The Effect of Religious Membership and Parental Involvement Laws on Adult and Teen Abortion Rates

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Abstract

County-level abortion rates were regressed against parental involvement laws, religious membership levels, and several demographic and socioeconomic variables. The sample size was all 781 counties in the 12 states that provide abortion data for five age groups from 15-34. Parental involvement laws were significantly related to lower abortion rates for all age groups. Religious membership levels were used for the three major categories of religious adherence in the U.S. – Catholic/Orthodox, Mainline Protestant, and Non-Mainline Protestant. Religious affiliation with Catholic/Orthodox was positively related to abortion rates for all age groups, as was Non-Mainline Protestant affiliation for ages 25-34. Mainline Protestant was minimally related to higher abortion rates for two of five age groups. Lower abortion rates were related to married-couple families (for all but minor teens), increased White population, and prevalence of families in poverty for ages 15-24. Higher abortion rates were related to population density and college-educated population.

Keywords: abortion rates, parental involvement laws

I. Introduction

Both the abortion rate and the abortion numbers have been steadily declining over the last 30 years, until stabilizing between 2005-2008. The abortion rate (per 1000 women, age 15-44) was 19.6 in 2008, compared with the peak of 29.3 in 1981. The number of abortions were 1.21 million in 2008, from the peak of 1.61 million in 1990. Nearly half of pregnancies are unintended, and about 40 percent of these pregnancies are terminated (Finer, 2011). Of all pregnancies, excluding miscarriages, 22 percent end in abortion (Jones, 2011). Eighteen percent of abortions are by teenagers (Jones, 2010).

Parental involvement laws, in theory, should reduce the incidence of abortion for minor teens. Parental involvement laws are of two types – (1) parental notification, in which one or both parents/guardians must be notified but are not required to give consent, and (2) parental consent, in which one or both parents/guardians must give permission for the abortion. Of the 43 states having a parental involvement law, 22 states require parental consent; 16 states require parental notice, and 5 states require both parental notice and consent (NARAL, 2011). The law is considered constitutional and enforceable in 37 of the 43 states with either/both type of law (NARAL, 2011; Guttmacher, 2012).

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Although some researchers find minimal impact on teen abortion rates (Guttmacher, 2009a) many researchers have found minor teen abortion rates to be negatively related to parental involvement laws (New, 2011; Joyce, 2006; Haas-Wilson, 1996; Ohsfeldt, 1994; Tomal, 1999b).

Although parental involvement laws apply only to minor teens, they were found to also be negatively related to non-minor teens abortion rates (Tomal, 1999b) and to adult abortion rates (Tomal, 2000). Therefore, parental involvement laws may be a proxy for a variable that is also related to lower abortion rates, whether for teens or adults. Since parental involvement laws may be more likely to be passed in jurisdictions with a higher level of anti-abortion sentiment, both the law and the anti-abortion sentiment may be responsible for lower abortion rates.

One variable that might be related to the negative effect of parental involvement laws is religious membership. Theoretically, religious membership, especially in a conservative religious group, could reduce abortion rates in two ways: both directly (through potentially stronger anti-abortion sentiment) and indirectly (stronger anti-abortion sentiment within a state may increase the likelihood of the passage of a parental involvement law). The latest Gallup survey (2012) showed 50% of Americans identifying themselves as "pro-life" and 41% identifying as "pro-choice." Americans identifying themselves with a religious group showed an even greater affiliation with the "pro-life" group – 59% of Protestant/Other Christian and 52% of Roman Catholic (Gallup, 2009). Researchers generally concur that religious beliefs affect abortion beliefs (Cochran, 1996).

In her regression model, Haas-Wilson (1996), used a state-level variable of the number of persons belonging to one of the nine religious denominations that had published a restrictive statement on abortion -- Roman Catholic, Eastern Orthodox, Churches of Christ, American Baptist, Lutheran Church-Missouri Synod, African Methodist, Christian Churches, Assemblies of God, and Mormon -- as a proxy for religious opposition to abortion in the state and found a negative relationship with minor teens' abortion rates. Tomal (2000)found that a greater percentage of religious adherents at the county level negatively affected abortion rates for all age groups. Jones (2002) found an opposite effect – that abortion rates between 1994 and 2000 declined the most for those with no religious affiliation.

These studies have viewed religious adherents as a pooled sample, when, in fact, certain religious groups may have a greater effect on abortion rates. Or, perhaps religious membership no longer has a statistically significant relationship with abortion rates. Most research on abortion rates has been on data before 2000. Since 2000, abortion rates and abortion numbers have declined. Abortion rates have declined by 7.5 percent between 2000 and 2008 (Guttmacher, 2011). Medical abortions, with the approval of the drug RU-486 in 2000, accounts for an increasing percentage of all abortions – from 13 percent in 2005 (Jones, 2008) to 17 percent of non-hospital abortions in 2008 (Guttmacher, 2011). The number of abortion providers declined by 37 percent between 1982 and 2000 and declined another two percent between 2000 and 2005 (Jones, 2008). About 87 percent of counties, which contain 35 percent of 15-44-year-old women, did not have an abortion provider in 2005 (Jones, 2008). In 2005, 97 percent of non-metropolitan counties had no abortion provider (Guttmacher, 2008).

In addition, the percentage of "religious adherents" has declined over the past twenty years. In 1990, 55.1 percent of the total U.S. population were adherents (members or regular attenders) of 137 million religious groups. The percentage declined to 50.2 percent in 2000 (141 million groups) and even further to 48.8 percent in 2010 (151 million groups) (ARDA, 2010).

This paper, therefore, further explores the relationship between parental involvement laws and religious affiliation on abortion rates by dividing the primary religious groups into three main categories – Orthodox/Christian, Mainline Protestant, and Non-Mainline Protestant; these three categories account for 91 percent of all religious adherents in 2010 (207 of 236 religious groups) (ARDA, 2010); the other 9 percent are non-Christian groups which fluctuate greatly among counties – from 0 percent to almost 100 percent. The study uses county-level data for teen and adult abortion rates, as well as several U.S. Census Bureau and U.S. Department of Labor socioeconomic and demographic control variables.

2. Data and Methodology

Data are at county-level and for five age groups: 15-17, 18-19, 20-24, 25-29, 30-34. For county "i" and for age group "a", the regression model is depicted as: Abortion Rate$_{ia}$ = β_0 + β_1Religion$_{ia}$ + β_2Parental Law$_{ia}$ + β_3Density$_{ia}$ + β_4Married Couple$_{ia}$ + β_5Bachelor$_{ia}$ + β_6Unemployment$_{ia}$ + β_7Poverty$_{ia}$ + β_8White$_{ia}$ + ϵ_{ia}

2.1. Dependent Variable

Virtually all research on abortion rates uses state-level abortion rates. However, using aggregate state-level rates means losing more precise estimates of the effects of various socioeconomic and demographic variables on abortion rates. To control for differences across smaller geographic regions, this study, therefore, uses aggregate county-level data. The U.S. Census Bureau includes "independent cities" in their county-level data, so this study also includes independent cities. The sample size is 781 counties/independent cities. No national database exists for county-level abortion rates, so all 50 states' health department websites were accessed. Of the 50 states, 12 states report recent abortion and birth numbers by residence county/independent city and by the five age groups used in this study – Arizona, Delaware, Georgia, Idaho, Montana, New York, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, Vermont, Virginia, and Washington. The most current data reported in 2012 is for 2010, but some states had not even reported those numbers yet. Only 2008-2010 data were used: 2010 – 4 states (361 counties), 2009 – 5 states (244 counties), and 2008 – 3 states (176 counties).

The limitation of using county-level data is that only states that report abortion numbers can be used in this study with the underlying assumption that these states are not necessarily different from those counties that choose not to report abortion numbers. To help control for any regional differences, county-level socioeconomic and demographic control variables were included in the regression models. In addition, while the results may show statistically significant relationships between county-level religious membership measures, parental involvement laws, and abortion rates, the caveat of ecological fallacy should preclude the inference of necessarily similar relationships at the individual level. However, since no abortion database exists for all U.S. counties, and given the desire to control for differences both within and between states, this study uses county-level data in this exploration of the statistical relationship between types of religious membership, parental involvement laws, and abortion rates for different age groups.

2.2. Parental Involvement Laws

Three of the 12 states have no parental notification or parental consent law – New York, Vermont, Washington. In addition, the parental laws are unconstitutional and unenforceable in Montana. Of the total 781 counties, therefore, 610 were in states with enforceable parental notification or consent laws.
Table 1 describes the counties/independent cities.

Table 1. Description of Counties

Table 1
Description of Counties*

	Region of Country **				
	Northeast	Midwest	South	West	TOTAL
Parental Involvement Law enforced in 2010***	67 counties (1 state)	88 counties (1 state)	396 counties (4 states)	59 counties (2 states)	610 counties (8 states)
No enforced Parental Involvement Law in 2010	76 counties (2 states)	0 counties (0 states)	0 counties (0 states)	95 counties (2 states)	171 counties (4 states)
TOTAL	143 counties (3 states)	88 counties (1 state)	396 counties (4 states)	154 counties (4 states)	781 counties (12 states)

* County or county-equivalent (independent city) as defined by the U.S. Census Bureau in the following
　　　　states: Arizona, Delaware, Georgia, Idaho, Montana, New York, North Carolina, Ohio, Pennsylvania,
　　　　Vermont, Virginia, Washington

** Region as defined by the U.S. Census Bureau

*** NARAL (National Abortion and Reproductive Rights Action League), 2011.

Table 2 provides the average abortion rate, by age group, for counties with a parental involvement law and counties with no enforced parental involvement law. For all age groups, not just minor teens, the abortion rate is lower in counties with a parental involvement law.

Table 2. Abortion Rates by Age Group

Table 2

Abortion Rates* by Age Group

	15-17	18-19	20-24	25-29	30-34	Overall
Counties with Parental Involvement Law (n=610)	249	197	164	111	93	120
Counties with No Parental Involvement Law (n=171)	346	258	202	124	93	157
All Counties (n=781)	228	181	153	110	97	128

* Abortion Rate = the number of abortions per 1000 pregnancies

2.3. Religiosity

To measure the level of religiosity within each county, data from ARDA (The Association of Religious Data Archives) (2010) was used. The data were collected by the Association of Statisticians of American Religious Bodies (ASARB) and includes county-level numbers of "congregational adherents" (members, their children, and regular attenders) for 236 religious groups. The total percentage of "congregational adherents" for these 236 groups was 48.8 percent in 2010. Of these 236 groups, all but 29 are classified in the following categories: Evangelical Protestant (146 denominations – 16.2%), Black Protestant (12 denominations – 1.6%), Mainline Protestant (23 denominations – 7.3%), Orthodox (23 denominations – 0.3%), Catholic (3 denominations – 19.1%). The remaining 29 religious groups are labeled as Other (4.3%); these groups are often highly concentrated in a county or virtually non-existent.

Overall, therefore, 44.5 percent of Americans are considered "congregational adherents" of a Protestant, Orthodox, or Catholic group; only 4.3 percent attend another religious group; and 51.2% are not members/regular attenders of any of the 236 religious groups in the survey; they are classified as "Unclaimed" by ARDA.

For purposes of this study, three religious groups are used: (1)Mainline Protestant, (2) Catholic/Orthodox, and (3) Non-Mainline Protestant. Classified as "Non-Mainline Protestant" are the ARDA groups "Evangelical Protestant" and "Black Protestant"; these two groups were combined, since the Black Protestant percentage is small and since the two groups have many similar religious beliefs and values (Green, 1996). Catholic and Orthodox are combined, given the small percentage for Orthodox and since both these religious groups are staunchly anti-abortion. ARDA's "Other" category is not used, as they comprise just under 4 percent, on average, of the 781 counties, and account for only 29 of the 239 religious groups.

Of the 781 counties represented in this study, the average percentage of adherents in Protestant, Catholic, or Orthodox groups was 41.76, with a minimum of 1.45 percent and a maximum of 99.56 percent. The average percentages were Mainline Protestant – 9.93 percent; Catholic/Orthodox – 10.13 percent; and Non-Mainline Protestant – 21.7 percent.

Table 3 provides the average percentage of adherents within the three categories of religious groups for counties with a parental involvement law and counties with no enforced parental involvement law.

Table 3. Religious Adherents by Category

Table 3
Religious Adherents by Category *

	Mainline Protestant	Catholic-Orthodox	Non-Mainline Protestant	Total**
Counties with Parental Involvement Law (n=610)	10.34	7.42	25.21	42.97
Counties with No Parental Involvement Law (n=171)	8.46	19.78	8.95	37.19
All Counties (n=781)	9.93	10.13	21.70	41.76

 * Percent of County Population identified as Adherents by ARDA (Association of Religious Data Archives)

 ** Does not include "Other" category (non-Christian religious groups) or "Unclaimed"

2.4. Other Control Variables

2.4.1. Public Funding (**RESTRICT**)

Because public funding may affect the abortion rates for low-income women, a binary variable was included for restrictive public funding. The Hyde Amendment, passed in 1977, specifies what abortion services are covered under Medicaid; the present version requires coverage of abortion in cases of rape, incest, and life endangerment. The Hyde Amendment affects only federal spending; states can use their own funds to cover abortions for additional reasons.   Some researchers found restrictive public funding were related to lower abortion rates (Lundberg, 1990; Levin, 1996); other researchers find a statistically insignificant relationship (Sun, 1995; Haas-Wilson, 1997).

Of the 12 states used in this study, 6 states provide funding under the Hyde Amendment only (Delaware, Georgia, Idaho, North Carolina, Ohio, Pennsylvania); 5 states provide funding for all or most health circumstances (Arizona, Montana, New York, Vermont, Washington) and Virginia for fetal abnormality (National Abortion Federation, 2012; Guttmacher, 2012). For purposes of this study, Virginia was put with the Hyde Amendment-only group, since the requirement of fetal abnormality is restrictive. Therefore, of the 781 counties, 595 are considered to have "restrictive funding," which limits the ability of low-income women to obtain an abortion.

In reality, however, many abortion service providers and nonprofit abortion funds provide services on sliding fee scales and through donations, which may allow low-income women to access services they otherwise could not afford (Guttmacher, 2009b).

2.4.2. Socio-Economic and Demographic Variables

Race, family structure, and the opportunity cost of giving birth may also affect abortion decisions. Therefore, several socio-economic and demographic variables were included as control variables.

Bachelor: the percent of a county's residents with at least a Bachelor's Degree. A higher level of education can influence abortion rates in more than one way: greater knowledge may mean better birth control; higher education may make the birth option for a pregnancy more costly if higher-paying jobs are involved; and higher education may mean better-paying jobs increasing the ability to afford abortions. Education, therefore, is expected to be positively related to abortion rates.

Unemployment: unemployment rate. A higher unemployment rate may be related to lower abortion rates for two reasons: abortions may be less affordable, and women may view the opportunity cost the birth option as lower in areas with fewer employment opportunities.

Density: the density per square mile of land area. The probability of choosing the abortion option is higher in more urban areas (Currie, 1996; Liu, 1995). In addition, urban areas are more likely to have abortion providers. Brown (2001) finds that there is higher probability of abortion for women living closer to abortion providers. In an analysis of teen abortion rates, Jewell (2000) finds that longer travel distances result in lower abortion rates.

Married: the percent of families with own children headed by a married couple. Hymowitz (1994) and Tomal (1999a) report that intact families are related to lower teen birth rates – and, theoretically, then, abortion and pregnancy rates as well.

Poverty: the percent of families living below poverty level. In areas with more pervasive poverty, women may be less able to afford abortions and may also view the birth option as more socially acceptable if unmarried, which would result in a negative relationship with abortion rates. Over 30 percent (30.3%) of families headed by a female householder (with no husband present) live below the poverty level (US Census Bureau, 2010), and almost 40 percent (39.6%) of female-headed households with children live below the poverty level.

White: the percent of "white only" residents. Since nonwhites, particularly teens, historically have a higher probability of choosing the birth option when pregnant, this variable was included. In counties that are not as heavily White, the other races are primarily Black, Native American, and/or Hispanic.

Table 4 lists the definitions and means of the control variables used in this study.

Table 4. Control Variables

Table 4

Control Variables -- County-Equivalent Data (n = 781)

		Mean	St. Error
RELIGIOSITY[2]	Percent that are "adherents" in any of 207 Christian religious groups	41.7	0.59
MAINLINE[2]	Percent that are in a Mainline Protestant religious group	9.93	0.23
ORTH-CATH[2]	Percent that are in an Orthodox or Catholic religious group	10.1	0.43
NON-MAINLINE[2]	Percent in Evangelical Protestant or Black Protestant religious group	21.6	0.56
PARENTAL[3]	Percent of counties with enforced parental involvement law	78.1	1.48
RESTRICTIVE[4]	Percent of counties with restrictive public funding for abortions	76.2	1.53
BACHELOR[5]	Percent of population with a Bachelor's Degree or higher	19.9	0.34
DENSITY[5]	Population per square mile of land area	53.2	115.20
MARRIED[5]	Percent of families headed by a married couple	19.5	0.19
POVERTY[5]	Percent of families living below poverty rate	11.3	0.18
WHITE[5]	Percent of population that is "white only"	79.5	0.64
UNEMPLOY[6]	Unemployment rate	9.8	0.09

[1] resident-county data obtained from states' health department websites

[2] ARDA (Association of Religious Data Archives

[3] NARAL (National Abortion and Reproductive Rights Action League)

[4] National Abortion Federation; [5] U.S. Census Bureau; [6] Bureau of Labor Statistics

3. Regression Analysis and Results

The dependent variable for each of the four age groups is the Abortion Rate, computed as: *p = abortion rate [(Number of abortions / (number of pregnancies * 1000)]*

Given the limited nature of the dependent variable (between 0 and 1,000), an appropriate functional form for this type of variable (Greene, 1993) is a logistic transformation of the variable:

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Ln(p/(1000-p), where p = number of abortions per 1,000 pregnancies

Some of the smaller counties, particularly for the teen age groups, have abortion rates at both the upper and lower limits (e.g., 0 abortions of 1 pregnancy, or 1 abortion of 1 pregnancy). In order for the logistic transformation to be calculated for all the abortion rates, rates of 0 (0 abortions/1000 pregnancies were arbitrarily set at 1, and rates 1000 (1000 abortions/1000 pregnancies) were set at 999.

Since some of the counties were small, with low numbers of pregnancies, and because the study used aggregate data, the regression was weighted with the appropriate weight for the logistic transformation (Maddala, 1983): *[(n*p*(1000-p))^.5], where n = number of pregnancies)*

To test for multicollinearity between the explanatory variables – using the overall abortion rate – and without any religious variables, a variance inflation factor analysis (VIF) was run, to measure the inflation in the variances of parameter estimates due to correlation between the regressors. PARENTAL (parental involvement law) and RESTRICT (restrictive public funding) – both dummy variables with values of 0 or 1 – had variance inflation factors approaching 10, the guideline for a severe multicollinearity problem (Mendenhall and Sinich, 1989); Neter, Wasserman, and Kutner, 1989). Both variables had statistically significant coefficients but with opposite signs. When the regression was run with just RESTRICT or just PARENTAL, the coefficients remained statistically significant but this time were both negative. The results are presented in Table 5.

Table 5. Testing for Multicollinearity

Table 5
Testing for Multicollinearity -- Variance Inflation Factors
Weighted Coefficient Estimates for Overall Abortion Rate (log-linear functional form)
Dependent Variable is "Overall Abortion Rate" (all age groups combined)

		VIF			VIF			VIF
PARENTAL	-1.161***	8.958					-0.45***	1.191
RESTRICT	0.72***	8.620		-0.39***	1.146			
DENSITY	0.1E-4***	1.666		0.03E-5***	1.643		0.1E-4***	1.666
MARRIED	-0.04***	1.461		-0.4E-2***	1.439		-0.04***	1.437
BACHELOR	0.02***	1.887		0.3E-2***	1.874		0.02***	1.874
UNEMPL	0.02*	1.640		0.7E-3	1.624		0.02	1.635
POVERTY	-0.03***	3.682		-0.2E-2	2.861		-0.03***	2.859
WHITE	0.02***	1.614		-0.2E-2***	1.603		-0.02***	1.612

Dependent Variable is logistic transformation of rate: *ln(p/1000-p)*, where p=number of abortions per 1000 pregnancies.

The weight for the regression= *((n*p*(1000-p))^.5)*

***p<.01; **p<.05; *p<.10

Because of the strong multicollinearity between PARENTAL and RESTRICT – and since both are dummy variables, so that a hybrid variable cannot be created – RESTRICT was dropped from the model, as the focus of this study is on the impact of parental involvement laws (rather than restrictive public funding) on abortion rates.

Table 6 presents the results for the two regressions that were run for each of the five age groups: (1) with RELIGIOUS (total percent of population that are "adherents" in any of 207 religious groups) and (2) with three separate religious categories – MAINLINE PROTESTANT, ORTHODOX-CATHOLIC, and NON-MAINLINE PROTESTANT.

Table 6. Weighted Coefficient Estimates for Abortion Rates

Table 6

Weighted Coefficient Estimates for Abortion Rates for Five Age Groups (Log-Linear Functional Form)

(t-statistic in parentheses)

	15-17 year olds		18-19 year olds		20-24 year olds		25-29 year olds		30-34 year olds	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MAINLINE PROTESTANT		0.004 *(0.63)*		0.008 *(1.51)*		0.010* *(1.71)*		0.009 *(1.65)*		0.009* *(1.82)*
CATHOLIC-ORTHODOX		0.009*** *(3.13)*		0.012*** *(5.13)*		0.014*** *(5.35)*		0.012*** *(5.24)*		0.007*** *(3.37)*
NON-MAINLINE		0.004 *(0.63)*		0.002 *(0.62)*		0.004 *(1.37)*		0.007*** *(2.95)*		0.008*** *(3.52)*
RELIGIOUS	0.005** *(2.45)*		0.007*** *(4.03)*		0.009*** *(4.80)*		0.010*** *(5.63)*		0.008*** *(4.86)*	
PARENTAL LAW	-0.894*** *(-12.43)*	-0.814*** *(-9.81)*	-0.680*** *(-10.73)*	-0.567*** *(-7.79)*	-0.539*** *(-7.96)*	-0.433*** *(-5.50)*	-0.400*** *(-6.52)*	-0.342*** *(-4.80)*	-0.286*** *(-5.11)*	-0.302*** *(-4.61)*
DENSITY	0.3E-4*** *(6.64)*	0.3E-4*** *(6.18)*	0.02E-4*** *(4.94)*	0.2E-4*** *(4.25)*	0.1E-4*** *(2.59)*	0.8E-5* *(1.96)*	0.1E-4*** *(2.74)*	0.8E-5** *(2.40)*	0.8E-5*** *(2.71)*	0.9E-5*** *(2.74)*
MARRIED-COUPLE	-0.010 *(-1.48)*	-0.010 *(-1.36)*	-0.024*** *(-4.00)*	-0.023*** *(-3.70)*	-0.028*** *(-4.28)*	-0.028*** *(-4.12)*	-0.035*** *(-6.08)*	-0.034*** *(-5.88)*	-0.027*** *(-5.27)*	-0.027*** *(-4.95)*
BACHELOR	0.012*** *(3.06)*	0.011*** *(2.86)*	0.027*** *(8.39)*	0.026*** *(8.08)*	0.034*** *(10.16)*	0.034*** *(9.96)*	0.025*** *(8.19)*	0.024*** *(8.06)*	0.007** *(2.57)*	0.007** *(2.57)*
UNEMPLOY	0.007 *(0.42)*	0.012 *(0.72)*	-0.008 *(-0.57)*	-0.7E-3 *(-0.05)*	0.034** *(2.29)*	0.041*** *(2.73)*	0.023* *(1.73)*	0.027* *(1.95)*	0.011 *(0.90)*	0.011 *(0.84)*
POVERTY	-0.068*** *(-6.46)*	-0.065*** *(-6.08)*	-0.052*** *(-5.61)*	-0.047*** *(-5.05)*	-0.027*** *(-2.73)*	-0.023** *(-2.26)*	-0.008 *(-0.91)*	-007 *(-0.73)*	-0.2-E-3 *(-0.02)*	-0.3-E-3 *(-0.04)*
WHITE	-0.010*** *(-4.97)*	-0.011*** *(-5.01)*	-0.013*** *(-7.29)*	-0.014*** *(-7.59)*	-0.013*** *(-7.04)*	-0.014*** *(-7.20)*	-0.017*** *(-9.83)*	-0.017*** *(-9.67)*	-0.017*** *(-4.86)*	-0.017*** *(-10.78)*
Adjusted R-Square	39.1%	39.4%	44.8%	45.8%	38.7%	39.4%	41.4%	41.5%	35.6%	35.5%

(1) Dependent Variable is logistic transformation of abortion rate: *ln(p/(1000-p)),* where p = *number of abortions per 1000 pregnancies*

(2) The weight for the regression = *((n*p*(1000-p))^.5),* where n = *number of pregnancies*

(3) In counties with p = 0, p was set at 1, and with p = 1000, p was set at 999, so that logistic transformations could be calculated

(4) * p < .10; ** p < .05; *** p < .01

Parental Involvement Laws – Minor teens' abortion rates would theoretically be lower in counties that are in states with either a parental notification law or a parental consent law. The regression results show, however, that parental involvement laws are strongly statistically significantly (p < .01) associated with lower abortion rates for all age groups, not just minor teens. The t-statistics are large, ranging from -5.11 to -12.43.

Religion – In Column (1) for each group, the overall percentage of the county population considered an "adherent" in any of 207 (of 236 groups) religious groups that would be considered "Christian" are included in the regression. In all age groups, RELIGIOUS is statistically significantly related to higher abortion rates (p < .01 for all but the minor teens, and p < .05 for the minor teens). The t-statistics are fairly large, ranging from 2.45 to 5.63.

Religious Categories – Column (2) for each age group separates the overall percentage of adherents into three separate categories – Mainline Protestant, Catholic-Orthodox, and Non-Mainline Protestant. The Non-Mainline Protestant would generally be considered more conservative ideologically and would be more likely to be "pro-life" than would be the Mainline Protestant group. While the Catholic and Orthodox religions have explicit statements against abortion, the membership may not necessarily be as rigid in their beliefs.

Theoretically, therefore, one would expect the Non-Mainline Protestant to have a negative coefficient and the Mainline Protestant and Catholic-Orthodox to not have a negative coefficient. The results were not as expected, however. The Catholic-Orthodox was the only religious group with a consistent result across all age groups; the coefficient was positively related, with p < .01 and the t-statistic ranging from 3.13 to 5.35. Mainline Protestant had no statistical significance, except for the 30-34 age group, but then only a weak relationship (p < .10). The Non-Mainline Protestant variable, however, showed no statistical significance for the three youngest age groups (15-17, 18-19, 20-24) and then a strong positive relationship for the older two age groups (25-29 and 30-34), with p < .01.

Socio-Economic Variables – Socio-economic factors do affect abortion rates. POVERTY (the percent of families living below the poverty rate) showed the strongest relationship and was negatively related to abortion rates ($p < .01$) for the 15-17, 18-19, and 20-24 age groups; the t-statistics ranged from -2.26 to -6.46. POVERTY was not related to abortion rates for the 25-29 and 30-34 age groups. UNEMPLOYMENT (Unemployment Rate) was related to abortion rates for only for the 20-24 ($p < .01$) and 25-29 age groups ($p < .10$).

Demographic Variables – All these variable were related to abortion rates, for at least most, if not all, the age groups. DENSITY (population per square mile) had a strong positive relationship ($p < .01$) in 8 of the 10 regressions and with $p < .05$ or $< .10$ in the other two regressions.

MARRIED-COUPLE (percent of families headed by a married couple) had a strong negative relationship ($p < .01$) for all age groups except 15-17; for those groups, the t-statistic ranged from -3.70 to -6.08.

BACHELOR (percent with a Bachelor's degree or higher) was strongly positively related for all age groups ($p < .01$ for all but the 30-34 group, with $p < .05$ for that group). The t-statistic ranged from 2.57 to 10.16.

WHITE (percent that are "white only") had a strong negative relationship ($p < .01$) for all age groups; the t-statistics ranged from -4.86 to -10.78.

In summary, all but two of the variables show strong statistical significance for most, if not all, the age groups. Mainline Protestant and Unemployment show no, or little effect, on abortion rates.

Abortion rates for all age groups are positively related to Catholic-Orthodox, population density, and Bachelor's degree; Non-Mainline Protestant positively affects abortion rates for 25-29 and 30-34.

Two variables are negatively related to abortion rates for all age groups – Parental Notification Laws and WHITE (proportion of "white only"). The other variables are strongly negatively related to all but one or two of the age groups: MARRIED-COUPLE (percent of families headed by a married couple), and POVERTY (percent of families living below the poverty rate).

4. Discussion and Conclusion

While many researchers have found that parental involvement laws – whether notification or consent – result in lower minor teen abortion rates, the fact that they are also related to lower abortion rates for adults in all the age groups – from 18 to 34 – suggests some degree of policy endogeneity. If parental involvement laws result in lower abortion rates for adults as well as teens, then the laws themselves may not be solely responsible for the lower minor teen abortion rates. The parental involvement laws may, therefore, be a proxy for some other variable that is related to both the enactment of the law and to lower abortion rates. A theoretically possible proxy might be the level of religiosity in a county or state, which might itself be a proxy for anti-abortion sentiment. The largest religious tradition in the U.S. is Christian – 44.6 percent (ARDA, 2010); almost all the rest (51.2 percent) claim no religious affiliation. Of the Christian religious groups, 43.6 percent are Catholic or Orthodox, 39.9 percent are Non-Mainline Protestant, and 16.4 percent are Mainline Protestant. This study, however, does not find a negative relationship with the level of religious adherence and abortion rates. While the coefficient for parental involvement laws is smaller when the religiosity variable is included in the regression model, religiosity shows a positive relationship with abortion rates ($p < .01$) for all age groups (ages 15-34).

When the three religion categories are analyzed separately, results are also not as expected. The Catholic and Orthodox official teaching is very anti-abortion and pro-life, yet this religious group is statistically significantly ($p < .01$) associated with higher abortion rates for all age groups. Similarly, Non-Mainline Protestant is not associated with lower abortion rates but instead shows a positive relationship with the two highest age groups (25-34). Mainline Protestant basically does not affect abortion rates.

A limitation with this study is that the data reflects county-level data, rather than individual data, so that information about women's marital status is not included. If unwed, the stigma of pregnancy may be leading some women to terminate the pregnancy if they are members of a religious tradition that is strongly anti-abortion, rather than face disapproval, censure, or condemnation.

There are several implications from this study: (1) parental involvement laws seem to be more likely to be enacted in states with higher percentages of Non-Mainline Protestant adherents, such that religious membership may be acting as a proxy for constituents' desire for more limited abortion rights; (2) there may be some unidentified variable that is associated with the enactment of parental involvement laws, since the laws are related to lower abortion rates for adults, as well as teens; (3) although increased membership levels of Non-Mainline Protestant appear to lead to higher probability of enactment of parental involvement laws, participation in Non-Mainline Protestant groups does not result in lower abortion rates; (4) even though Catholic and Orthodox church official stance is anti-abortion, membership in these religious groups is associated with higher abortion rates for all age groups (15-34); and (5) other variables, besides just parental involvement laws, affect abortion rates, both positively and negatively – population density, married-couple families, college education, poverty, and percent White population.

Further research might explore reasons why parental involvement laws show a negative relationship with adult abortion rates and also why higher levels of both Catholic/Orthodox and Non-Mainline Protestant are related to higher abortion rates, when these are the religious groups that publicly speak out against abortion.

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