Funding for Abstinence-Only Education and Adolescent Pregnancy Prevention: Does State Ideology Affect Outcomes?

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Objectives. To examine the relationship between adolescent pregnancy–prevention and sexuality and abstinence-only education funding and adolescent birthrates over time. Also, to determine whether state ideology plays a moderating role on adolescent reproductive health, that is, whether the funding has its intended effect at reducing the number of adolescent births in conservative but not in liberal states.

Methods. We modeled time-series data on federal abstinence-only and adolescent pregnancy–prevention and sexuality education block grants to US states and rates of adolescent births (1998–2016) and adjusted for state-level confounders using 2-way fixed-effects models.

Results. Federal abstinence-only funding had no effect on adolescent birthrates overall but displayed a perverse effect, increasing adolescent birthrates in conservative states. Adolescent pregnancy–prevention and sexuality education funding eclipsed this effect, reducing adolescent birthrates in those states.

Conclusions. The millions of dollars spent on abstinence-only education has had no effect on adolescent birthrates, although conservative states, which experience the greatest burden of adolescent births, are the most responsive to changes in sexuality education–funding streams. (*Am J Public Health.* 2019;109:497–504. doi:10.2105/AJPH.2018.304896)

See also Santelli et al., p. 356.

Although formalized sexuality education has been included in most US public schools since the 1970s, its content varies widely across school districts and is not federally mandated or regulated.[1] Debates over the content of sexuality education have centered primarily on the degree to which "safer sex" versus abstinence until marriage should be taught. Supporters of comprehensive safer sex education contend that students should be taught age-appropriate, medically accurate information on a broad set of topics related to sexuality. Supporters of sexual abstinence until marriage education, conversely, argue in favor of restricting information about contraception and other risk-reduction approaches that are believed to legitimize and possibly inadvertently endorse out-of-wedlock sexual activity at younger ages.[2,3] Although funding for abstinence-only education declined substantially under President Barack Obama and funding for evidence-based adolescent pregnancy–prevention initiatives was expanded beginning in 2010,[4,5] the inauguration of President Donald Trump appears to have augured a shift back to support for abstinence education. President Trump's proposed 2018 budget included $277 million in new funding for abstinence-only education,[6] including a repackaging of some portion of the funding as sexual risk avoidance education.[7]

It is estimated that the federal government has spent nearly $2 billion in abstinence-only funding since the mid-1990s.[2] Yet, critics of abstinence-only education argue that abstinence promotion is motivated more by morality than evidence.[4] To date, a preponderance of studies has found no effect of abstinence education at reducing adolescent pregnancy or insufficient evidence to draw conclusions.[8] In a systematic review of abstinence-only interventions, Chin et al. found that the effect size for abstinence-only evaluation is inversely related to the quality of the evidence.[8] Only by adding weaker designs in their meta-analysis did they find a positive effect in any abstinence-only study.

By contrast, studies of comprehensive sex education that support both abstinence and safer sex for sexually active adolescents have found these interventions to be effective at delaying or reducing sexual activity and increasing condom and other contraceptive use.[9] Furthermore, there is no evidence that comprehensive programs hasten the initiation of sexual relations or increase the frequency of sexual activity.[9–12] However, these conclusions have largely been derived from the results of a handful of randomized trials that, although strong on internal validity, may lack external validity.[13] Previous longitudinal and econometric studies have also primarily found null effects regarding the impact of abstinence

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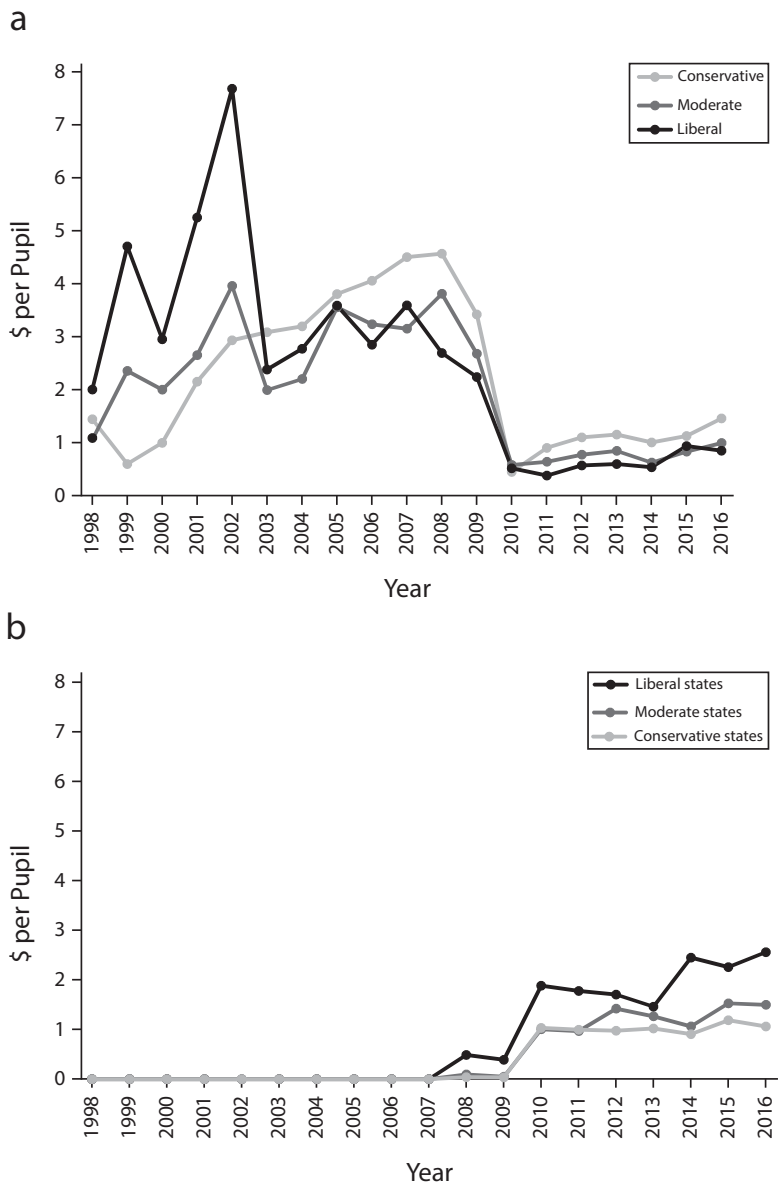


FIGURE 1—US Federal Block Grant Funding by State Ideology for (a) Abstinence Education 1998–2016 and (b) Adolescent Pregnancy Prevention 1998–2016

funding on adolescent birth outcomes, with 1 study finding that abstinence curricula decrease adolescent birthrates, several finding no effect, and 1 finding an increase in unprotected sex.[14–18]

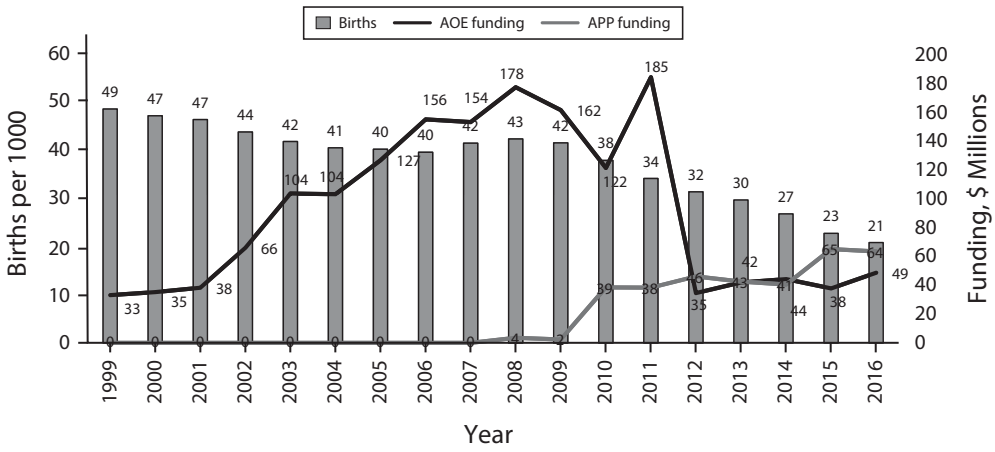
However, to our knowledge, previous research has not explored whether sexuality education funding has different effects in different states. Abstinence messages may resonate more in US states with higher degrees of religiosity and political conservatism, such as the Southeast, than in liberal areas, such as the Northeast and Northwest. In liberal states, the moralizing tone of abstinence education may produce cognitively dissonant reactions that could be counterproductive to reducing adolescent births. To our knowledge, previous studies have not included the variation in state political ideology to understand the differential effects of abstinence funding across states.

Federal funding of abstinence only until marriage (abstinence-only) sexuality education is an area that allows improved analyses to disentangle policy influences from demographic and sociopolitical influences because of the way it has been implemented as block grants to the states, which most states have accepted to varying degrees. State laws tend to reflect the underlying politics of the state, and research indicates that more liberal states have declined certain abstinence block grants.[18]

However, some of the more recent abstinence education–funding streams have been implemented in such a way that state approval is not required. For instance, in 2000, Congress created the Maternal and Child Health Block Grant's SPRANS (Special Projects of Regional and National Significance) program, renamed the Community-Based Abstinence Education program in 2005. This program allows the federal government to award grants directly to state and local organizations (including faith-based organizations), thereby bypassing the need for state approval (Figure 1; Figure A [available as a supplement to the online version of this article at http://www.ajph.org]).[2] The other 2 major sources of abstinence funding include the Adolescent Family Life Act funds, which has disbursed more than $200 million to states since its inception in 1981, and Title V funding enacted under the 1996 Welfare Reform Act.[2]

Federal funding for abstinence education declined precipitously with the election of Obama and a predominately democratic Congress in 2009 (Figure 2; Figure B [available as a supplement to the online version of this article at http://www.ajph.org]). The steep increase in earmarked federal abstinence-only funding to states since 2000, including funds that bypass the need for state approval, provides an opportunity to test the impact of increased federal funding for abstinence-only programs on adolescent sexual and reproductive health outcomes.

We hypothesized that, because abstinence-only education is not science based, abstinence-only funding should have no effect on adolescent reproductive health outcomes. However, we also hypothesized that to the extent that abstinence-only funding has an effect, the effect will vary depending on the political ideology of the state. Specifically, we hypothesized that abstinence-only funding may actually be effective at reducing adolescent births in more conservative states but may have more of a counterproductive effect (increasing adolescent pregnancy and birthrates) in less conservative states if students who receive



Source. Data adapted from Guttmacher Institute Report.

FIGURE 2—Average Annual Abstinence-Only Education (AOE) and Adolescent Pregnancy Prevention (APP) Funding per Pupil and Births per 1000: United States, 1999–2016

abstinence education do not also receive information on modern contraception that may prevent unwanted pregnancy.

METHODS

We constructed a state-year database that included available information on federal funding for state abstinence-only education and adolescent birthrates and that covered the period between 1998 and 2016, a period marked by a sharp increase in earmarked abstinence-only funding followed by a steep decline (from 2009 onward; Figure 2; Figure B).

Measures

Our primary outcome of interest was state adolescent birthrates per 1000. Annual data on the number of live births per 1000 girls aged 15 to 19 years each year is available from the Centers for Disease Control and Prevention and has been extracted for years 1998 through 2016. These rates were determined from birth certificates registered in all states, and they are available from the National Center for Health Statistics at the Centers for Disease Control and Prevention.[19] Although, optimally, we would have examined pregnancy rates rather than birthrates, reliable annual adolescent pregnancy data were not available for our time period. However, we adjusted for state abortion rates because births reflect pregnancies that are not otherwise terminated or lost. We obtained state adolescent (aged 15–19 years) abortion rates per 1000 from the Guttmacher Institute State Center.[20] We imputed abortion rates for missing years using linear interpolation (specifically the following years: 1999, 2000, 2002, 2003, 2004, 2007, 2012, 2014).

Our primary exposure variable was federal block grants for state abstinence-only education. The Sexuality Information and Education Council of the United States (SIECUS) has collected information on federal funding for abstinence-only education by state from all sources, including Title V, Maternal and Child Health Block Grant's SPRANS—Community-Based Abstinence Education and Adolescent Family Life Act funding for fiscal years 2003 to 2010. SIECUS funding estimates contain funding from (1) the Adolescent Family Life Act, (2) Title V, (3) Maternal and Child Health Block Grant's SPRANS—Community-Based Abstinence Education funding, and (4) a small "other funding sources" category.[2] We cross-checked these data and supplemented them with data from the Tracking Accountability in Government Grants System (TAGGS), which tracks federal grant funding. We used the search term "abstinence" and then removed anything that was clearly unrelated to sex education (e.g., drug abstinence programs). We accessed estimates for 1998 to 2002 and 2011 to 2016 from TAGGS to supplement the SIECUS data.

We calculated the per pupil abstinence-only expenditure by dividing the total expenditure by the total number of high school students in the state and adjusted for inflation in 2013 dollars. Information on the number of middle and high school students per state can be found at the National Center for Education Statistics.[21]

Starting in 2008, and greatly increasing after 2010, states began receiving new funding streams aimed at promoting more comprehensive programming to reduce adolescent pregnancy.[5] We coded these funds as zero before 2008 and then calculated per pupil funds in subsequent years. We accessed data from TAGGS.[22]

Detailed state sexuality education content laws are available through the Guttmacher Institute.[21] Following previous studies,[3] we coded states that require that abstinence content be stressed as 2, states that require that abstinence be covered as 1, and states that set no rules as 0.

Control Variables

Following other studies,[3,14–17] to isolate the impact of federal abstinence-only funding on state-level sexual and reproductive health outcomes, we adjusted for several variables; however, we excluded variables with variance inflation factors greater than 10 to reduce multicollinearity.

We adjusted for abortion, but data on abortion rates come from tenuous

estimates. We therefore also adjusted for state policies that are likely to affect the ease with which an adolescent may obtain an abortion. Thirty-four states require women and girls to get counseling before an abortion, and there have been some changes in policy over the years. Using data from the Correlates of State Policy Project,[23] we also included information on the year that certain states granted required counseling before abortion as well as on policies concerning whether women can access emergency contraception over the counter (i.e., without a prescription).

Adolescent births are known to occur at higher rates among individuals living in poverty.[24] We adjusted for state poverty rates, measured as the percentage of children younger than 18 years who lived in households with incomes under the poverty threshold (as defined by the US Office of Management and Budget, Census Bureau's small-area income and poverty estimate files: https://www.census.gov/did/www/saipe/data/statecounty/data/2010.html).

Adolescent birthrates among Hispanics and African Africans are each higher than the national average (41.7/1000 and 39/1000 vs 25.5/1000, respectively).[25] We used census data to determine the percentage of the state population that is White.

Previous studies have found strong support for the effect of labor market conditions on birth outcomes, generally finding a negative relationship between employment and birthrate (i.e., when there is more unemployment, there are fewer births).[26] We therefore adjusted for state unemployment rates to capture labor market effects on birth outcomes.

Effect Modifiers

We hypothesized that federal abstinence-only funds would have different effects on outcomes in states with different political ideologies and treated this variable as an effect modifier. We drew data on state ideology from the previously validated measures of state government and citizen ideology of Berry et al. (revised 1960–2013 citizen ideology series).[27] We used the measure of state citizen ideology of Berry et al., which was measured on a scale of 0 to 100, with higher values indicating greater political liberalism.

We examined this variable both as a continuous, time-variant variable and as a time-invariant average metric to divide the 50 states into consistently liberal, moderate, and conservative categories by averaging scores over time and dividing them into terciles (Table A [available as a supplement to the online version of this article at http://www.ajph.org] presents state scores and coding). The resultant grouping largely matches common perceptions of liberal, moderate, and conservative states.

Analyses

We modeled state adolescent sexual and reproductive health outcomes over time (1998– 2016) using 2-way fixed-effects models for repeated measures (i.e., repeated observations over time nested within states) for a total of 865 state-years. We clustered the SEs to correct for serial correlation. We lagged all independent variables 2 years to allow time for funding to have an effect on outcomes, which we think is reasonable with a 9-month gestational period and time for implementation. Table B (available as a supplement to the online version of this article at http://www.ajph.org) presents the effects from a 1-year time lag, which shows the results to be consistent with the 2-year time lag.

To analyze the moderating effect of state political ideology on outcomes, we used an interaction term between state funding and whether the state was classified as conservative, moderate, or liberal. We ran all analyses as 2-way fixed-effects models, adjusting for time and state to capture only time-variant characteristics. We deemed a difference-in-difference approach inappropriate because all states received some amount of abstinence funding over the time period and there were no clear cutoffs to identify treatment and control states. However, 2-way fixed-effects models with group fixed effects and time fixed effects and a policy variable is considered to be a generalized form of difference in difference.[28] We performed data analysis using Stata version 14 (StataCorp LP, College Station, TX).

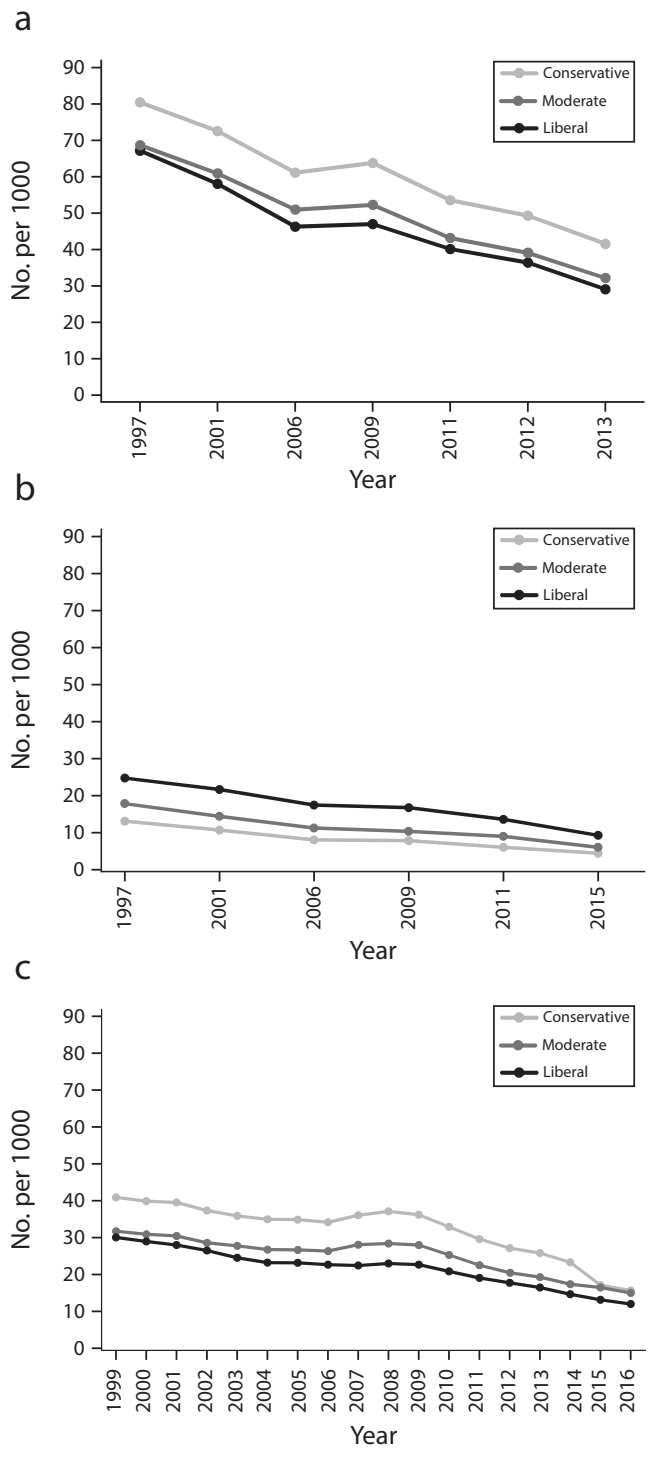
RESULTS

Figure 3 (and Figure C [available as a supplement to the online version of this article at http://www.ajph.org]) shows trends in adolescent pregnancy, abortion, and birthrates stratified by conservative, moderate, and liberal states. Conservative states consistently have had higher pregnancy and birthrates than have liberal and moderate states. Liberal and moderate states have consistently higher abortion rates than do conservative states, resulting in lower birthrates. All states have experienced declines in pregnancy, abortions, and births since the 1990s, with upticks in births around 2009, as has been documented elsewhere.[29] Figure 1 (and Figure A) shows that more abstinence funding early on went to liberal states but later evened out and favored moderate and conservative states.

Table 1 displays the multivariable results with interactions between state ideology and abstinence-only education (model 1), state ideology and adolescent pregnancy–prevention funding (model 2), and state interactions with abstinence-only education and adolescent pregnancy prevention in a single model (model 3). Examining the main effects of abstinence-only education and adolescent pregnancy prevention on adolescent births shows that, adjusting for control variables, there is no overall effect of either federal funding program on adolescent births (Table 1).

Moreover, state abstinence-only content policies were not associated with adolescent births. However, the interaction of state political ideology with state abstinence funding shows an increase in births in conservative states of 0.30 per 1000 for a 1 dollar per pupil increase in abstinence funds compared with moderate states (95% confidence interval [CI] = 0.02, 0.57; $P < .05$; Table 1, model 1). In addition, when we interacted adolescent pregnancy–prevention funding with state government ideology, we found that it was associated with a reduction in births of 2.42 per 1000 for each dollar per pupil increase in abstinence funding (95% CI = –3.83, –1.00; $P < .001$) in conservative states compared with moderate states but had no effect in liberal states (Table 1, model 2).

When both the abstinence-only education and adolescent pregnancy–prevention interactions with state ideology were introduced in model 3, we saw that adolescent pregnancy–prevention funding eclipsed



Note. For parts a and b, only the years for which data were available are shown from 1999 to 2016.

FIGURE 3—State Rates per 1000, by State Ideology, of Adolescent (a) Pregnancies, (b) Abortions, and (c) Births: United States, 1999–2016

the effect of abstinence-only education funding on births in conservative states, reducing the effect size and significance level. Accounting for abstinence funding, adolescent pregnancy–prevention funding was associated with a decline in adolescent births of 2.20 per 1000 (95% CI = –3.50, –0.90; $P < .001$). In addition to the main effects, we found that percentage White in a state predicted lower birthrates and that increases in unemployment also predicted declines in adolescent birthrates (Table 1). We did not find a statistically significant relationship between other state-based policy variables and birth outcomes, including counseling requirements before abortions.

DISCUSSION

Between 1998 and 2016, the federal government dedicated more than $2 billion in federal funding to states for abstinence-only and adolescent pregnancy–prevention education programs with the intention of reducing adolescent pregnancy and births. Although adolescent births have been experiencing a secular decline over the past several decades, on the basis of our analysis, adjusting for state characteristics, neither increases in federal funding for abstinence-only education nor adolescent pregnancy prevention between 1998 and 2016 explain this declining trend.

The finding that federal abstinence-only education block grants to states have no overall effect on the adolescent birthrate in states over time supports the literature that finds that abstinence-only education has no impact on adolescent birthrates.[8–12,14–17] However, we also found no overall effect of sexuality education (adolescent pregnancy–prevention funding) on adolescent births. As a more recent and less extensive funding mechanism, it is possible that the nationwide effect of these programs may be yet to be detected.

Although we found no overall effect of either program on adolescent births, we did find evidence that the effects of funding varied by state ideology, although not in the manner hypothesized. On the basis of our analysis, conservative states appear to be most responsive to different types of sexuality education funding. Although we expected that abstinence funding would be effective in states where these messages are more likely to resonate, we found the opposite. Without factoring in the more recent infusions of evidence-based adolescent pregnancy–prevention funding, abstinence funding predicted higher birthrates in conservative states, suggesting that abstinence funding may not

TABLE 1—Predictors of Adolescent Birthrates: Centers for Disease Control and Prevention Data, United States, 1998–2016

Variable	Model 1,[a] B (95% CI)	Model 2,[a] B (95% CI)	Model 3,[a] B (95% CI)
Per pupil AOE	−0.06 (−0.26, 0.15)		−0.03 (−0.24, 0.17)
Per pupil APP		0.08 (−0.42, 0.58)	0.04 (−0.40, 0.48)
State funding interaction terms			
Moderate × AOE (Ref)	1		1
Conservative × AOE	0.30 (0.02, 0.57)		0.18 (−0.08, 0.44)
Liberal × AOE	−0.02 (−0.22, 0.18)		−0.04 (−0.24, 0.16)
Moderate × APP funding (Ref)		1	1
Conservative × APP funding		−2.42 (−3.83, −1.00)	−2.20 (−3.50, −0.90)
Liberal × APP funding		0.42 (−0.72, 1.55)	0.35 (−0.77, 1.48)
Abstinence content law			
No mandate (Ref)	1	1	1
Mention but not stress	1.32 (−0.53, 3.17)	1.2 (−0.67, 3.06)	1.1 (−0.70, 2.90)
Stress	0.97 (−0.15, 2.09)	0.86 (−0.32, 2.04)	0.79 (−0.29, 1.88)
State government ideology (continuous measure)	0.03 (0.01, 0.05)	0.02 (0.002, 0.040)	0.03 (0.003, 0.046)
Abortion and access to contraceptives			
Abortion	0.12 (−0.08, 0.33)	0.2 (−0.01, 0.41)	0.18 (−0.04, 0.39)
Over-the-counter access to emergency contraception	1.64 (−0.25, 3.53)	1.66 (−0.14, 3.47)	1.52 (−0.29, 3.34)
Counseling before abortions	−1.93 (−4.34, 0.48)	−1.98 (−4.17, 0.21)	−1.90 (−4.10, 0.29)
Additional controls			
Poverty at age < 18 y	−0.15 (−0.42, 0.13)	−0.08 (−0.36, 0.20)	−0.07 (−0.34, 0.20)
% White	−0.21 (−0.31, −0.10)	−0.20 (−0.31, −0.09)	−0.20 (−0.31, −0.10)
Unemployment rate	−1.13 (−1.56, −0.69)	−0.99 (−1.42, −0.56)	−1.02 (−1.45, −0.59)
Constant	66.20 (55.90, 76.60)	62.90 (52.30, 73.40)	63.50 (53.10, 73.90)
Adjusted r^2	0.9	0.9	0.9
No. of observations, state-years	847	847	847

Note. AOE = abstinence-only education; APP = adolescent pregnancy prevention; DV = dependent variable. Main estimates are regression coefficients of 2-way fixed-effect models. Time and state fixed effects included but not shown. All predictors lagged by 2 years.

[a]The dependent variable was adolescent births per 1000.

simply be an ineffective policy but may also have perverse effects in these states.

Specifically, we estimated that conservative states received $692 million in federal abstinence funding between 1998 and 2016 (Table A). In 2008 alone, conservative states received more than $71 million in abstinence funding, which amounts to $4.52 per pupil. With an average effect of raising births by 0.20 (0.30 + −0.06) per 1000, we estimate that the change in the birthrate from this single year of abstinence funding amounted to a change in the birthrate of 1.08 per 1000, or 1080 additional births, to adolescents than would have otherwise been the case.

Not only did conservative states experience perverse effects from abstinence funding, but these states were also the most sensitive to the more recent adolescent pregnancy–prevention funds. Funding for adolescent pregnancy prevention was associated with an average effect of a −2.34 (−2.42 + 0.08) reduction in births per 1000 for each dollar per pupil increase in adolescent pregnancy–prevention funding in conservative states. In 2014, conservative states received more than $13 million in adolescent pregnancy–prevention funding, which amounts to about $0.80 per pupil. This small amount resulted in a reduction in the birthrate of 1.87 births per 1000, potentially averting 1870 births. Yet, the Trump administration has proposed to spend an additional $277 million in abstinence-only education and, at the same time, has recently cut more than $200 million to evidence-based adolescent pregnancy–prevention programs.[6]

The effect of even this relatively small amount of adolescent pregnancy–prevention funding appears to counteract the perverse effect of abstinence funding, still reducing births by 2.16 (−2.20 + 0.04) per 1000 in conservative states even with the continuance of abstinence funding. The finding of different effects depending on state ideology suggests a number of questions and potential research avenues. Although we expected that abstinence funding would potentially be effective at reducing adolescent births in conservative states, where there may be a better correspondence between the ideology motivating the policy and the desired outcome, we found conservative states to have experienced an increase in births following infusions of abstinence funding. Moreover, in these same states, adolescent pregnancy–prevention funding was associated with a decrease in adolescent births. Thus, ironically, the states that have most favored abstinence education and eschewed comprehensive sexuality education have seen the

largest effects from these policies (with abstinence funding increasing births and comprehensive sexuality education funding decreasing births).

Support for comprehensive sexuality education is not inconsistent with the notion that adolescents should delay sexual debut until they are emotionally prepared, as other research has suggested.[30] However, our results suggest that efforts to encourage abstinence in the absence of providing more comprehensive information can be detrimental, particularly in conservative states, where birthrates have historically been the highest. By contrast, comprehensive adolescent pregnancy–prevention programming appears to reduce births in those states, although it has not had an impact overall, perhaps because of its lower funding levels relative to abstinence funding (Figure 2; Figure B).

Limitations

Our analysis has several limitations. Our study was subject to the standard limitations of time-series cross-sectional regression, including the potential for omitted variable bias and multicollinearity.[31] Our use of state-level data also limited inferences about the individual effects of state policies on outcomes. We cannot know from this analysis the precise mechanisms leading from state ideology to differences in the effect of abstinence-only policies.

Furthermore, we were limited by a lack of available data on adolescent pregnancy rates, which is ultimately what all sexuality education funding aims to avert, as well as relatively few observations for abortion rates. Nevertheless, our model represents an improvement over previous longitudinal studies that have looked at the impact of state policies, which may be endogenous to other factors under examination.

Conclusions

Our results indicate that funding for abstinence-only sex education has no effect on adolescent birthrates, although conservative states, which experience the greatest burden of adolescent births, are the most responsive to the effects of changes in sexuality education–funding streams. Public health studies should consider the political diversity of US states and how state political climate may affect implementation and reception of different types of interventions. AJPH

CONTRIBUTORS

A. M. Fox, G. Himmelstein, and H. Khalid contributed to data collection and analysis. All authors contributed to the writing and conceptualization of the article.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

HUMAN PARTICIPANT PROTECTION

This study was deemed exempt from the institutional review board approval process because no human participants were involved.

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