates and rates of abortion during the second trimester among a subgroup of minors who were 17.50 to 17.74 years of age at the time of conception.

From Baruch College (T.J.) and the Graduate Center (S.C.), City University of New York; and the National Bureau of Economic Research (T.J., R.K.) — both in New York; and the University of Illinois at Chicago, Chicago (R.K.). Address reprint requests to Dr. Joyce at the National Bureau of Economic Research, 365 Fifth Ave., 5th Fl., New York, NY 10016, or at ted_joyce@baruch.cuny.edu.

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THE TEXAS PARENTAL NOTIFICATION LAW went into effect on January 1, 2000. The law states that all unemancipated minors under the age of 18 years may not have an abortion until at least 48 hours after the physician has notified a parent as to his or her intent to perform the termination.¹ Notification can be waived if the minor obtains judicial approval for the termination. Thirty-five states currently enforce parental involvement laws (which include both consent and notification provisions).² Federal legislation that is under review would also limit a minor's access to abortion without parental involvement. The U.S. House of Representatives recently passed the Child Interstate Abortion Notification Act, which would extend enforcement of the parental involvement law in the minor's state of residence to any state in which she sought an abortion. Senate passage of a similar statute is likely.³

The effect of parental involvement laws is uncertain. Some research suggests that such laws lower rates of abortion among minors but have little effect on birth rates.⁴⁻⁸ Other studies suggest that the observed decline in abortions is spurious, since abortions to minors obtained outside their state of residence are often not recorded.⁹⁻¹² Moreover, results from previous research may be less relevant to the probable effect of such laws today, because of the increased distance a minor has to travel in order to obtain an abortion in states without parental involvement laws. The number of states that enforce parental involvement laws has doubled since 1991.^{2,13} Given the more restrictive environment, such laws may be more likely to lower abortion rates and increase birth rates and may increase the likelihood that an abortion will be performed later in pregnancy.

Texas is geographically the largest and most populous state to enforce a parental involvement law. In addition, distances to abortion providers in states that do not enforce such laws are substantial, especially for minors in the heavily populated southeastern region of the state. Thus, Texas offers a good opportunity to assess the effect of parental involvement laws on abortions, births, and the timing of abortion in a more restrictive environment. In this study, we analyzed changes in the rates of abortions, births, and the timing of abortion among minors before and after enforcement of Texas's parental notification statute.

METHODS

After receiving approval from the institutional review board at the Texas Department of State Health Services, we obtained all individual birth and abortion certificates from the period from 1997 to 2003. We limited all analyses to Texas residents who were 15 to 19 years of age who conceived during the period from August 1, 1997, to July 31, 1999, and from January 1, 2000, to December 31, 2002 (a total of 394,015 certificates). These data provide information on the date of birth of the person who had an abortion or gave birth, the date of the abortion or birth, and a clinical estimate of gestation in weeks. We estimated the date of conception by subtracting the gestational age from the date of abortion or birth. We also estimated the age at the time of conception by subtracting gestational age from the age at the time of the abortion or birth.

One limitation of the data from abortion certificates is that the reporting of the birth date of the mother is sometimes incomplete. For instance, 3419 of induced-termination certificates (24.1 percent) lacked the patient's exact date of birth in 1997, as did 1278 of the certificates (9.9 percent) in 1998, 389 (3.0 percent) in 1999, 44 (0.4 percent) in 2000, 911 (8.5 percent) in 2001, 2 (0.02 percent) in 2002, and 2 (0.02 percent) in 2003. In contrast, the mother's date of birth is well recorded on birth certificates: less than 1 percent lacked this information in each year. We excluded cases for which data on the exact date of birth were missing. Because more cases lacked data in the years before the parental notification law went into effect than after its introduction, we underestimate the absolute reduction in abortions associated with the law. However, because the proportion that is missing is distributed equally by age, the relative change in the rate of abortions among minors before and after enforcement of the law, as compared with the relative change among older teens, should not be substantively affected by the missing cases (Table 1 of the Supplementary Appendix, which is available with the full text of this article at www.nejm.org). To address the possibility of bias associated with these exclusions further, we also performed a secondary analysis limiting the sample to one year before and one year after enforcement of the law, a period during which there were fewer missing data.

STATISTICAL ANALYSIS

Abortion rates were calculated as the number of abortions per 1000 age-specific population. Rate ratios for abortions and births were calculated for various age groups by dividing the rate before enforcement of the parental notification law by the rate after its enforcement. Because abortion rates and birth rates among teenagers have been declining nationally and in Texas since 1991,¹⁴⁻¹⁷ we calculated the rate ratios for abortions and births for teens who were 18 years of age at the time of conception and were therefore not subject to the parental notification requirements; these teens were used as the referents (i.e., the rate ratios that would have been expected in the absence of a parental notification law).

We estimated the changes in abortion and birth rates associated with the law by dividing the rate ratio for teens under the age of 18 by the rate ratio for 18-year-olds to calculate relative rate ratios. A relative rate ratio of 1 indicates no association between the law and the rates of abortions and births for minors. We used the delta method to estimate the confidence interval of the natural logarithm of the rate ratio (Section 1 of the Supplementary Appendix).¹⁸

Before enforcement of the parental notification law, there were large differences in the rates of abortions and births between younger and older teens. To help compensate for these differences, we also performed analyses comparing changes in outcomes among minors who were at least 17 years 6 months but less than 17 years 9 months of age at the time of conception (17.50 to 17.74 years) with teens who were less than 3 months beyond their 18th birthday at the time of conception (18.00 to 18.24 years). Minors who conceived when they were at least 17 years 9 months but less than 18 years at the time of conception (17.75 to 17.99 years) were unlikely to have been affected by the law, since most would have been 18 years of age by the time that an abortion would have been performed.

We used logistic regression to analyze the association between Texas's parental notification law and the probability that a minor's pregnancy would end in abortion. An odds ratio of less than 1 indicates that the law is associated with a decreased likelihood that a minor, as compared with an 18-year-old, would have an abortion. We also analyzed whether the law was associated with an increased probability that an abortion, if per-

formed, would occur after 12 weeks' gestation (a second-trimester abortion).^{19,20} Odds ratios were adjusted for race and ethnic background (as self-reported by teens), marital status, previous abortions, previous live births, and health service region of residence, all of which were reported on both the birth and induced-termination certificates.

RESULTS

ABORTIONS AND BIRTHS

There were, on average, 14,644 abortions and 65,055 births per year among teens in Texas in the two years before enforcement of the parental notification law (Table 1). Abortions were most common among non-Hispanic white teens (41.5 percent), whereas most births were to Hispanic teens (53.5 percent).

Among minors who were 17 years of age at the time of conception, the abortion rate fell from 18.7 in 1998-1999 to 14.5 in 2000-2002 (Table 2),

Table 1. Annual Average Number of Abortions and Births among Texas Residents 15 to 19 Years of Age at the Time of Conception, According to Race or Ethnic Group.*

Variable	1998-1999†	2000-2002‡
	<i>no. of patients (%)</i>	
Abortion		
Non-Hispanic white	6,079 (41.5)	5,168 (38.3)
Non-Hispanic black	2,755 (18.8)	2,534 (18.8)
Hispanic	4,679 (32.0)	5,107 (37.9)
Other	384 (2.6)	417 (3.1)
Unknown	747 (5.1)	264 (2.0)
Total	14,644	13,490
Birth		
Non-Hispanic white	19,552 (30.1)	17,671 (27.3)
Non-Hispanic black	10,068 (15.5)	9,337 (14.4)
Hispanic	34,779 (53.5)	37,057 (57.3)
Other	656 (1.0)	652 (1.0)
Total	65,055	64,717

* Race or ethnic group was reported by patients on birth certificates or abortion certificates. Percentages may not sum to 100, because of rounding.

† All abortions and births from pregnancies conceived from August 1, 1997, to July 31, 1999, were included as events before enforcement of the parental notification law.

‡ All births and abortions from pregnancies conceived from January 1, 2000, to December 31, 2002, were included as events after enforcement of the parental notification law.

Table 2. Teen Abortion and Birth Rates in Texas, According to the Age and Year at the Time of Conception.*

Variable	1998–1999		2000–2002		Rate Ratio†	Relative Rate Ratio (95% CI)‡
	No.	Rate per 1000§	No.	Rate per 1000¶		
Abortion						
Age at time of conception						
15	1,017	6.5	864	5.4	0.82	0.89 (0.83–0.94)
16	1,886	12.1	1,450	9.0	0.75	0.80 (0.76–0.85)
17	2,866	18.7	2,297	14.5	0.78	0.84 (0.80–0.87)
18	4,173	27.7	4,086	25.8	0.93	
19	4,701	31.5	4,792	30.1	0.95	1.03 (0.99–1.07)
Birth						
Age at time of conception						
15	5,252	33.6	4,906	30.5	0.91	0.95 (0.92–0.98)
16	9,305	59.7	8,689	54.2	0.91	0.95 (0.93–0.97)
17	13,539	88.2	13,174	83.2	0.94	0.99 (0.97–1.01)
18	17,732	117.9	17,799	112.4	0.95	
19	19,227	129.0	20,149	126.5	0.98	1.03 (1.01–1.05)

* The number of abortions and births is the annual average and has been rounded. The rate is the number of abortions and births per 1000 age-specific population. Population was estimated from data obtained from the Web site of the Centers for Disease Control and Prevention (www.cdc.gov/nchs/about/major/dvs/popbridge/datadoc.htm). CI denotes confidence interval.

† The rate ratio was calculated by dividing the rate for a single year of age after enforcement of the law by the rate before enforcement of the law.

‡ The relative rate ratio was calculated by dividing the rate ratio for each group by the rate ratio for 18-year-olds.

§ All abortions and births from pregnancies conceived from August 1, 1997, to July 31, 1999, were included as events before enforcement of the parental notification law. Minors who conceived between August 1, 1999, and December 31, 1999, could have been subject to the law, given the time that could have elapsed between the recognition and resolution of the pregnancy.

¶ All births and abortions from pregnancies conceived from January 1, 2000, to December 31, 2002, were included as events after enforcement of the parental notification law.

a decline of 22 percent (rate ratio, 0.78). The abortion rate of teens who were 18 years of age at the time of conception fell from 27.7 to 25.8 during the same period, a decline of 7 percent (rate ratio, 0.93). Thus, the relative rate ratio for the two groups was 0.84 (0.78÷0.93), which was consistent with an abortion rate among 17-year-olds that was 16 percent less than that among 18-year-olds (95 percent confidence interval, 0.80 to 0.87). After enforcement of the law, the abortion rates among minors 15 and 16 years of age at the time of conception also decreased more than did the rates among 18-year-olds (Table 2). There was no significant difference between 17-year-olds and 18-year-olds in the change in birth rates after enforcement of the law, whereas birth rates of

younger minors (who were under 17 years of age at the time of conception) fell relative to those of teens who were 18 at the time of conception. Results were similar when we limited the analysis to one year before and after enforcement of the law (Table 2 of the Supplementary Appendix).

In a subgroup analysis, teens who were 17.50 to 17.74 years of age at the time of conception, as compared with teens who were 18.00 to 18.24 years at conception, had a relative rate ratio for abortion of 0.84 (95 percent confidence interval, 0.77 to 0.92) and a relative rate ratio for birth of 1.04 (95 percent confidence interval, 1.00 to 1.08) (Table 3). In contrast, there were no significant differences in changes in the rates of abortions and births after enforcement of the law among

Table 3. Abortion and Birth Rates in Texas among Teens between the Ages of 17.50 and 18.24 Years at the Time of Conception, According to Year and Race or Ethnic Group.*

Variable	1998–1999		2000–2002		Rate Ratio†	Relative Rate Ratio (95% CI)‡
	No.	Rate	No.	Rate		
All races and ethnic groups						
Abortion						
17.50–17.74 yr	753	19.6	569	14.4	0.73	0.84 (0.77–0.92)
17.75–17.99 yr	835	21.8	740	18.7	0.86	0.98 (0.90–1.07)
18.00–18.24 yr	976	26.0	899	22.7	0.87	
Birth						
17.50–17.74 yr	3458	90.1	3485	88.0	0.98	1.04 (1.00–1.08)
17.75–17.99 yr	3685	96.1	3652	92.3	0.96	1.02 (0.98–1.07)
18.00–18.24 yr	4186	111.4	4135	104.4	0.94	
Non-Hispanic white						
Abortion						
17.50–17.74 yr	332	18.5	234	12.8	0.69	0.84 (0.73–0.96)
18.00–18.24 yr	404	23.2	348	19.2	0.83	
Birth						
17.50–17.74 yr	1025	57.1	938	51.4	0.90	1.10 (1.02–1.18)
18.00–18.24 yr	1348	77.4	1150	63.5	0.82	
Non-Hispanic black						
Abortion						
17.50–17.74 yr	136	27.5	108	21.4	0.78	0.99 (0.80–1.21)
18.00–18.24 yr	199	40.4	163	31.8	0.79	
Birth						
17.50–17.74 yr	521	105.2	477	94.5	0.90	0.97 (0.88–1.08)
18.00–18.24 yr	628	127.7	603	117.7	0.92	
Hispanic						
Abortion						
17.50–17.74 yr	226	15.7	204	13.5	0.86	0.81 (0.69–0.95)
18.00–18.24 yr	306	21.7	348	23.0	1.06	
Birth						
17.50–17.74 yr	1877	130.6	2044	135.7	1.04	1.03 (0.98–1.09)
18.00–18.24 yr	2165	153.3	2337	154.5	1.01	

* Abortion and birth rates were annualized by multiplying the numerator by four and dividing by the population of 17-year-olds or 18-year-olds. This calculation facilitated comparison but had no effect on the relative rate ratios. Teens other than those in the listed racial and ethnic groups and those whose race was unknown were not included. CI denotes confidence interval.

† The rate ratio was calculated by dividing the rate by single year of age after enforcement of the parental notification law by the rate before enforcement of the law.

‡ The relative rate ratio was calculated by dividing the rate ratio for each age group by the rate ratio of teens between the ages of 18.0 and 18.24 years at the time of conception. Confidence intervals for the relative rate ratios are estimated on the basis of nonannualized rates.

Table 4. Adjusted Odds Ratios for Abortion in Texas among 17-Year-Olds and 18-Year-Olds at the Time of Conception.*

Age	Abortion†	Second-Trimester Abortion‡
	Adjusted Odds Ratio (95%CI)	Adjusted Odds Ratio (95%CI)
17.00–17.24 yr	0.83 (0.75–0.91)	1.04 (0.84–1.28)
17.25–17.49 yr	0.86 (0.78–0.94)	1.15 (0.93–1.41)
17.50–17.74 yr	0.77 (0.71–0.84)	1.34 (1.10–1.62)
17.75–17.99 yr	0.92 (0.85–1.00)	1.16 (0.97–1.40)
18.00–18.99 yr	1.00	1.00

* The odds ratios were estimated by logistic regression and were obtained from the coefficients of the interaction between the indicator after enforcement of the law and age at the time of conception. The odds ratios were adjusted for race or ethnic background, age at the time of conception, marital status, previous induced abortions, previous live births, health service region of residence, and the years after enforcement of the law. The reference age category was 18.00 to 18.99 years of age at the time of conception. The analysis included abortions and births to teens 15 to 19 years of age who conceived in the periods from August 1, 1997, to July 31, 1999, and from January 1, 2000, to December 31, 2002.

† Pregnancies included all induced abortions and live births and totaled 394,015. Of those, 4318 cases were dropped because data regarding race or region of residence were missing for abortions. Dichotomous indicators for missing data on marital status, previous live births, and previous induced abortions were included in the model. Of the remaining 389,697 cases used in the analysis, there were 9585 pregnancies (2.46 percent) with missing information for at least one of these characteristics.

‡ There were 69,754 induced abortions. Of those, 493 abortions were dropped due to missing information on gestational age. Dichotomous indicators for missing data on race or ethnic group, region of residence, marital status, previous live births, and previous induced abortions were included in the model. Of the remaining 69,291 abortions used in the analysis, 5675 (8.19 percent) had missing information for at least one of these characteristics. Of the total number of abortions, 11,493 (16.59 percent) occurred in the second trimester.

teens who were 17.75 to 17.99 years of age at the time of conception, as compared with teens who were 18.00 to 18.24 years of age.

Subgroup analyses according to race and ethnic group indicated that the abortion rate among non-Hispanic white minors fell significantly (relative rate ratio, 0.84; 95 percent confidence interval, 0.73 to 0.96) and the birth rate rose significantly (relative rate ratio, 1.10; 95 percent confidence interval, 1.02 to 1.18), relative to the comparison group (Table 3). Among non-Hispanic black minors, there was no significant change in the rate of abortions or births associated with the law. The abortion rate of Hispanic minors fell relative to that of older Hispanic teens (relative rate ratio, 0.81; 95 percent confidence interval, 0.69 to 0.95). The birth rate of Hispanic minors rose, but the increase was not significantly different from that of the 18-year-old comparison group.

PREGNANCY RESOLUTION AND ABORTION TIMING

The odds that a pregnancy would end in abortion after enforcement of the law fell significantly more among minors who were 17.50 to 17.74 years of age at the time of conception than among 18-year-olds (adjusted odds ratio, 0.77; 95 percent confidence interval, 0.71 to 0.84) (Table 4). Among minors who were 17.70 to 17.80 years of age at the time of conception, there was an increase in the proportion of abortions performed after 12 weeks' gestation after enforcement of the law (years 2000–2002) (Fig. 1). There was no analogous rise in second-trimester abortions among 17-year-olds two years before enforcement of the law (1998–1999). The adjusted odds of having an abortion after 12 weeks increased among teens who were 17.50 to 17.74 years of age at the time of conception relative to those who were 18 years of age (odds ratio, 1.34; 95 percent confidence interval, 1.10 to 1.62) (Table 4). However, no significant increase in the odds of second-trimester abortion was observed among younger 17-year-olds (among whom parental notification requirements would have been in force throughout the time that abortion was an option).

DISCUSSION

On the basis of birth and abortion records, we found that enforcement of Texas's parental notification law was associated with a decline in abortion rates among all minors. In association with the law, there was also a decrease in the odds that a pregnancy would result in an abortion and an increase in the odds of a second-trimester abortion among older minors who were 17.50 to 17.74 years of age at the time of conception.

We also found that among this older group of minors, the abortion rate of non-Hispanic white minors and Hispanic minors fell after enforcement of the law, whereas the abortion rate of non-Hispanic black minors did not. This finding was consistent with racial and ethnic differences in communication between minors and parents about the use of reproductive health services.^{21,22} In a recent survey of minors at family planning clinics, 53.1 percent of Hispanics, 58.1 of non-Hispanic whites, and 75.9 of non-Hispanic blacks reported that their parents knew of their use of the clinics' services.²¹ In an earlier study, researchers reported that parents of black girls were more likely to know that the minor sought an abortion than were the parents of white girls.²³

Results from previous studies have indicated that the abortion rate of minors decreases 13 to 42 percent after enforcement of a parental notification or consent law, if abortions are measured according to state of occurrence.^{5,8-10,12} Only a few studies have reported a decline associated with these laws when abortions are measured according to state of residence.^{4,7,11} Researchers have also analyzed changes in birth rates associated with parental notification or consent laws.^{6,7,10,11} Birth rates should rise if abortion rates fall, unless minors increase the use of contraception or decrease sexual activity in response to a parental notification or consent law. However, no previous study has reported a change in birth rates associated with such laws.^{6,7,10,11}

In each of these studies, researchers have relied on information regarding the age of minors at the time of birth and thus have been unable to distinguish teens who conceived at the age of 18 years and also gave birth at the age of 18 years from teens who conceived at the age of 17 years (and were subject to the law) but gave birth at the age of 18 years. This discrepancy may have biased previous estimates of the effect of parental involvement laws on birth rates toward a finding of no increase.^{6,7,10,11} A strength of our study was the availability of information from birth and abortion certificates that allowed us to calculate age at the time of conception and thus to distinguish teens who were subject to the law at the time of conception from those who were not. Moreover, the relatively large number of abortions and births to teens in Texas allowed us to focus on the behavior of 17-year-olds. Older minors are more likely to be affected by parental involvement laws than are younger minors, because they are less likely to communicate with their parents about their abortion.²³ The demonstrated decrease in abortion rates and increase in birth rates suggest that Texas's parental notification law induced a rise in unintended childbearing among this subgroup of older minors.

A potential limitation of our study and of previous analyses of parental involvement laws is the possibility that the decline in abortion rates associated with the law might have been overestimated if there had been an increase in abortions in other states to minors from Texas that were not recorded by the Texas Department of State Health Services. On the basis of information that was recorded on abortion certificates from the health department, less than 0.3 percent

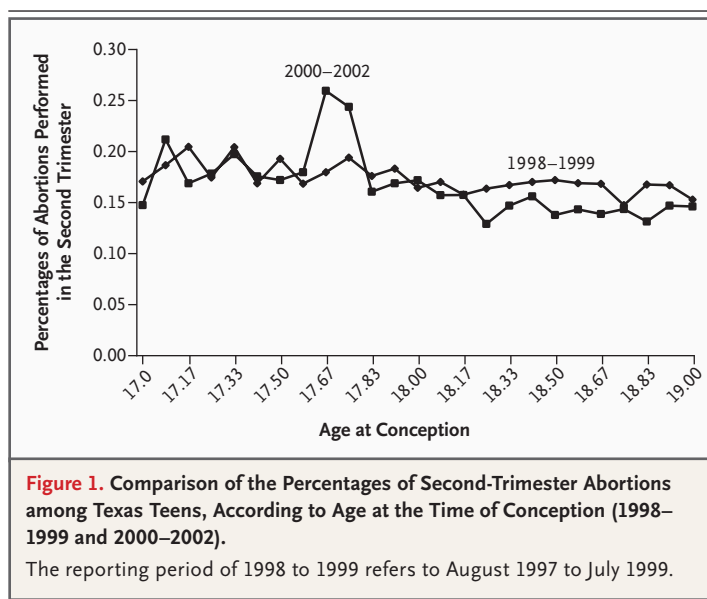


Figure 1. Comparison of the Percentages of Second-Trimester Abortions among Texas Teens, According to Age at the Time of Conception (1998–1999 and 2000–2002).

The reporting period of 1998 to 1999 refers to August 1997 to July 1999.

of abortions to minors who were residents of Texas were obtained in another state from 2000 to 2002. The low number, however, could mean that abortion certificates of Texas residents that were recorded in other states were not sent to the Texas health department by the health departments in other states. To assess this possibility, we obtained data on the number of abortions that Texas residents had in neighboring states, as recorded by the respective state health departments. In 2000, there were 13 abortions obtained by Texas minors in New Mexico, 5 in Oklahoma, and 5 in Arkansas (Henshaw S: personal communication). A high rate of reporting is supported by the observation that in 2000 the numbers of abortions that were reported by the state health departments in New Mexico, Oklahoma, and Arkansas are very close to those reported by the survey of abortion providers conducted by the Alan Guttmacher Institute, which is widely accepted to provide an accurate estimate of abortions.^{16,24} Louisiana does not report the state of residence on the abortion certificate. However, the state has enforced a parental consent law since 1978, which makes it unlikely that minors would seek abortions in Louisiana in response to the parental notification law in Texas. Finally, there is little evidence to suggest that the decline in abortions associated with the law was due to the underreporting of abortions for minors that were performed in Mexico (Section 5 of the Supplementary Appendix).

We limited our analysis to Texas and used 18-year-olds as the comparison group because simi-

lar data were not available from bordering states. An analysis of data from another state would allow minors of the same age to be used as a comparison group, but an important limitation of such an analysis would be that other unmeasured determinants of the numbers of abortions and births (which are likely to vary across states) could confound the estimates. However, published data from the Centers for Disease Control and Prevention relating to changes in abortion rates in states that did not have changes in the status of parental notification laws appear to support our conclusions. For instance, the abortion rate of 17-year-olds fell by 25 percent in Texas from 1999 to 2000 but rose by 12 percent in Louisiana, New Mexico, and Oklahoma; overall abortion rates fell by 6 percent in the 41 states (and the District of Columbia) that report such data and had no change in their parental notification

laws during this period (Table 5 of the Supplementary Appendix).^{16,25}

In summary, the enforcement of a parental notification law in Texas has been associated with lower abortion rates among minors and increased birth rates among older minors who were 17.50 to 17.74 years of age at the time of conception. We also found an increase in second-trimester terminations among teens who did not reach the age of 18 years until after the first trimester of pregnancy. Although the observational design of the study makes it impossible to confirm causality, these findings are relevant to an assessment of the likely effect of pending legislation to extend such laws.

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