

Impact of the Minnesota Parental Notification Law on Abortion and Birth

ABSTRACT

Background. The impact of the Minnesota Parental Notification Law on abortion and birth was examined.

Methods. Using linear models, outcome parameters were compared before and after enactment of the law. Time by age group interactions also were examined.

Results. The pre-enactment to post-enactment change in the Minnesota abortion rate reflected a greater decline for minors (≤ 17 years old) than for 18–19 year-olds (who were not under the law). An increase in abortion rate occurred for women ages 20–44. The law appeared to have had no impact on birth rate in minors. Following the enactment of the law, the rate of early abortions (≤ 12 weeks) declined among minors more than the rate of late abortions (> 12 weeks). This resulted in a pre-enactment to post-enactment increase in the ratio of late-to-early abortions among minors.

Conclusions. These data suggest that parental notification facilitated pregnancy avoidance in 15–17 year-old Minnesota women. Abortion rates declined unexpectedly while birth rates continued to decline in accordance with a long-term trend. (*Am J Public Health* 1991;81:294–298)

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Introduction

Laws requiring parental consent or parental notification prior to legal induced abortion for minor women, collectively called parental involvement laws, exist or have been proposed in numerous states. As of July 1990, laws in the United States requiring parental consent were in effect in Alabama, Indiana, Louisiana, Massachusetts, Missouri, North Dakota, and Rhode Island. Laws requiring parental notice were in effect in Arkansas, Idaho, Utah, and West Virginia; and parental involvement statutes were under challenge in Arizona, California, Georgia, Illinois, Kentucky, Mississippi, Nevada, Pennsylvania, and Tennessee. National attention focused on these laws when statutes from Minnesota and Ohio were heard by the US Supreme Court during its October 1989 term resulting in a decision largely supporting these laws. The present paper concerns the Minnesota law, enacted in August 1981 and enjoined in March 1986. This law required a minor woman to notify both parents at least 48 hours prior to an abortion or else seek court approval.

Few empirical studies have evaluated the impact of parental involvement statutes on minor women. Cartoof and Klerman¹ determined that abortions to minors in Massachusetts declined dramatically (43 percent) following the enactment of a parental consent law. However, during this time an approximately equal number of women migrated to surrounding states to obtain abortions. Blum² found that under parental notification in Minnesota, communication with parents about a minor's planned abortion occurred more often than had been reported by Clary³ in a Minneapolis/St. Paul study predating the law. But Blum found that patterns of com-

munication differed little from those among teenagers simultaneously surveyed in the neighboring state of Wisconsin (without such a law).

Common negative claims about parental involvement laws are that they force minors to leave the state to obtain abortions (as in Massachusetts), and that they result in increased birth rates, late abortions and medical complications. These effects are presumably related to a minor's reluctance to discuss her pregnancy with parents.⁴ Positive claims about these laws are that they promote responsibility (by encouraging teenagers to "think before they act"), foster parent-child communication, facilitate mature decision making, and may reveal medical history information that would otherwise remain unknown to the physician.^{5,6}

Empirical evaluation of assertions like these will necessitate multiple studies under a variety of circumstances and localities. The Cartoof and Klerman study¹ was conducted in Massachusetts, located in close proximity to states without parental involvement laws. This made it possible for minors to avoid the law altogether by crossing state lines. In Minnesota, the distance from out-of-state abortion facilities appears to have worked against mi-

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gration. Blum determined that “[i]n counterdistinction to the Massachusetts data, there is little evidence to indicate large numbers of Minnesota youths are leaving the state for abortion (data available on request to author).”²² It cannot be assumed that findings characterized by one set of background factors, such as proximity to out-of-state abortion facilities, will generalize to other settings.

In this study, the statewide impact of the Minnesota Parental Notification Law upon the incidence rate of abortion and birth, as well as upon the ratio of abortions to births and the ratio of early to late abortions, is examined.

Methods

Data

Abortion and birth incidence data were provided by the Minnesota Center for Health Statistics (MCHS). The data exclude all observations of unknown age and are restricted to residents of Minnesota. Live births to Minnesota residents are included regardless of whether the birth occurred inside or outside of Minnesota. Induced abortions reflect only those occurring in Minnesota.

Population estimates by age and gender are provided by the Minnesota Center for Health Statistics that computed them using a modified version of the cohort-component method for all years following the 1980 census.⁷

Throughout this report “birth(s)” and “abortion(s)” will refer to live birth(s) and induced abortions(s), respectively.

Outcome Measurements

The report utilizes six outcome measurements: four rates and two ratios.

- The abortion rate, the late abortion rate (>12 weeks), the early abortion rate (≤12 weeks) and the birth rate refer to the number of reported abortions (or births) in one year divided by the population estimate of females, in thousands, for that same year.

- The abortion-to-birth ratio refers to the number of abortions in a year divided by the number of births. Alternatively, this may be thought of as the abortion rate divided by the birth rate for a given year.

- The late-to-early abortion ratio refers to the number of late abortions in a year divided by the number of early abortions. Again, this may be thought of as the late abortion rate divided by the early abortion rate for a given year.

Measures of Effect

Each rate and ratio was examined using a linear model.^{8,9} Serving as a dependent variable, the rate (or ratio) was modeled as a function of age category (≤17, 18–19 or 20–44 years old), the year of occurrence (1975 through 1987), and the age by year interaction.

First, each model was employed to determine whether a given rate (or ratio) three years before and four years after enactment of the Minnesota Parental Notification Law differed within each age category. Because the modeling was performed in the log scale, the pre-enactment (1978 to 1980) and post-enactment (1982 to 1985) values represent the geometric mean of the individual values comprising the pre-enactment and post-enactment periods. (The antilog of the arithmetic mean of log values corresponds to the geometric mean of the same measurement in the original scale. That is, $\text{anti-log}[\ln a + \ln b]/2 = \sqrt{[ab]}$.)

Second, three additional contrasts were constructed to detect the presence of any age group by time interaction that might exist for a given rate or ratio. These contrasts reflect whether the pre-enactment to post-enactment *change* was different among minors than among 18–19 year-olds, or 20–44 year-olds, or among 18–19 year-olds than women 20–44 years old. It was assumed that a change due to the law, rather than to general factors operating in all age groups, would be most pronounced among women 17 years of age or younger; less evident among 18 and 19 year-old women who would have recently been, but would not presently be under the law (pregnancy at age 17 may mean birth at age 18); and least present among older women not subject to the law for at least two years.

Models

The mechanics underlying the linear models^{8,9} used to construct the six contrasts described above were as follows. The model parameters, representing age category (two parameters capturing three age classifications), year (12 parameters capturing 13 years), and the age by year interaction (24 parameters reflecting the cross-product of age and year), were regressed against the *natural log* of the rate or ratio under question. Rows of each model’s design matrix were combined to form the six contrasts. When the abortion rate, late abortion rate, early abortion rate, or birth rate served as the dependent variable, weighted least squares estimates and

asymptotic variances for the estimates were obtained. When the abortion-to-birth ratio or late-to-early abortion ratio served as the dependent variable, maximum likelihood was used to obtain estimates and asymptotic variances. PROC CATMOD of Version 6.03 of the Statistical Analysis Software (SAS)¹⁰ was employed to fit the models.

For ease of interpretation, the authors elected to display each contrast effect as a quotient (contrast ratio) in the original scale rather than a difference in the log scale. For any given contrast, this means that rather than presenting in tables the difference between two natural log values, it is the antilog of this difference that has been presented. It is evident that the difference between two identical log values will be “zero” while the corresponding contrast ratio will be unity (one). That is, $(\ln A) - (\ln A) = 0$ implies that the antilog is unity. Thus, contrast ratios equal to unity imply equivalence between the contrasted values.

Results

Table 1 contains the outcome measures examined in this study. For each outcome measure, Table 2 contains the contrast ratios that compare the pre-enactment and post-enactment periods. Contrast ratios greater than unity imply an increase in the outcome measure (abortion rate, birth rate, etc.) after enactment of the law and contrast ratios less than unity imply a decrease. Similarly, Table 3 contains ratios that reflect the age by time interactions. Here, a contrast ratio less than unity indicates a greater pre-enactment to post-enactment decline in the younger age group of the two being compared; a contrast ratio greater than unity indicates a greater increase.

Abortion Rate

Deviations from unity for the contrast ratios that compare pre-enactment and post-enactment periods (Table 2) are substantial in all age groups. Whereas the yearly abortion rates after the law’s enactment increased for women 20–44 years old (who were substantially removed from its impact), abortion rates declined in both 15–17 and 18–19 year-olds during this same period. The pre-enactment to post-enactment decline was substantially greater for 15–17 than 18–19 year-old women, and for 18–19 year-old women than 20–44 year-old women (Table 3).

TABLE 1—Outcome Measures and Population Estimates for Minnesota Women, 1975 to 1987*

Outcome Measure	Age (years)	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Abortion Rate [†]	15-17	12.38	16.50	18.60	18.25	19.24	19.57	16.06	14.25	12.80	13.03	14.54	14.42	15.45
	18-19	20.47	28.92	31.27	35.71	38.72	40.26	38.37	36.45	33.08	35.05	34.07	31.89	30.83
	20-44	7.32	9.55	11.48	12.36	13.41	14.13	14.00	13.96	13.11	14.21	14.48	14.29	14.17
Birth Rate [†]	15-17	20.94	19.64	19.62	17.80	17.71	17.48	17.36	16.54	14.56	16.00	15.01	15.52	15.03
	18-19	56.11	52.98	55.10	55.60	57.00	59.48	59.33	56.57	48.76	48.85	47.18	42.65	43.68
	20-44	74.02	72.48	75.79	76.14	78.05	79.80	79.43	78.13	75.18	75.57	75.92	74.00	72.67
Abortions/ Births	15-17	0.59	0.84	0.95	1.03	1.09	1.12	0.93	0.86	0.88	0.81	0.97	0.93	1.03
	18-19	0.36	0.55	0.57	0.64	0.68	0.68	0.65	0.64	0.68	0.72	0.72	0.75	0.71
	20-44	0.10	0.13	0.15	0.16	0.17	0.18	0.18	0.18	0.17	0.19	0.19	0.19	0.19
Early Abortion Rate [†]	15-17	10.22	12.81	14.73	14.97	15.73	15.34	12.93	11.37	9.86	9.68	11.24	11.38	12.65
	18-19	17.81	24.01	25.89	30.46	33.31	33.56	32.58	30.92	27.63	28.42	28.13	26.04	26.23
	20-44	6.62	8.45	10.23	11.24	12.19	12.71	12.74	12.65	11.87	12.69	13.04	12.85	12.84
Late Abortion Rate [†]	15-17	2.16	3.69	3.88	3.28	3.51	4.23	3.13	2.89	2.94	3.36	3.30	3.04	2.80
	18-19	2.65	4.91	5.39	5.25	5.41	6.69	5.78	5.53	5.44	6.63	5.94	5.85	4.56
	20-44	0.70	1.10	1.25	1.11	1.23	1.42	1.27	1.31	1.24	1.53	1.44	1.44	1.31
Late/Early Abortions	15-17	0.21	0.29	0.26	0.22	0.22	0.28	0.24	0.25	0.30	0.35	0.29	0.27	0.22
	18-19	0.15	0.20	0.21	0.17	0.16	0.20	0.18	0.18	0.20	0.23	0.21	0.22	0.17
	20-44	0.11	0.13	0.12	0.10	0.10	0.11	0.10	0.10	0.10	0.12	0.11	0.11	0.10
Population	15-17	115684	117102	116317	115722	115262	113600	108143	103981	104371	100131	100912	101172	101846
	18-19	85889	86826	86110	85525	85047	83964	79863	76786	77004	73784	74295	74375	74788
	20-44	662309	683069	700327	722162	747058	761209	779081	797138	799912	811693	819042	821954	828167

*Raw data provided by the Minnesota Center for Health Statistics.

[†]Abortion, birth, early abortion and late abortion rates are expressed as the number of abortions or births per 1000 women.

NOTE: Early abortions: ≤ 12 weeks; Late abortions: > 12 weeks.

Birth Rate

Birth rates decreased in all age categories following enactment of the law (Table 2). However, the decline was most pronounced in 15-17 and 18-19 year-old women. Table 3 reveals that the pre-enactment to post-enactment change among 15-17 and 18-19 year-old women was similar, with both age groups evidencing a substantially greater decline than found among women ages 20-44.

Ratio of Abortions to Births

A marked drop in the abortion-to-birth ratio occurred after the law in 15-17 year-old women when compared to both 18-19 year-old women and 20-44 year-old women (see Tables 2 and 3). In Figure 1, the abortion rate and birth rate are plotted separately for 15-17 year-old women along with the abortion-to-birth ratio (abortion rate/birth rate) in order to examine the relative importance of abortions and births to the markedly declining abortion-to-birth ratio in this age group. It is evident that birth rates continue a modest and nearly linear decline, apparently unaffected by the law ($r = -0.89$ between birth rate and year). On the other hand,

the abortion rate falls dramatically after the enactment of the law in August 1981. Together, these facts indicate that the drop in the 15-17 year-old abortion-to-birth ratio is due to a disproportionately greater decrease in the abortion rate (numerator).

Early and Late Abortions

The early abortion rate closely tracks the overall abortion rate (Tables 2 and 3). The pre-enactment to post-enactment late abortion rate substantially declines for women of 15-17 years, increases for women of 20-44 years, and remains nearly constant for women of 18-19 years (Table 2). The pre-enactment to post-enactment change in the late abortion rate, when compared between age groups, evidences a greater decline in late abortions for 15-17 than for either 18-19 or 20-44 year-old women (Table 3).

The late-to-early abortion ratio increased after the enactment of the law in all age groups (Table 2). However, the increase was greater among 15-17 year-old women than 20-44 year-old women (Table 3). Figure 2 reveals that a steep decline in early abortions, not an increase in late

abortions, accounts for the increased late-to-early abortion ratio in 15-17 year-old women.

Discussion

Data presented in this study are compatible with the hypothesis that, initially, parental notification facilitated pregnancy avoidance in 15-17 year-old Minnesota women. Abortion rates fell markedly in this age group relative to older women. Birth rates also fell, but only in keeping with a long-term trend established before enactment of the law. One possibility is that when minor women are restricted from abortion without notifying parents or seeking court approval, and are geographically prohibited from easy access to out-of-state abortions,² they are more likely to take measures to avoid pregnancy.

Although the data are compatible with this hypothesis, other explanations are possible. For example, a growing concern over human immunodeficiency virus infection, and/or awareness and availability of birth control may explain in part or in full these findings. However,

TABLE 2—Contrasts Between Pre- and Post-Enactment Periods*

Outcome Measures	Age (years)	Pre-Enactment**	Post-Enactment†	Contrast Ratio
				(Post/Pre) With 95% CI
Abortion Rate ^{††}	15–17	19.012	13.635	0.717 (0.692, 0.743)
	18–19	38.181	34.638	0.907 (0.883, 0.932)
	20–44	13.280	13.931	1.049 (1.034, 1.064)
Birth Rate ^{††}	15–17	17.663	15.510	0.878 (0.848, 0.909)
	18–19	57.338	50.213	0.876 (0.857, 0.895)
	20–44	77.982	76.191	0.977 (0.971, 0.983)
Abortions/Births	15–17	1.076	0.879	0.817 (0.777, 0.859)
	18–19	0.666	0.690	1.036 (1.000, 1.074)
	20–44	0.170	0.183	1.074 (1.057, 1.091)
Early Abortion Rate ^{††}	15–17	15.343	10.507	0.685 (0.658, 0.713)
	18–19	32.413	28.749	0.887 (0.861, 0.914)
	20–44	12.032	12.554	1.043 (1.027, 1.059)
Late Abortion Rate ^{††}	15–17	3.653	3.114	0.852 (0.788, 0.921)
	18–19	5.750	5.867	1.020 (0.952, 1.093)
	20–44	1.247	1.375	1.103 (1.052, 1.157)
Late/Early Abortions	15–17	0.238	0.296	1.245 (1.140, 1.359)
	18–19	0.177	0.204	1.150 (1.067, 1.241)
	20–44	0.104	0.110	1.058 (1.006, 1.112)

*Raw data provided by the Minnesota Center for Health Statistics.
 **Geometric mean, years 1978–80, Table 1.
 †Geometric mean, years 1982–85, Table 1.
 ††Abortion, birth, early abortion and late abortion rates are expressed as the number of abortions or births per 1000 women.
 NOTES: 1) Early abortions: ≤12 weeks; Late abortions: >12 weeks.
 2) Pre-enactment (1978–80) to post-enactment (1982–85) means are compared (post/pre) in the form of contrast ratios. A contrast ratio of one implies no pre-enactment to post-enactment change.

the abrupt nature of the change in abortion rate, a phenomenon found also in Massachusetts by Cartoof and Klerman,¹ makes these rival hypotheses less tenable. In any event, the data argue against Clary's³ concern that more minors might carry pregnancies to term as an indirect effect of the parental notification law. If such were the case, it seems unlikely that birth rates would have continued to decline in 15–17 year-olds along the linear trend line established prior to the law, or that the decline in birth rates would be nearly identical between 15–17 and 18–19 year-old women.

The pre-enactment to post-enactment increase in the proportion of late (>12 weeks) to early (≤12 weeks) abortions was greater for 15–17 than for 20–44 year-old women. At least two hypotheses may explain this finding. First, the law may have been more successful in preventing pregnancy among minors who would have had early abortions than among minors who would have had late abortions. A second possibility is that the law caused delays for a greater percentage of a declining number of minors seeking abortions. Regardless, the claim that the law caused more minors to obtain late abortions is unsubstantiated. In fact, the reverse is true. For ages 15–17 the number of late abortions per 1,000 women decreased following the enactment of the law. Therefore, an increased medical hazard due to a rising number of late abortions was not realized.

In this paper no effort has been made to confront the philosophical and legal issues surrounding parental involvement laws. Rather, the authors have pursued a limited task, that of empirical evaluation within a framework of defined outcome parameters. This study is consistent with the hypothesis that conception among minor women may be reduced immediately following enactment of parental notification legislation when migratory abortion across state lines is not a viable alternative. However, generalizations to other states must be made cautiously, as Minnesota is a unique state with a low minority population and a low pregnancy rate even before the parental notice legislation. The authors emphasize that replication in states other than Minnesota will be required to sustain the hypothesis. □

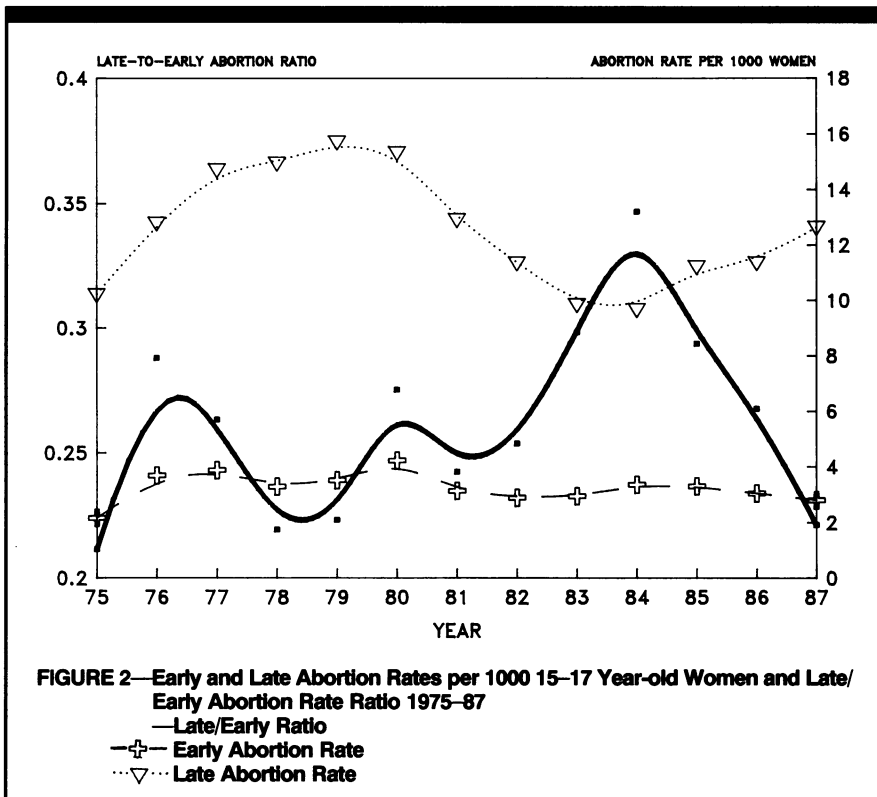
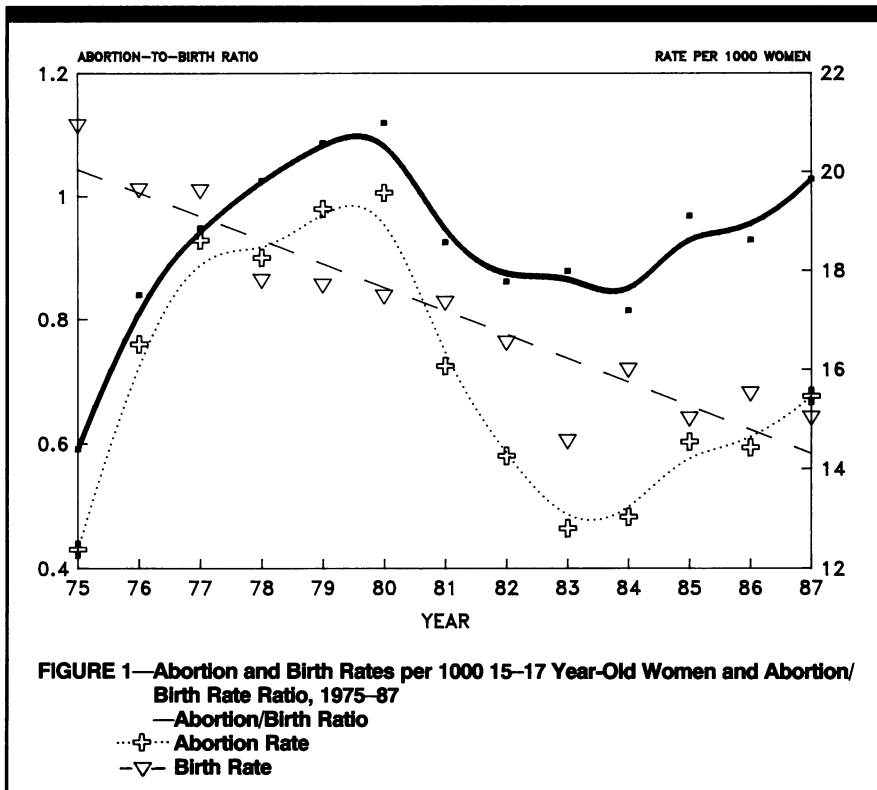
TABLE 3—Age by Time Interactions*

Outcome Measures	Age Group Comparison	Post- / Pre-enactment Ratios**		Contrast Ratio (younger/older) with 95% CI
		Younger	Older	
Abortion Rate	15–17 vs 18–19	0.717	0.907	0.791 (0.756, 0.827)
	15–17 vs 20–44	0.717	1.049	0.684 (0.658, 0.710)
	18–19 vs 20–44	0.907	1.049	0.865 (0.839, 0.892)
Birth Rate	15–17 vs 18–19	0.878	0.876	1.003 (0.962, 1.045)
	15–17 vs 20–44	0.878	0.977	0.899 (0.867, 0.931)
	18–19 vs 20–44	0.876	0.977	0.896 (0.876, 0.917)
Abortions/Births	15–17 vs 18–19	0.817	1.036	0.788 (0.741, 0.839)
	15–17 vs 20–44	0.817	1.074	0.761 (0.722, 0.802)
	18–19 vs 20–44	1.036	1.074	0.965 (0.928, 1.003)
Early Abortions	15–17 vs 18–19	0.685	0.887	0.772 (0.735, 0.812)
	15–17 vs 20–44	0.685	1.043	0.656 (0.629, 0.685)
	18–19 vs 20–44	0.887	1.043	0.850 (0.822, 0.879)
Late Abortions	15–17 vs 18–19	0.852	1.020	0.835 (0.753, 0.927)
	15–17 vs 20–44	0.852	1.103	0.772 (0.705, 0.846)
	18–19 vs 20–44	1.020	1.103	0.925 (0.850, 1.006)
Late/Early Abortions	15–17 vs 18–19	1.245	1.150	1.082 (0.963, 1.215)
	15–17 vs 20–44	1.245	1.058	1.177 (1.064, 1.302)
	18–19 vs 20–44	1.150	1.058	1.088 (0.994, 1.191)

*Raw data provided by the Minnesota Center for Health Statistics.
 **Post- / pre-enactment ratios are from Table 2.
 NOTES: 1) Early abortions: ≤12 weeks; Late abortions: >12 weeks.
 2) Post-enactment to pre-enactment ratios (Table 2) are compared across age groups (younger/older) to examine age by time interactions. A contrast ratio of "one" implies equivalent post- / pre-enactment ratios for both age groups (no interaction).

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References

1. Cartoof VG, Klerman LV: Parental consent for abortion: Impact of the Massachusetts law. *Am J Public Health* 1986; 76:397-400.
2. Blum RW, Resnick MD, Stark TA: The impact of a parental notification law on adolescent abortion decision-making. *Am J Public Health* 1987; 77:619-620.
3. Clary F: Minor women obtaining abortions: A study of parental notification in a metropolitan area. *Am J Public Health* 1982; 72:283-285.
4. Parental Notice Laws: Their Catastrophic Impact on Teenagers' Right to Abortion. New York: The American Civil Liberties Union Foundation Reproductive Freedom Project, 1986.
5. *H. L. v. Matheson*, 450 US 398, 1981.
6. *H. B. v. Wilkinson*, 639 F. Supp. 952 (D. Utah 1986).
7. US Department of Commerce, Social & Economic Statistics Administration, Bureau of the Census: *The Methods and Materials of Demography*, Vol. 2. Washington, DC: The Bureau, 1973; 735-741.
8. Forthofer RN, Lehnen RG: *Public Program Analysis*. Belmont, CA: Lifetime Learning Publications/Wadsworth, 1981.
9. Grizzle JE, Starmer CF, Koch GG: Analysis of categorical data for linear models. *Biometrics* 1969; 25:489-504.
10. SAS Institute Inc: *SAS/STAT Users Guide*, Release 6.03 Ed. Cary, NC: SAS Institute, 1988.