THE EFFECTS OF ABSTINENCE-ONLY SEXUAL EDUCATION ON TEEN HEALTH AND BEHAVIORAL OUTCOMES

by

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The federal government began providing funding for abstinence-only sexual education in the 1980s to decrease teen pregnancy and poverty in the United States. In the last two decades a significant body of research has found that comprehensive sexual education is more effective than abstinence-only sexual education to obtain lower teen pregnancy rates and improve teen physical and mental health. This study investigates the effects of states rejecting federal funding from the Title V Abstinence-Only Until Marriage Program on teen health and behavioral outcomes. I hypothesize that these outcomes will improve upon the rejection of Title V funding. This research utilizes a quasi-experimental difference-in-difference econometric model to estimate the effects of the rejection of Title V funding on contraceptive use, sexually transmitted disease (STD) rates, and birth rates in teens of high school age in the United States. The data that this research utilizes comes from the Centers for Disease Control and the Sexuality Information and Education Council of the United States. The results indicate that rejection of Title V funding is correlated with small statistically significant increases in

contraceptive use rates and inconclusive changes in STD and teen birth rates. These results are in line with those of previous research done in this field, and also add to the few studies that have investigated the effects of state-level sexual education policy on teen health and behavioral outcomes. This study highlights the complexity of federal funding for sexual education and the need for evidence-based policy when determining sexual education curriculum.

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Table of Contents

List of Figures

List of Tables

Chapter One

Introduction

Sexual education has become a polarizing topic in American politics. It is a subject about which that the majority of people have strong opinions about, and it has become an issue that represents the cultural differences regarding sex in American society. The issue of sexual education forces people to interact with the taboo that is sex in our society—complicated further by the fact that this topic involves adolescents. The result is a dichotomy between wanting to keep teens from having sex, and ensuring that they are equipped with the knowledge and emotional tools necessary to navigate sexual relationships in a healthy and safe manner. For many parents this is the role that sexual education plays in their lives. For the federal government, however, sexual education is a tool that can be used to reduce teen birth rates, sexually transmitted disease rates, and the overall sexual health of teens.

The United States does not have a good standing on the world stage in terms of teen sexual health and teen pregnancy rates. Since the 1990s, teen birth rates in the United States have been declining. Despite this downward trend in teen births, the U.S. still has one of the highest teen birth rates among high-income countries (Kirby, 2002). In addition, teenagers in the U.S. between the ages of 15 and 19 account for almost half of the new cases of sexually transmitted diseases each year (Office of Adolescent Health, 2019). What, if anything, is this country doing to prevent these outcomes? The answer is sexual education programs. Sex education has been utilized to address theses issues, but without a unified approach. Instead of one specific sexual education

curriculum used nationally, the sexual education that a student receives in the United States differs from state to state, county to county, and even school to school. Each state has the power to mandate whether or not schools are required to teach sexual education and what the content of those courses must include. This means that students across the country are either receiving abstinence-only sexual education, comprehensive sexual education, or no sexual education at all. The type of sexual education a student receives largely depends on the grants that their state of residence obtains from the federal government.

There are two categories that sexual education programs fall under in the United States: comprehensive or abstinence-only. Abstinence-only programs follow the curriculum outlined in the "A-H Definition" of Abstinence-Only Sexual Education. The core focus of the A-H definition is to emphasize to students that abstaining from premarital sexual activity is not only the healthiest choice for teens in regard to their physical and mental health, but that it is the expected norm. This curriculum also teaches that abstinence is the only way to avoid STDs and unwanted pregnancies ("What is Title V," 2016). The lack of contraceptive education is a defining characteristic for these programs. Contraception is only mentioned in the context of its limitations in absolutely preventing pregnancy and STDs. It is also important to understand that these programs may include medically inaccurate material. In addition, the A-H definition of abstinence-only sexual education does not require that the curriculum include medically accurate material resulting in students receiving biased and false information regarding sexuality, pregnancy, and STDs.

Comprehensive sexual education covers a wider range of topics than abstinence-only. According to the Sexuality Information and Education Council of the United States (SIECUS), comprehensive sexual education should be “appropriate to the age, development level, and cultural background of students and respect the diversity of values and beliefs presented in the community”(Malone, P., & Rodriguez, M., 2011). School based programs should complement the education that students are receiving at home, from their healthcare professionals and communities. Comprehensive sexual education covers abstinence, contraception, reproductive choice, anatomy, and development, and all information must be scientifically accurate. These programs also have the potential to cover material on both straight and LGBTQ+ relationships (Malone, P., & Rodriguez, M., 2011). Although abstinence is included in these programs, it is not presented as the only acceptable choice—as it is in abstinence-only programs—and students are provided with information on how to have safe sex if they do not choose to be abstinent.

Since comprehensive sexual education programs do not all have one overarching curriculum that they all must follow, there is a large variation in material between programs. Strictly defining what comprehensive sexual education is in the United States is impossible for this reason. Instead, comprehensive sexual education can be described in terms of the topics that programs identifying as “comprehensive” generally tend to cover, with the understanding that curriculum between programs will most likely differ. The guidelines for comprehensive programs are set either at the state level, or by the organization that is funding the program.

Sexual education curriculum is set at the state-level, and it is the responsibility of the state to mandate the type of sexual education that is taught to students, at what age, and what the curriculum should entail. Some states do have laws that mandate the aforementioned characteristics of sexual education programs, while some states leave those decisions up to the discretion of school districts, and sometimes even individual schools. Often, states will make overarching requirements that public schools must meet in their sexual education programs, but allow each school district to create their own curriculum. In Oregon, the Oregon Human Sexuality Education Law is considered progressive compared to other states because it requires programs to be comprehensive, medically accurate, and educate students on how to properly use contraception ("Human Sexuality," 2015). This is considered progressive because there are states that do not have any requirements for sexual education and some that do not require the material taught in programs to be medically accurate. These state requirements only apply to the public schools in each state, private schools can choose their own curriculums.

Overview of Federal Funding Sources

The federal government does not have direct control over what kind of sexual education is taught in schools, but it can influence state policies by providing funding to specific programs. Federal funding for abstinence-only education began in 1981 with Title XX of the Public Health Service Act, also known as the Adolescent family Life Act (AFLA). The pregnancy prevention component of the act was meant to discourage premarital sex and promote "chastity" and "self-discipline"("A History," 2018). Originally, programs under this grant were not required to follow the A-H definition of

abstinence-only education. These changed in fiscal year 1997, and from that point on funds from the AFLA were tied to the A-H definition. The AFLA could provide funds to faith-based organizations, but following a court settlement that challenged the AFLA for violating the separation of church and state, federal funds could not be used to teach any form of religion. The funds were strictly for pregnancy prevention programs ("A History," 2018). Funding for the AFLA ended in December of 2010 when Congress passed the Consolidated Appropriations Act. This act eliminated all existing discretionary funding for abstinence-only programs ("A History," 2018).

The next federal funding stream for abstinence-only education is the Title V, Section 510 (b) of the Social Security Act in the Welfare Reform Law of 1996. This act was passed quietly with no public or legislative debate, and represented a distinct shift from pregnancy prevention to promoting abstinence outside of marriage ("A History," 2018). The Title V grant was the beginning of the implementation of the A-H definition of abstinence-only sexual education. From 1997 on, all federal funding for abstinence education are grounded on the basis of the A-H definition ("A History," 2018). The funding for the Title V grant is allocated to states by Health and Human Services (HHS) based on the number of low-income youth in each state. HHS has $50 million to split between states every year. States that do accept funds must match every $4 in federal funds with $3 in state funds for the programs. The Title V funds are distributed to the state governments which then decide either to use the money to directly fund programs, or to allocate the funds to sub-grantees to make the decisions about the use of the funding (Carr, J. B., & Packham, A., 2016). The Title V grant expired in 2009, but was refunded in the Patient Protection and Affordable Care Act in 2010.

The third and most restrictive federal funding stream for abstinence-only education was a grant called Community-Based Abstinence Education (CBAE) which was created in October of 2000, and funding became available to programs beginning in fiscal year 2001. It is considered a more restrictive funding stream because programs that promote the use of contraception in any way were not eligible for funding. CBAE also went a step further than promoting abstaining from sexual intercourse until marriage, to encouraging students to abstain from any form of sexual activity prior to marriage. This program also differed from Title V in the manner of which funds were allocated to programs. While Title V funds are given to the state governments to disperse, CBAE funds were given directly to the programs of their choosing ("A History," 2018). This gives federal lawmakers more control over the use of abstinence funding by removing the state government from the equation.

The CBAE was the cause of the first congressional hearings regarding abstinence-only education in 2008. These were spurred by a report released by the minority leader of the House Committee on Government Reform in 2004 that found that 11 out of 13 CBAE programs taught "false, misleading, or distorted information about reproductive health, misrepresentations of the effectiveness of condoms, as well as gender stereotype, moral judgments, religious concepts and factual errors"("A History," 2018). This trial brought attention to the fact that not requiring programs to be medically accurate actually affected the type of information that was being presented to students. The result of these hearings was a call for an end to all federal funding for abstinence-only programs and to instead fund comprehensive sexual education

programs. Ultimately CBAE funding was cut by the same act that ended the funding for AFLA.

There are currently two federal funding streams for comprehensive sexual education: The Teen Pregnancy Prevention Program (TPPP) and the Personal Responsibility Education Program (PREP). TPPP is administered by the Department of Health and Human Services Office of Adolescent Health with the intention of supporting evidence based programs and innovative approaches to preventing unintended teen pregnancies and improving the overall sexual health of teens ("Federal Funds," 2019). The Office of Adolescent Health (OAH) is a national organization that funds diverse, evidence based programs across the United States that are working to prevent teen pregnancy ("Teen Pregnancy Prevention", 2019). OAH funds evidence based programs for teen pregnancy prevention and funds the evaluation of new programs with the same goal. TPPP was created in 2010 through a congressional mandate to fund medically accurate sexual education programs and currently funds ninety-one grants for comprehensive sexual education programs and their evaluation ("Teen Pregnancy Prevention", 2019). The grants provided by the TPPP do not always represent actual comprehensive education programs, but also funding being devoted to improving current comprehensive sexual education programs.

The Family and Youth Services Bureau administers the Personal Responsibility Education Program. The Title V Social Security Act was amended in March of 2010 to include PREP ("State Personal Responsibility", 2017). Thus, both programs were implemented in 2010, following the first congressional hearings pertaining to sexual education that began in 2008. The mission of this program is to support the

organizations with the goal to end youth homelessness, adolescent pregnancy and domestic violence. Projects that are funded by PREP replicate well-established evidence-based program models to educate youths from the ages of 10 to 19 on both abstinence and contraception to prevent teen pregnancy and the transmission of STDs. The programs that PREP replicates have all been proven to delay sexual activity, increase contraceptive use in sexually active teens (both condoms and other forms), and overall reduce pregnancy (State Personal Responsibility, 2017). All states and U.S. Territories are eligible to apply for at least $250,000, but overall allotments are based on the number of adolescents between the ages of ten and nineteen in each state or territory. The project that PREP funds can be administered directly through the state or through sub-award to a private group (State Personal Responsibility, 2017).

The key differences between PREP and TPPP and the federal funding for abstinence-only education are that PREP and TPPP provide students with information on contraception and their information is required to be medically accurate. They are considered to be “comprehensive sexual education” federal funding streams, but they do cover abstinence. However, it is presented as one of many methods to prevent pregnancy and the transmission of STDs instead of the only option. This provides teens with the necessary information for making informed decisions regarding sex. Teens are presented with the option of having safe sex, instead of complete abstinence or unprotected sex.

It is important to understand why federal funding for abstinence-only education was created. The AFLA was initially intended to prevent teen pregnancy. Abstinence-only education was the tool used to prevent teen pregnancy, but the overall goal of the

abstinence-only education was pregnancy prevention. However, with the Title V grant, there was definitive shift from pregnancy prevention to the promotion of sexual abstinence until marriage. In the 1990s, both Democrats and Republicans introduced legislation and support for abstinence-only education programs. This support was given under the conviction that adolescent sexual behavior causes many negative outcomes in teens including social, physical, psychological and moral harms (Mccarthy, B., & Grodsky, E., 2011). With this shift, funding for abstinence education was not only attempting to decrease teen pregnancy and reduce STD infections, but to promote a way of living that lawmakers considered to be acceptable for young adults. The writers of the CBAE grant viewed sexual abstinence as an indicator of integrity, and a way to improve an individual's chances of a better education, staying out of jail, and having a longer lifespan ("A History," 2018). Abstinence-only education is represented by lawmakers as an effective way to decrease teen pregnancy and STD transmission rates, but it has become a way of instituting a particular set of moral values into teens.

The importance of this project is relevant to both public health and fiscal policy. Teen pregnancy is a public health issue because it places a burden on the health and social systems due to the fact that teenage pregnancies are often correlated with increased medical complications, and teenagers are generally less prepared both financially and psychologically. Resulting in negative effects on both the parent(s) and the child. It has also been shown that teenage parents are less likely to finish high school than their peers, which in turn reduces their earning potential (Doan, A. E., & Mcfarlane, 2012). Thus, one of the one of the motivators behind sexual education is to decrease poverty that can be caused by teen pregnancy (Mccarthy, B., & Grodsky, E.,

2011). Courses are used as preventative measures by the government to decrease these rates in teens in order to improve their health and future prospects.

This project pertains to fiscal policy because the issue of teen pregnancy is directly related to poverty and increased stress on the social welfare systems. A strong sexual education can allow teenage girls to finish their education without the financial, emotional, and physical stress of being a mother. There are teen moms who manage to finish their high school education and even go on to college, but that is not the norm. Without a high school education, they have a much higher chance of a life of poverty. Teen pregnancy poses a high risk to the economic potential of young girls, increasing the likelihood that they will need government financial assistance throughout their lives. For this reason, it is in the government's best interest to fund the most effective sexual education programs possible, to both improve health of youth and to minimize government spending on welfare systems.

Project Design

The fact that the federal government is funding both abstinence-only and comprehensive sexual education begs the question: which is the most effective use of funds? A study found that for every dollar invested in sexual education programs, two dollars and sixty-five cents were saved in medical and social costs due to the prevention in pregnancy and STDs (Kirby, 2002). The Title V Abstinence-Only block grants were passed on the conviction that reducing teen pregnancy would reduce poverty. However, it has not been proven that abstinence-only programs are in anyway effective in that pursuit (Mccarthy, B., & Grodsky, E., 2011). Despite this, the federal government is allocating fifty billion dollars a year to the Title V funding stream (Trenholm et al,

2008). If abstinence-only education is not the most effective curriculum to reduce teen pregnancy and STD rates, then it is not financially responsible for the federal government to allocate be allocating those funds in that manner.

The Title V grant provides a unique research opportunity to investigate these questions. Since the passing of the Welfare Reform Act in 1996, states have been rejecting Title V funding. California was the only state to never accepted Title V funding due to its own evaluations of abstinence education and its ineffectiveness. New Jersey was another early state to reject funding in 2006. It did so because it in order to accept Title V funding, and it also had to fund another program to clarify the misinformation taught under the abstinence-only programs. Since then, twenty-four states have rejected Title V funding ("A History," 2018). The majority of states rejected funding between 2006 and 2012. States rejecting Title V funding is a unique research opportunity because it naturally creates a treatment and control group—those that reject funding and those that do not. While this provides an opportunity to investigate the effects that rejecting abstinence-only funding has on teen health and behavioral outcomes, it is important to remember that the AFLA and CBAE were providing funding for abstinence-education to states even after they rejected Title V funds.

This project will investigate how abstinence-only sexual education effects teen health outcomes using a differences-in-differences model between states that have rejected Title V funding and those that are still accepting abstinence-only education funding through the Title V grant. The teen health outcomes that will be used as measurement in this study are the teen birth rates, the STD transmission rates, and contraceptive use rates. All of the statistics for this project are from the Centers for

Disease Control. This project will compare these rates in states prior to rejecting Title V funding and after they opt out it. The group of states that opted out of Title V funding will also be compared to the control group, which will be composed of the states that never opted of Title V funding. This project will use data from 2000 to 2017 because these are the beginning and end dates of the majority of the datasets I will be using.

Research Questions

The two main questions that this study will explore are: one, do state-level sexual education policies have an effect on teen health and behavioral outcomes? And two, what is the effect of rejecting federal abstinence-only sexual education funding on teen health and behavioral outcomes, specifically contraceptive use, STD, and teen birth rates in the United States?

Hypothesis

Economists and policy makers often use the specific teen health outcomes chosen for this study as indicators to judge the effectiveness of sexual education programs. In theory, if these rates change in conjunction with a change in policy, then moving away from abstinence-only education programs is having a direct impact on teen health and behavioral outcomes. I hypothesize that the rejection of Title V funding will result in an increase in contraceptive use, and decreases in STD and teen birth rates. I am basing this hypothesis off previous research in this field and the assumption that if states are rejecting abstinence-only sexual education then they are moving to a comprehensive curriculum. The core difference in the two curriculums is comprehensive sexual education instructs students on proper contraceptive use, while

abstinence-only does not. Transitioning to a curriculum with instruction on contraceptive should increase its use and decrease STD and teen birth rates.

Literature Review

Since the 1970s, there has been a lot of research on the subject of sexual education and the effectiveness of different curriculums. In order to understand the controversy over whether or not comprehensive or abstinence-only sexual education should be taught in schools, it is important to understand the history of sexual education in the United States and the strengths and weaknesses of the two kinds of programs, both of which have been well documented in the literature surrounding the topic of federal sexual education funding.

The article “Abstinence-Only Education: How We Got Here and Where We’re Going” by Karen Perrin and Sharon Bernecki Dejoy, 2003, provides a history of federal sexual education funding from 1981 until 2011, and a social commentary surrounding these funding streams. They authors preface the article with the idea that teen sexual activity is driven by a multitude of interconnected social, educational, and economic factors (Perrin &Dejoy, 2003).The authors also dive into reasons why abstinence-only sexual education is not a good use of federal funds. Those are that despite the fact that abstinence-only programs have not been proven to work, the federal government was still willing spend $135 million on such programs (Perrin &Dejoy, 2003). A major concern with abstinence-only federal funding streams is the lack of evidence for the effectiveness of these programs. This begs the question, what are the real goals of these programs?

Following this point, Perrin and Dejoy stipulate that abstinence-only education programs are in "direct conflict with the expressed opinion and needs of stakeholders—taxpayers and adolescents"(Perrin & Dejoy, 2003). They found that 92% of Americans believe that sexual education should teach sexually active teens to use contraception and 83% believe that students should receive information on how to protect themselves from STDs and pregnancy even if they are not sexually active (Perrin & Dejoy, 2003). These survey results put the majority of Americans in direct conflict with abstinence-only education curriculum, which does not teach students about contraception, except for its inability to completely prevent pregnancy and the transmission of STDs. The authors also cite the data that about 80 percent of Americans have intercourse prior to getting married and 50 percent have intercourse before the age of 18 (Perrin & Dejoy, 2003). Based on these statistics, abstinence-only education is not an effective method of preventing teen pregnancy and STD transmission based on the trends of sexual behavior in the United States.

This project is centered on the debate over abstinence-only and comprehensive sexual education. Thus, it is important to understand the arguments for and against both of these curriculums. First, the arguments for abstinence-only education. The article "Impacts of Abstinence Education on Teen Sexual Activity, Risk of Pregnancy, and Risk of Sexually Transmitted Diseases" by Trenholm et al analyzes the expected outcomes of comprehensive and abstinence-only programs versus what the data shows about their respective effectiveness. Proponents of abstinence-only programs believe that abstinence is the best way for teens to successfully avoid the physical, psychological, and moral risks associated with teen sexual activity. The purposes of

these programs are to provide a clear message that outlines strict boundaries for the students that are age appropriate. A common fear among supporters of abstinence-only education is that instruction on contraceptives will cause teens that were not previously sexually active to become sexually active (Trenholm et al, 2009). Providing information on contraceptives gives teens another option besides abstinence, and is thought to increase the likeliness that teens will have premarital sex by a majority of the people that support abstinence-only sexual education over comprehensive.

Carr and Packhman's 2016 article, "The Effects of State-Mandated Abstinence-Based Sex Education on Teen Health Outcomes," highlights that one of the main goals of abstinence-only education is to elevate the perceived consequences of having sex for teens to discourage them from participating in pre-marital sex and stress the importance of monogamous relationships (Carr & Packham, 2016). This is one of the main reasons why instruction on contraceptive use is not taught. Abstinence-only-until-marriage is only effective if teens believe that the risks of having sex outweigh their perceived "rewards" of having sex. It is believed that if teens are educated in how to have safe sex, the "perceived cost" of having sex is lowered substantially. Overall, the reasoning behind abstinence-only sexual education programs not providing students with any information on contraceptives is based in a fear that this knowledge will lead to increased sexual activity among teens.

On the other hand, the proponents of comprehensive sexual education believe that it is the responsibility of sexual education programs to prepare students to make safe and age appropriate decisions about sex, not to make those decisions for them (Carr & Packham, 2016). Since not all students choose to remain abstinent, proponents

believe that teens should be taught about contraception. This way they are equipped with the knowledge necessary to have safe sex when they choose to. Supporters of comprehensive sexual education prefer that teens are abstinent, but in the event that they are not, it is in the best interest of society and the individuals involved for teens to have safe sex to unprotected sex. Supporters of comprehensive education contend that contraceptive use is an essential aspect of sexual education because the majority of teens are sexually active by the time they graduate from high school (Trenholm et al, 2009). Comprehensive sexual education does not promote earlier instances of first course, but it does take into account the data that the 50 percent of teens have sex before they graduate from high school. The main focus is to reduce the prevalence of teen pregnancy and STD rates, not impose morally based sexual behavior on teens.

The core difference between the two types of sexual education in the United States is whether or not medically accurate information about contraception in taught to the students. Both curriculums present abstinence as the safest option for avoiding STDs and unwanted pregnancies, but comprehensive education also includes information on contraception. Supporters of abstinence-only programs often critique comprehensive sexual education programs for providing mixed messages. Providing information on contraception is considered contradicting because if teens are being abstinent then they have no need for contraception. However, the proponents of comprehensive sexual education make the argument that a teen's decision to have sexual intercourse should not be dependent on their school-based curriculum, and they should be informed on safe-sex practices. Overall, the debate can be simplified to the

questions: should teens be educated about contraception, and if they are, will it incentivize them to have sex earlier?

Douglas Kirby documents the effectiveness of comprehensive programs based on teen behavior in the article “Effective Approaches to Reducing Adolescent Unprotected Sex, Pregnancy, and Childbearing” in 2002. This meta-study reviewed 73 prior studies of sexual education programs and their effectiveness at reducing teen pregnancy and STDs. Through evaluations of programs in the study, Kirby found that the comprehensive programs did not increase sexual activity, cause students to begin sexual activity at younger ages, or increase their number of sexual partners (Kirby 2002). This indicates that comprehensive sexual education programs are not responsible for teens having intercourse at an early age. The study also concluded that these programs do not increase any type of teen sexual activity, and may be responsible for delaying or reducing teen intercourse. They also found that these programs increased condom use and overall contraceptive use in teens (Kirby 2002). Although this study does not confirm that comprehensive sexual education programs have observable effects on teen health outcomes such as the teen birth rate or STD rates, it does confirm that these programs affect teen sexual behavior which has the potential to directly affect the teen health outcomes.

One assumption that is often made about abstinence-only programs is that they are responsible for increases in STD rates among teens because students are not instructed in the proper use of contraceptives. The article “Impacts of Abstinence Education on Teen Sexual Activity, Risk of Pregnancy, and Risk of Sexually Transmitted Diseases” found that abstinence-only programs did not cause an increase in

STD rates when compared to the control group (Trenholm et al, 2016). However, in this study the control group was students who had not received any sex-ed. When this context is taken into account, the previous conclusion does not add controversy to the discussion surrounding sexual education. If the study had been comparing STD rates between abstinence and comprehensive programs, this conclusion would have been more significant.

One of the most important questions to consider when analyzing the literature on this subject is why are people interested in whether or not certain curriculums of sex education are better than the others? This brings the discussion back to the purpose of sexual education programs. To the government, these programs are a public investment with the intention to lower the economic, social and individual costs to society caused by teen pregnancy (Carr & Packham, 2016). If these programs are not reducing these rates, they are not operating effectively—and by extension—not a good use of public funds. There are also more individual reasons that make sexual education important. Perrin and Dejoy cite that the some of the common factors surrounding teen pregnancy are “poor family and peer relationships, perceived lack of love in their lives, grieving the loss of a loved one, interpersonal conflicts with parents, fear of losing a boyfriend, and reduces prohibitions against pregnancy”(Perrin & Dejoy, 2003). Sexual education is necessary to help mitigate these factors and teach teens how to have healthy relationships. In order for teen pregnancy prevention to be effective, programs must prepare students to handle a wide variety of social situations, and address the factors that influence risky behavior.

There have been a handful of studies on the effectiveness of state-level mandates on sexual education, and the majority of them have found that these policies tend to have little to no affect on teen health outcomes. The most prominent study in this area is "The Effects of State-Mandated Abstinence-Based Sex Education on Teen Health Outcomes" published in 2016 by Carr and Packham. This study investigates the casual effects of state-level sex education policies on teen health outcomes. They found that state-level abstinence education mandates have no effect on teen birth or abortion rates, but can increase the rates of sexually transmitted diseases among teens. The changes in state mandated policy did change students' knowledge, but that knowledge did not translate into a change in sexual behavior. However, that finding only applied to statistics on the time of the first intercourse and frequency of intercourse. This did not hold true for STD rates (Carr and Packham). This study differs from mine because it includes abortion rates—while mine will not—and does not include contraceptive use rates.

Overall, the literature on this subject supports my hypothesis that state-mandated policies have little impact on teen health outcomes, except for STD rates and contraceptive use rates. Although the literature cites some positive outcomes for abstinence-only education, almost all of those studies compared abstinence-only education to instances of no sexual education, which is not the comparison this project is concerned with. There have been very few studies that look at the direct effects of state rejection of Title V funding on teen behavioral outcomes, so this research will add to a very limited field.

Chapter 2

Methods

This study will utilize an economic quasi-experimental method of analysis known as a difference-in-difference analysis. In economics it is often hard and illegal to conduct experiments that have truly random control and treatment groups. Instead, economic studies often rely on natural experiments, or quasi-experimental studies. These observational studies rely on policy changes or natural events to mimic a random assignment of treatment and control groups.

Difference-in-difference analysis is a specific kind of quasi-experimental method that compares the difference in outcomes of the control group and the treatment group after the treatment group receives the treatment over the same span of time. In order to conduct this type of analysis the data used must be panel data. This means that the data is longitudinal and contains multiple observations of the same individuals over multiple periods of time. Difference-in-difference analysis is also based on the core assumption that the control group is a counterfactual of the treatment group. In other words, the control group represents the treatment group if it had never been treated, thus the difference in the differences is the effect of the natural event or policy change. In practice, this translates to observing the teen health and behavioral outcomes in states that rejected Title V funding prior to and post rejection and comparing the outcomes between the states that rejected and those that did not.

For this study, the control group is made up of the states that never rejected the federal funding for the Title V grant, and the treatment group is composed of the states

that did reject funding after they rejected it. This study is slightly more complex because not all of the twenty-four states that did reject funding did so at the same time. The majority of states rejected funding between 2006 and 2009. See figure 1 below for a visual representation of when states entered the treatment group.

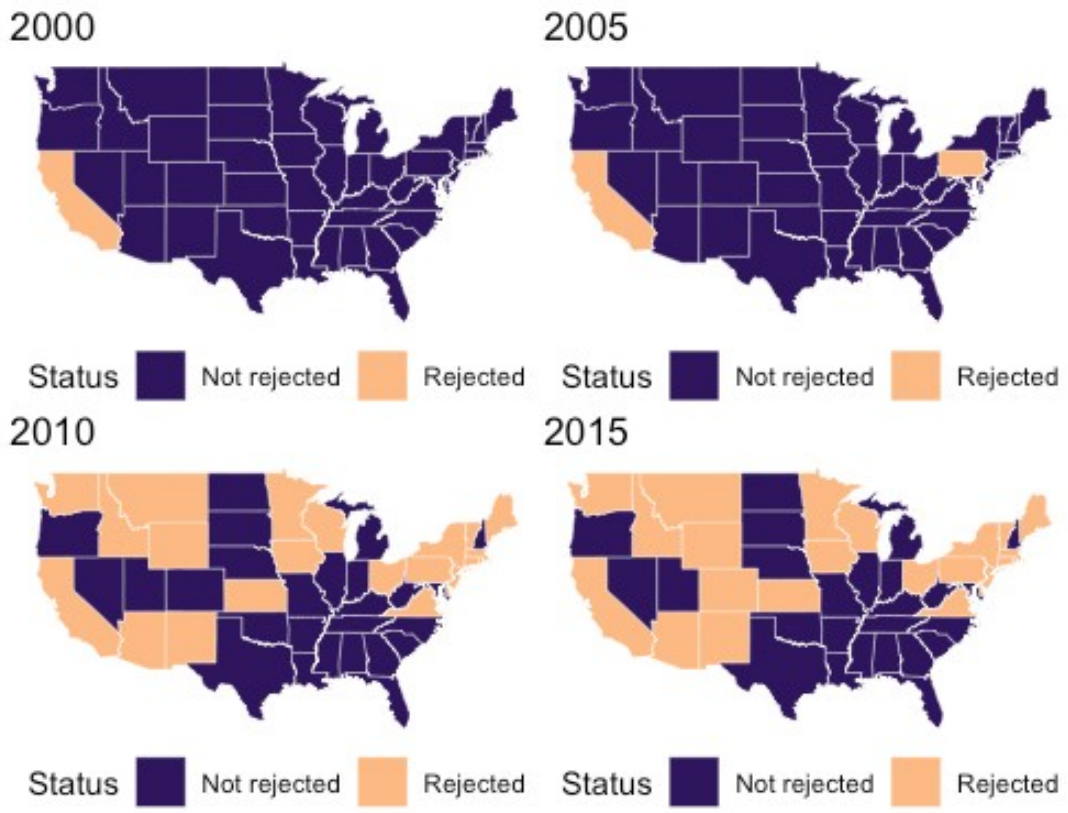

Figure 1: States' Rejection of Title V Funding 2000-2015

These maps represent the progression of states rejecting Title V funding from 2000 to 2015. The majority of states rejected funding between 2006 and 2009. California was the only state to reject funding when Title V first became available. Due to the fact that it never accepted funding, it has been excluded from this study. Alaska and Hawaii are not included in these maps. Alaska rejected Title V in 2008, and Hawaii never did. The data for these graphics and used to create the treatment and control groups come from the SIECUS State Profiles from Fiscal Year 2003 and Fiscal Year 2018.

This study will compare the outcomes of teen birth rates, STD transmission rates, and contraceptive use rates between the treatment and control groups. If there is a statistically significant change in the data, then it can be concluded that there is correlation between the rejection of Title V funding and a change in the health and/or behavioral outcomes for teens.

To ensure that the data being used in this study upholds the core assumption of difference-in-difference analysis, I will run event studies on all of my outcome variables (which will be listed in detail in the data description section). An event study is a statistical method commonly used to estimate the impact of an event. The event in question is states rejecting Title V funding. Since all of the states in the control group did not reject funding at the same time, instead of grouping data by year (2000, 2001, 2002, etc.), I ordered the data for each state off of how many years it was before or after that state rejected funding. The data for each year is still grouped together, but for a state that rejected funding in 2008, for example, the data for 2008 is now referred to as time 0, 2009 is time 1, 2010 is time 2, etc. This solves the issue of states rejecting funding at different times.

The goal of the event study is to estimate the difference in trends of the teen health and behavioral outcome variables between the treatment and control groups. If there are differences in the trends prior to rejection, then the data described in the event study cannot be used for regression analysis. After event studies are run on all outcome variables, those that uphold the similar trends assumption will be used to for regression analysis to determine the effect of rejection on their outcomes.

Differences in trends prior to rejection of Title V funding means that any regression results will be biased and represent more than just the effect of rejecting funding. Differences in trends prior to rejection indicate that the states may be selecting into the treatment group for similar underlying reasons. For example, rising teen pregnancy rates, rising STD rates, or rising abortion rates. Whether or not this selection is happening will not be determined until after the event studies are run, but it is a

potential bias that could be present in this project due to the fact that this is a natural experiment.

Data Description

This project investigates the effect of rejecting Title V funding on teen contraceptive use rates, teen sexual activity rates, teen STD transmission rates, and teen birth rates in all fifty states. When this study references “teen behavioral outcomes” it is referring to the contraceptive use data and teen sexual activity data. When this study references “teen health outcomes” it is referring to the STD transmission rates and teen birth rates datasets. As a whole, these datasets make up the dependent variables in this study. Each of these three datasets are comprised of multiple smaller datasets from the Centers of Disease Control (CDC) that will be explained in detail below.

All of the data for the teen behavioral dataset comes from the Youth Risk Behavior Surveillance System (YRBSS). CDC developed the YRBSS in 1990 with the intention of monitoring health behaviors that contribute to the major causes of death, disability and social issues in adolescents and young adults. The YRBSS monitors sexual behaviors, behaviors that can lead to unintentional injuries/violence, alcohol and substance use, tobacco use, unhealthy dietary behaviors, and lack of physical activity. The surveys are conducted every two years during the spring. The national survey that is conducted by the CDC is representative of ninth through twelfth graders in public and private schools in the United States. Since these datasets are based off grade and not age, the general age group that this dataset is composed of is 14 to 19 years old. The state, territorial, tribal government and local surveys, conducted by departments of health and education provide data that is representative of students in public schools. I

am using the data for individual states instead of the national survey, so the data used in this project is representative of high school students in public schools in the United States.

For this project I will be focusing on the sexual behaviors aspect of the survey. I will be using five specific datasets from the YRBSS. The datasets that will be utilized are the following: birth control pill use, condom use, no birth control use, current sexual activity, and ever had sexual intercourse. I considered using four other datasets from the sexual behavior aspect of the survey. These include IUD or implant use, shot patch or ring use, pill, IUD, or ring use, and dual birth control use. These will not be included in this study because too many states in these datasets did not have data until 2013 or later. There are three subsections of each of these datasets that I will be using: female responses, male responses, and total responses for each survey question that the five datasets represent. Refer to Table 1 for descriptions of the five behavioral outcome datasets that will be included in the study.

Behavioral Outcome Variable	Dataset Overview	Source
No Contraceptive Use	Refers to sexually active high school students that did not use any method to prevent pregnancy during their last intercourse.	The CDC's Youth Risk Behavioral Surveillance System Survey.
Birth Control Pill Use	Refers to sexually active high school students that did not use a birth control pill before their last sexual intercourse.	The CDC's Youth Risk Behavioral Surveillance System Survey.
Condom Use	Refers to sexually active high school students that did not use a condom during their last intercourse.	The CDC's Youth Risk Behavioral Surveillance System Survey.

Ever Had Sex	Refers to high school students who had at least one sexual partner during the three months before the survey.	The CDC's Youth Risk Behavioral Surveillance System Survey.
Current Sexual Activity	Refers to high school students who had at least one sexual partner during the three months before the survey.	The CDC's Youth Risk Behavioral Surveillance System Survey.

Table 1: Behavioral Outcome Variables

This table provides an overview of the five datasets that make up the behavioral outcome variables in this project. All of these datasets come from the CDC's YRBSS Survey.

The health outcome variables are comprised of STD rates and teen birth rates in each state. The data for the STD rates comes from the CDC's National Center for HIV/ AIDS, Viral Hepatitis, STD and TB Prevention's (NCHHSTP) AtlasPlus. AtlasPlus is an interactive tool that allows users to create tables of specific datasets that are available in the database. For this study, I chose use the datasets for three common STDs: gonorrhea, chlamydia, and syphilis. Each of these datasets covers the rates per 100,000 of these diseases in every state from 2000 to 2017. Each dataset has two age groups: 0-14 and 15-19 years old. In general, the 0-14 age group has very few cases and is only included because the YRBSS survey includes 14 year olds. The 15-19 year old age group is the main focus of this study.

The data for the teen birthrate comes from two different sources. First, the natality data comes from the CDC WONDER tool. WONDER stands for "Wide-ranging Online Data for Epidemiologic Research." It is a public resource tool created by the CDC to make health related datasets available to public health departments, researchers, and others. The natality dataset spans from 1995 to 2017, and includes the

number of births for mothers under the age of 15 and mother between the ages of 15-19. This dataset only includes the number of births. Population data is needed in order to calculate the teen birthrate. The population data that was used for this came from the National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) Program. This data was originally arranged in groups by age, race, sex, and county. Due to the fact that the rest of the data in this study organized at the state-level, I combined the county-level data for each state. I also excluded all male population data and age groups that did apply. The two age groups that I included in the population data were 10-14 and 15-19. The 10-14 age group does not match perfectly with the age of mother under 15 group in the natality data, but due to the biological limitations of giving birth prior to the age of 10 it was logical choice to cut off the population data there. Refer to Table 2 below for an overview of the four datasets that make up the health outcome variables in this study.

Health Outcome Variable	Dataset Overview	Source
Gonorrhea Rates	This dataset is composed of the gonorrhea infection rates per 100,000 in each state from 2000-2018 for the age groups of 0-14 and 15-19 years old.	NCHHSTP AtlasPlus
Syphilis Rates	This dataset is composed of the syphilis infection rates per 100,000 in each state from 2000-2018 for the age groups of 0-14 and 15-19 years old.	NCHHSTP AtlasPlus
Chlamydia Rates	This dataset is composed of the chlamydia infection rates per 100,000 in each state from 2000-2018 for the age groups of 0-14 and 15-19 years old.	NCHHSTP AtlasPlus
Teen Birth Rates	This data set has two age groups: mothers under 15 and between the age of 15 and 19. The data is composed of the teen birth rate per 10,000 girls in each age group in each state from 1995-2017.	CDC Wonder and SEER

Table 2: Health Outcome Variables

This table provides an overview of the four datasets that make up the health outcome variables in this project. The STD datasets come from the NCHHSTP AtlasPlus, and the teen birthrates dataset comes from the CDC Wonder tool and SEER.

The data for what year states rejected Title V funding comes from the Sexuality Information and Education Council of the United States (SIECUS). SIECUS is an organization in the United States that believes that comprehensive sexual education can play an important role is social change. To this end, SIECUS produces state profiles of federal funding for abstinence-only sexual education every fiscal year. I contacted SIECUS directly to obtain the state profiles dating back to 2003. Since California was

the only state to reject funding prior to 2003, the fact that the profiles only data back to 2003 is not an issue. I used an accumulation of those yearly state profiles from 2003 to 2018 to compile a list of when states rejected Title V funding. For this project I have identified 24 states that rejected Title V funding from 1996 to 2013. They are listed below in Table 3.

State	Year of Rejection	State	Year of Rejection
Alaska	2008	**Montana**	2009
Arizona	2008	**New Jersey**	2006
California	1996	**New Mexico**	2008
Colorado	2013	**New York**	2009
Connecticut	2009	**Ohio**	2007
Delaware	2009	**Pennsylvania**	2004
Idaho	2009	**Rhode Island**	2007
Iowa	2009	**Vermont**	2008
Kansas	2009	**Virginia**	2008
Maine	2005	**Washington**	2008
Massachusetts	2009	**Wisconsin**	2007
Minnesota	2009	**Wyoming**	2007

Table 3: The Treatment Group

States that rejected Title V federal funding. The data for this chart comes from the SIECUS State Profiles from fiscal year 2003 to fiscal year 2018 (SIECUS State Profiles).

Due to the manner in which the control and treatment groups were created for this study, California has been excluded. California did reject funding, but it never accepted funding in the first place which disqualifies it from both the treatment and control group.

Results Section

The results for this study can be broken into two sections: the event study results and the regression results. Before any regressions could be run, I had to determine that the control and treatment groups in each dataset had similar trends prior to treatment. I used event studies to determine what datasets upheld this assumption. For the event

study, I compared the treatment control group outcomes for all of the dependent variables mentioned in the data section.

The event studies examine the differences between the treatment and control groups in the 10 to 12 years prior to states rejecting Title V funding and then the 10 to 12 years following rejection of Title V funding for each dataset. Due to differences in when states began collecting data for some variables and the different years that states rejected funding, any data provided more than 10 years prior to rejection, and 10 years post rejection is grouped together, respectively. That is, if one state began collecting data 14 years prior to rejection and on state began collecting data 12 years prior to rejection, they would both be included in the -12 data bin. This was done for simplicity.

A dataset is considered to uphold the core assumption the of a difference-in-difference study if prior to time zero—which is the time of rejection or the "event" being analyzed—there is no statistically significant difference in the trends of the treatment and the control groups for each dataset. This does not mean there is no difference between the treatment and control group, but it does mean that there is a consistent difference; the two groups have similar trends prior to the rejection of federal funding.

Results Subsection 1: Event Study Results

First, the results of the event study for teen behavioral outcomes. Since all of the data for the teen behavioral outcomes comes from the same survey, each dataset includes data on teen health behaviors for on the basis of sex and grade. Due to lack of consistent data by grade, this study will only examine the data with respect to all grades —the variable for this is "Grade = Total." Three separate event studies were conducted

were conducted for every behavioral outcome variable: one on examining male responses, one examining female responses, and one examining the responses of males and females combined.

The event studies for the dataset titled “No Contraceptive Use” were conflicting. The event studies for “No Contraceptive Use” are displayed below in Figure 2. One important note to make about the event studies is the way the estimated difference in trends is presented. The dots are the estimates, and the vertical black lines going through the black dots are the confidence intervals of the estimates. This applies to all of the event studies in the event study results section.

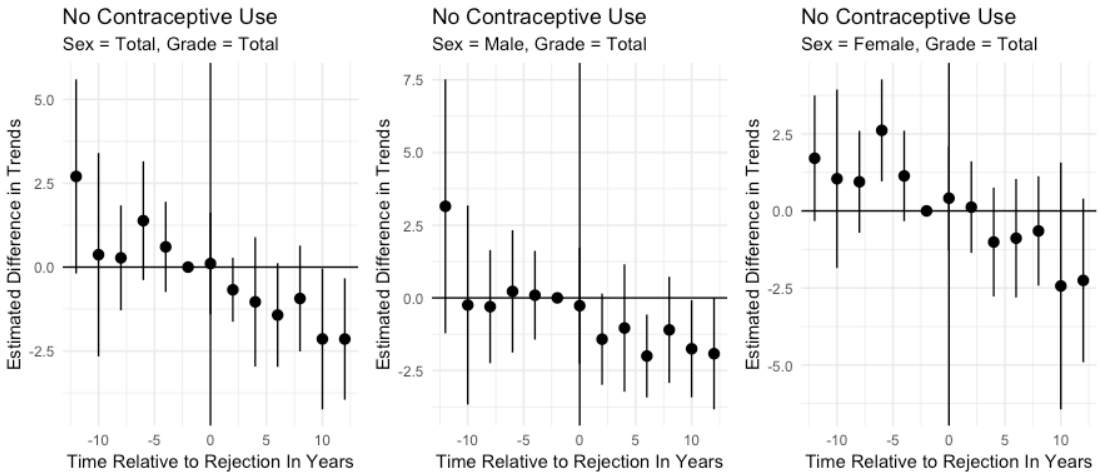

Figure 2: No Contraceptive Use Event Studies

Event studies of the “No Contraceptive Use” dataset for combined responses (left), male responses (middle), and female responses (right). The event studies for combined and male responses showed display similar trends between the treatment and control groups. The event study of female responses does not.

The event study for total responses of both sexes found that the control and the treatment group had similar trends prior to rejection, and remained similar until ten years after rejection when they became negative. A negative difference means that there

was a decrease in the number of students that responded that they had not used any form of birth control the last time they had sexual intercourse in the group of states that rejected Title V funding. Simply put, after states rejected funding there was a small increase overall contraceptive use based on combined survey responses eight years post rejection. The event study for male responses showed the same similarity in trends prior to rejection as well as a trend in negative difference estimates following rejection. Both of these event studies indicate that the combined and male responses from this dataset can be used for regression analysis. These results will be reported in the regression results subsection.

The event study for female responses tells a very different story. A statistically significant difference in trends prior to rejection can be observed from the female response data. This can be seen six years prior to rejection where the confidence interval for difference estimate is above zero and the estimate is centered on 2.5. There is a negative difference seen in the 12+ post rejection estimate, but this is irrelevant because without the similar trends prior to rejection the difference-in-difference model cannot hold. This portion of the “No Contraceptive Use” dataset will not be used for regression analysis.

The event studies for the dataset titled “Condom Use” also had conflicting results. The event studies for all three respondent groups for the “Condom Use” dataset are displayed below in Figure 3.

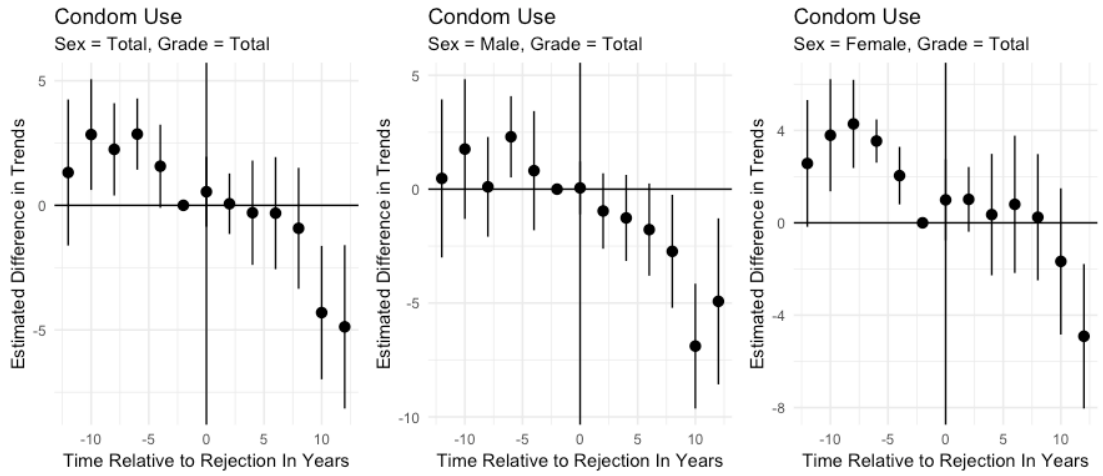

Figure 3: Condom Use Event Studies

Event studies of the "Condom Use" dataset for combined responses (left), male responses (middle), and female responses (right). The event study of male responses displayed similar trends between the treatment and control groups. The event studies for combined and female responses did not.

The event study for total responses found that the control and the treatment group did not have similar trends prior to rejection, and thus this data cannot be used for regression analysis. The event study for female responses also showed a statistically significant difference in trends prior to rejection that disqualify it as well. The only event study that showed moderately promising results was that of the male responses. In Figure 3 it can be noted that prior to rejection, the male responses for the "Condom Use" data based off of male responses all had similar trends, except for the difference estimate six years before rejection. After rejection, there is a steady trend of negative difference estimates between the treatment and control group. This means after states rejected Title V funding there was an increase in males reporting that they used a condom during their last sexual intercourse. This data is moderately significant, due to the fact that the only difference in estimates occurred six years prior to rejection. Based

off of this event study, the male responses of the condom use dataset can be used for regression analysis.

The event studies for the “Birth Control Pill Use” dataset were inclusive. The event studies for all three respondent groups for the “Birth Control Pill Use” dataset are displayed below in Figure 4.

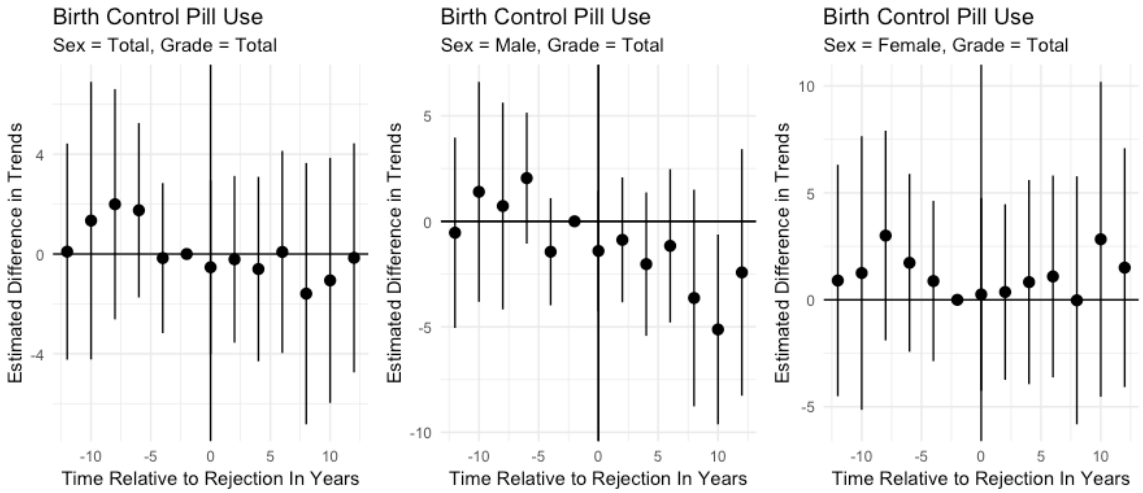

Figure 4: Birth Control Pill Use Event Studies

Event studies of the “Birth Control Pill Use” dataset for combined responses (left), male responses (middle), and female responses (right). The event studies of all three response groups displayed similar trends between their treatment and control groups.

All three response groups (total, male, and female) show similar trends prior to rejection. This is good. However, both the event study for total responses and female responses also show that there were very few changes in pill use reported after rejection as well. This indicates that the rejection of Title V funding most likely had very little affect on the overall use of birth control pills. However, since there were similar trends prior to rejection, this data can be used for regression analysis. The only event study that did show a change in trends following the rejection of Title V funding was that of

the male reporting of birth control pill use. Following rejection there was a downward trend in difference estimates, indicating that more males were reporting that their partner had been on the pill during their last sexual intercourse. Based off of these results, all of the “Birth Control Pill Use” data can be used for regression analysis.

The all of the event studies for both the “Ever Had Sex” and “Current Sex” datasets disqualify them from regression analysis. There are significant differences in trends between the treatment and control groups prior to rejection across all respondent groups. Although these differences exclude these datasets from regression analysis under the difference-in-difference model, the data for both of these datasets indicate that there were downward trends of for both current sexual activity and whether respondents had ever been sexually active in both the treatment and control group. Even though the treatment and control groups in both datasets have downward trends, the slopes of those trends are different, thus disqualifying them from regression analysis. This concludes the event study results for the behavioral outcome variables.

Moving into the event studies for the health outcome variables. The event studies for STD rates were marginally significant for the age group 0-14, but less so for the target age group of 15-19. The event studies for the gonorrhea, chlamydia, and syphilis rates per 100,000 for the age group of 0-14 are displayed below in Figure 5.

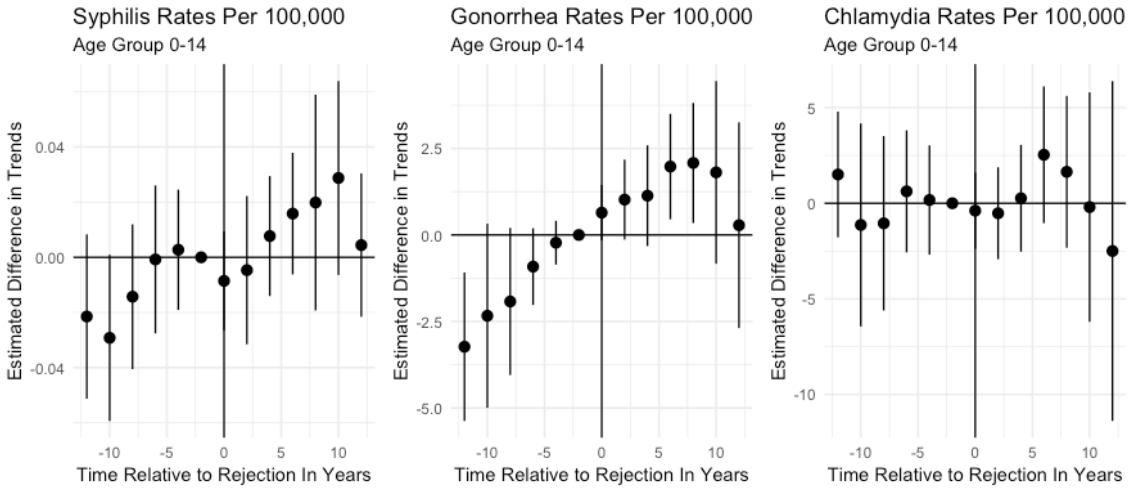

Figure 5: STDs, Age Group 0-14 Event Studies

Event studies of the following STD rates per 100,000 for the 0-14 age group: syphilis (left), gonorrhea (middle), and chlamydia (right). The event study chlamydia rates per 100,000 displayed similar trends between the treatment and control groups.

The only dataset for the 0-14 age group that can be used for regression analysis is the chlamydia data. The other two have statistically significant differences in trends prior to and at the time of rejection. For this reason, the syphilis and gonorrhea datasets for the 0-14 age group will be excluded from regression analysis.

The event studies for the same diseases in the 15-19 age group did not all have similar trends prior to rejection. There event studies are displayed in Figure 6 below.

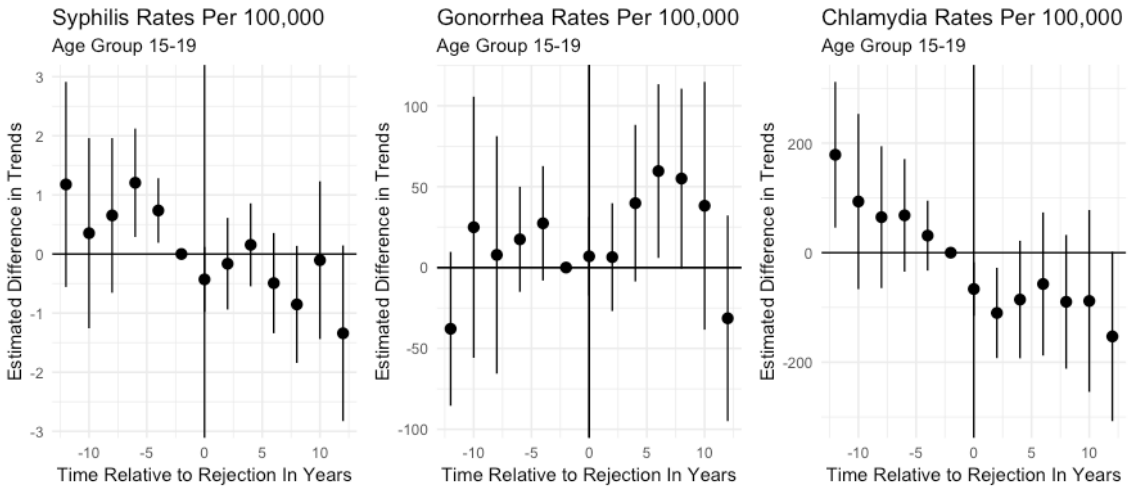

Figure 6: STDS, Age Group 15-19 Event Studies

Event studies of the following STD rates per 100,000 for the 15-19 age group: syphilis (left), gonorrhea (middle), and chlamydia (right). The event study for gonorrhea rates per 100,000 display similar trends between their treatment and control groups. The event studies for syphilis and chlamydia rates per 100,000 do not.

The event study for syphilis rates per 100,000 did not have similar trends prior to rejection, and thus this dataset will be excluded from regression analysis. The event study for gonorrhea rates per 100,000 for the 15-19 age group showed similar trends prior to rejection, and then an increase in gonorrhea cases in the treatment group after rejection. The event study for chlamydia had similar trends up until the time of rejection. However, the difference in trends directly at the time of rejection disqualifies this dataset from being eligible for regression analysis. Based off of the event studies for the three STDs in the 15-19 age group, only the gonorrhea dataset qualifies for regression analysis. This dataset can be used for regression analysis to estimate the percentage increase in gonorrhea cases in the treatment group following the rejection of Title V funding.

The teen birth rate datasets are the final event studies for the health outcome variables. There are two age groups to consider with this dataset: the birth rates per 10,000 to mothers under the age of 15 and to mothers from 15-19 years old. The event studies for these two groups are below in Figure 7.

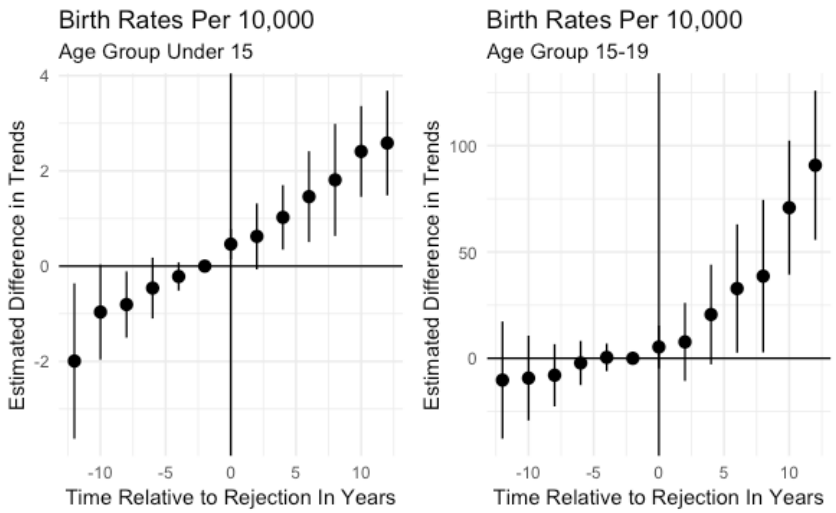

Figure 7: Teen Birth Rate Event Studies

Event studies of the teen birth rates per 10,000 girls for the following age groups: mothers under 15(left) and mothers between 15 and 19 years old. The event study for mothers between 15 and 19 years old displays similar trends between its treatment and control groups. The event study for mothers under 15 does not.

The event study for the birth rates to mothers under the age of 15 shows a difference in trends over 12 and 8 years prior to rejection. There is also a difference in trends at the time of rejection. Due to the multiple differences in trends prior to rejection, I will not be using this dataset for regression analysis. The difference estimates for this dataset appear to be following a linear trend. Due to the fact that there are few births to children under the age of 15 and census data is not taken every year, this linear trend could be a

result of linear algorithm used to calculate the population on non-census years. Regardless, the dataset will be excluded from regression analysis.

The event study for the birth rates to mothers between the age of 15 and 19 shows a difference in trends over 12 years prior to rejection and then similar trends in the remaining years leading up to rejection of Title V funding. This event study will be used for regression analysis and indicates that Title V funding may have resulted in an increase in teen births to mothers between the age of 15 and 19 in the treatment group. This concludes the event study portion of the results section.

Results Subsection 2: Regression Results

This section of the results section records the results of the difference-in-difference regression analysis of the eleven outcome variables that qualified due to their event study results. The first dataset to report results from is the "No Contraceptive Use" dataset. This dataset reflects the percent of high school students who replied that they did not use any form of contraception the last time they had intercourse. The total responses and the male responses will be used in the regression results for total responses and male responses will provide estimates for β in the in the following equation:

$$\text{no\_bc\_percent} = \alpha + \beta * \text{post\_rejection} + \varepsilon$$

Thus, the estimates for β represent the estimated effect of rejecting Title V funding on the outcome variable. In this case, the outcome variables are the total and male responses in the "Contraceptive Use" dataset. The results for total responses are reported below in Table 4.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Total Responses for Contraceptive Use	-1.8635	0.6468	-2.881	0.00425**

Table 4:Total Responses for Contraceptive Use Regression Results

This table reports the results for the rejection of Title V funding of the total responses from high schoolers on whether or not they used any form of contraception the last time they had intercourse. The estimate is statistically significant.

The estimate for β in this regression is -1.8635 and statically significant at the 99 percent confidence level. It is important to note that the results of this survey are in the form of high schoolers that did not use contraception. Thus, this result is interpreted as a -1.8635 decrease in the high schoolers that reported not using any form of contraception the last time they had sex. This means that the rejection of Title V funding resulted in a 1.8635 percent increase in sexually active high school students using some form of contraception when they had sex.

Using the same dataset, but now looking only at the male responses using the same equation as the results for total response, the regression results are reported in Table 5.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Male Responses for Contraceptive Use	-2.0276	0.8325	-2.436	0.0154*

Table 5: Male Responses for Contraceptive Use Regression Results

This table reports the results for the rejection of Title V funding of the male responses from high schoolers on whether or not they used any form of contraception the last time they had intercourse. The estimate is statistically significant.

The estimate for β in this regression is -2.0276 and statically significant at the 95 percent confidence level. Thus, this result is interpreted as a -2.0276 decrease in the high schoolers that reported not using any form of contraception the last time they had sex. This means that the rejection of Title V funding resulted in a 2.0276 percent increase in sexually active male high school students using some form of contraception when they had sex. Based off of these results, rejecting Title V funding resulted in almost a 2 percent overall increase in high school students using contraceptives during intercourse.

The next dataset that had event studies display similar trends prior to rejection was the "Condom Use" dataset. This dataset reflects the percent high school students who replied that they did not use a condom the last time they had intercourse. The male responses for this dataset upheld the assumption of similar trends prior to rejection of funding necessary to use be for regression analysis. The regression results for this subset of the dataset provide estimates for β in the in the following equation:

$$no\_condom = \alpha + \beta * post\_rejection + \varepsilon$$

Thus, the estimates for β represent the estimated effect of rejecting Title V funding on the outcome variable. In this case, the outcome variable is the percent of males that report using a condom the last time they had intercourse. The regression results are reported below in Table 6

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Male Responses for Condom Use	-2.7529	0.8309	-3.313	0.00103 **

Table 6: Male Responses for Condom Use Regression Results

This table reports the results for the rejection of Title V funding of the male responses from high schoolers on whether or not they used a condom the last time they had intercourse. The estimate is statistically significant.

The estimate for β in this regression is -2.7529 and statically significant at the 95 percent confidence level. Thus, this result is interpreted as a -2.7529 percent decrease in the male high school students that reported not using a condom the last time they had sex. This means that the rejection of Title V funding resulted in a 2.7529 percent increase in sexually active male high school students using condoms when they had sex. This was the only portion of the data on condom usage that could be used for regression analysis. Thus, I can conclude that the rejection of Title V funding is correlated with a 2.75 percent increase in male high school students reporting using condoms.

The next dataset that had event studies display similar trends prior to rejection was the "Birth Control Pill Use" dataset. This dataset reflects the percent high school students who replied that they—or their partner—did not rely on a birth control pill as contraceptive the last time they had intercourse. Based off of the results of the event studies, the male, female, and total responses upheld the assumption of similar trends prior to rejection of funding necessary to be included in regression analysis. The regression results for this dataset provide estimates for β the in the following equation:

$$no\_bc\_pill = \alpha + \beta * post\_rejection + \varepsilon$$

Thus, the estimates for β represent the estimated effect of rejecting Title V funding on the outcome variable. In this case, the outcome variable is the percent of total high

schoolers that reported that they relied on birth control pills as a contraceptive the last time they had intercourse. The regression results are reported below in Table 7.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Total Responses for Birth Control Use	-0.9953	1.0860	-0.916	0.36

Table 7: Total Responses for Birth Control Pill Use Regression Results

This table reports the results for the rejection of Title V funding of total responses from high schoolers on whether or not they relied on birth control pill as a contraceptive the last time they had intercourse. The estimate is not statistically significant.

The estimate for β in this regression is -0.9953, but it is not statistically significant. This means that I cannot conclude that this estimate is different than zero. If an estimate is not statistically significant, no conclusions can be drawn about the effect of rejecting Title V funding on the outcome variable.

Still using the "Birth Control Pill Use" dataset and the same equation, but now looking at the male responses, the regression results are reported in Table 8.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Male Responses for Birth Control Use	-1.863	1.198	-1.555	0.121

Table 8: Male Responses for Birth Control Pill Use Regression Results

This table reports the results for the rejection of Title V funding of male responses from high schoolers on whether or not they relied on birth control pill as a contraceptive the last time they had intercourse. The estimate is not statistically significant.

The estimate for β in this regression is -1.863, but it is not statistically significant. This means that I cannot conclude that this estimate is different than zero. No further conclusions can be drawn from this data.

The final subsection of the birth control pill use data left to analyze is the female response data. The regression results are shown below in Table 9.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Female Responses for Birth Control Use	-0.3429	1.2087	-0.284	0.777

Table 9: Female Responses for Birth Control Use Regression Results

This table reports the results for the rejection of Title V funding of female responses from high schoolers on whether or not they relied on birth control pill as a contraceptive the last time they had intercourse. The estimate is not statistically significant.

The estimate for β in this regression is -0.3429, but it is not statistically significant. This means that I cannot conclude that this estimate is different than zero. No further conclusions can be drawn from this data. Overall, none of the estimates from the "Birth Control Pill Use" dataset were statistically significant. Thus, no conclusions can be draw about the effect of states rejecting Title V funding on the percent of high school students using birth control pills as contraception during sex.

Next, are the regression results for the STD rates. The event study for chlamydia rates per 100,000 in the 0-14 age group showed similar trends in the treatment and control groups prior to the rejection of Title V. The only dataset for the 15-19 age group with similar trends was the gonorrhea dataset. The regression results for all of the STD data provide estimates for β the in the following equation:

$$STD\_rates = \alpha + \beta * post\_rejection + \varepsilon$$

Thus, the estimates for β represent the estimated effect of rejecting Title V funding on the outcome variable. The regression results for chlamydia rates for 0-14 year olds are below in Table 10.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Chlamydia Rates, 0-14	0.3673	1.3212	0.278	0.781

Table 10: Chlamydia Rates, 0-14 Regression Results

This table reports the results for the effects of the rejection of Title V funding on the transmission rates of chlamydia in age group of 0-14. The estimate is not statistically significant.

The estimate for β in this regression is 0.3673, but it is not statistically significant. I cannot conclude that this estimate is different than zero. No further conclusions can be drawn from this data.

The final STD regression results are for gonorrhea rates in the15-19 age group. The results are based off of the same equation as the previous STD regression results, and are reported below in Table 11.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Gonorrhea Rates, 15-19	19.64	24.84	0.791	0.429

Table 11: Gonorrhea Rates, 15-19 Regression Results

This table reports the results for the effects of the rejection of Title V funding on the transmission rates of gonorrhea in age group of 15-19. The estimate is not statistically significant.

The estimate for β in this regression is 19.64, but it is not statistically significant. I cannot conclude that this estimate is different than zero. No further conclusions can be drawn from this data. Neither of the regressions on the STD datasets produced statistically significant estimates. This means that I cannot draw any conclusions of the effect of rejecting Title V funding on the prevalence of STDs in teens. I initially hypothesized that rejecting Title V funds would result in decreases in STD rates. These results neither confirm nor discredit this hypothesis.

The teen birth rates for mothers between the age of 15 and 19 is the final dataset that qualified for regression analysis. The teen birth rates for this study are based off of the number of births for mothers in the age group divided the population of girls for the age group multiplied by 10,000. This creates an approximation of the teen birthrate per 10,000 girls. The regression results the teen birth rate data provides estimates for β the in the following equation:

$$birth\_rates = \alpha + \beta * post\_rejection + \varepsilon$$

Thus, the estimates for β represent the estimated effect of rejecting Title V funding on the outcome variable. For the final regression results, the outcome variable is the teen birth rates for mothers between the age of 15 and 19 years old. The results are reported below in Table 12.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Teen Birth Rates, Mothers 15-9	25.70	14.61	1.759	0.0788

Table 12: Teen Birth Rates 15-19 Regression Results

This table reports the results for the effects of the rejection of Title V funding on the teen birthrates of mothers between the ages of 15 and 19 years old. The estimate is not statistically significant.

The estimate for β in this regression is 25.70, but it is not statistically significant. I cannot conclude that this estimate is different than zero. No further conclusions can be drawn from this data. Due to the removal of the restrictions on instruction on contraceptives as a result of rejecting funding, I hypothesized that the teen birthrates would decline in the treatment group after Title V was rejected. These results neither confirm nor discredit that hypothesis.

As shown in Table 12 below, only three of the eleven estimates were statistically significant. All of the statistically significant estimates were related to the behavioral outcome variables—specifically, total and male responses on contraceptive use and male responses for condom use.

Outcome Variable	Coefficient Estimate	Standard Error	t-value	Pr(>|t|)
Total Responses for Contraceptive Use	-1.8635	0.6468	-2.881	0.00425**
Male Responses for Contraceptive Use	-2.0276	0.8325	-2.436	0.0154*
Male Responses for Condom Use	-2.7529	0.8309	-3.313	0.00103 **
Total Responses for Birth Control Use	-0.9953	1.0860	-0.916	0.36
Male Responses for Birth Control Use	-1.863	1.198	-1.555	0.121
Female Responses for Birth Control Use	-0.3429	1.2087	-0.284	0.777
Chlamydia Rates, 0-14	0.3673	1.3212	0.278	0.781
Gonorrhea Rates, 15-19	19.64	24.84	0.791	0.429
Teen Birth Rates, Mothers 15-9	25.70	14.61	1.759	0.0788

Table 12: Overview of All Regression Results

Overview of all of the regression results previously reported in this section. The only statistically significant results are total and male responses on contraceptive use and male responses on condom use. They all indicate increases in use by less than a percent as a result of Title V funding. No other conclusions can be drawn from these results.

In general, these results do not directly conflict with my hypothesis, but they also do not entirely support it. Since there was a—minimal—statistically significant increase in contraceptive use and condom use, I can conclude that rejection of Title V funding is correlated with an increase in some contraceptive use, but not necessarily all. Due to the fact that none of the health outcome variables had statistically significant estimates, I cannot conclude the effect that rejecting Title V had on them. It may be that rejecting the funding had no effect on them. It is also possible that these datasets,

specifically the STD ones, are very loud and even if rejecting Title V did effect them, it could have been drowned out by the noise already present in the data. The results for the health outcome variables were inconclusive, and the fact that they were so ambiguous means there is more work to be done on the structuring of this study.

Chapter 3

Discussion Section

The results from this study were inconclusive and do not allow me to fully confirm my hypothesis. The literature that I reviewed for this project led me to anticipate the treatment group would show a decrease in STD and birth rates, and an increase in contraceptive use rates. Only one of these assumptions is partially supported by the results from this study, and that was the increase in contraceptive use. The increase in contraceptive use rates after rejecting Title V funding is similar to the results that Kirby reported after analyzing 73 studies on the effects of comprehensive sexual education programs on teen health and behavioral programs (Kirby 2002). Kirby found that comprehensive sexual education programs resulted in an increase in both condom and overall contraceptive use—my results indicate this as well.

None of the results for STD and birth rates were statistically significant in my study. These results are in line with the general uncertainty about the effect of comprehensive vs. abstinence-only sexual education on STD and teen birth rates. Both Kirby and Carr and Packham were unable to conclude if comprehensive education resulted in lower STD and teen birth rates than abstinence-only education (Carr & Packham, 2016). Although Kirby's study was very different than the structure of mine, but Carr and Packham's study also used the rejection of Title V funding as the event being studied and the same dataset for teen birth rates. This indicates that my inconclusive results may not be a coincidence. This section will discuss the implications of my regression results, and the aspects of this study that need improvement.

When critically examining the contraceptive use results, there is one important note to make about this data: it is all based off of surveys proctored by the YRBSS. This does not make it inaccurate, but it is necessary to recognize that sexually active high school students may not be the most inclined group to respond truthfully about their sexual activity. The results of this survey may be under reporting the number of sexually active students there are. If a sexually active student falsely reports that they are not, then they may also be falsely reporting their contraceptive use as well. However, the results do indicate statistically significant increases in male and total use of contraception in the treatment group following the rejection of Title V funding. This increase in overall contraceptive use is in line with my hypothesis that rejecting Title V would cause an increase in contraceptive use.

Since there are other federal funding streams for abstinence-only sexual education available to states, it cannot be assumed that if a state rejects Title V funding that is automatically transitioning to comprehensive sexual education. However, rejecting Title V funding does indicate the state is moving away from the restrictive regulations of the A-H definition of sexual education. Recall that this definition prohibits any instruction on contraceptive use. Thus, I am assuming that the states that reject funding will begin to include more instruction on contraceptive use. My results indicate changes in sexual behavior that support this assumption.

When analyzing the contraceptive use data it is interesting that the event studies for female responses on overall contraceptive use and condom use did not have the same trends as the males. There are a variety of reasons that this could be happening, but it begs the question whether males and females are both reporting honestly and if

rejecting Title V funding affects behavior between the two groups differently. No conclusions about this can be drawn from the data used in this study, but it raises questions about the authenticity of teenagers self-reporting about their sexual behaviors and the differences in sexual behaviors between males and females.

A core assumption of this study is that changes in sexual education will translate to changes in teenage sexual behavior. However, it cannot account for fundamental differences in sexual behaviors between males and females. The fact that the event studies for female responses to the survey questions regarding overall contraceptive use and condom use did not show similar trends prior to rejection, while the male event studies for the same questions did, indicates that there may be underlying differences in male and female sexual behaviors. Sexual education may also have differing effects on male and female sexual behaviors. Despite these potential differences, this study did find that rejecting Title V funds resulted in an increase in total responses of contraceptive use. This result indicates that the rejection of funding did have an overall effect on teen sexual behaviors in regard to contraceptive use.

The STD and birth rate results did not support my hypothesis. The regression results were not statistically significant for either of these datasets. These results do not aid in answering either of my research questions, but they are similar to studies on this topic. These results bring up questions about how the treatment and control groups were created, and if this caused biased estimates. This study is not a randomized controlled trial, thus the states that rejected Title V funding had reasoning behind the rejection of the funds. Rising rates of STD transmission and teen pregnancy in the states that rejected Title V funding—prior to their rejection—may have played a role in the state's

decision to reject the funding. However, not all of the states that rejected funding had rising birth and STD rates, so this does not provide a complete explanation for the lack of statistical significance in my estimates. There are limitations with the statistical methods of this project and the data used, that do not always allow for tidy explanations of the data.

The empirical design of this study has pros and cons. The simplicity of my model allowed me to isolate the impact that rejecting Title V had on the outcome variables. However, because the model is so simple, it does not account for the many factors that go into teen sexual behavior and how those factors interact with each other. A more complex model would have made it harder to interpret the specific impact of rejecting Title V funding, but would have allowed me to better control of more variables. Although my model has limitations, I believe that it was the best choice for my project. This study was not an attempt to create a model for all teen sexual behavior, but instead it investigated the effects of rejecting a specific federal abstinence-only sexual education-funding stream had on teen health and behavioral outcomes.

I chose the to use the rejection of Title V funding because almost half of the states in the U.S. decided to reject the funding and because the A-H definition of abstinence-only sexual education is extremely strict. A policy change from this severity of abstinence-only education has the potential to change teen sexual behavior. This is especially likely due to the fact that under Title V, students were not instructed on how to use contraceptives. An assumption that this study made—but that may not have been correct across the board—is that once Title V was rejected, the states in the treatment group would transition to comprehensive sexual education. This assumption is not

necessarily true because the majority of states that rejected Title V funding were still receiving other federal grants for abstinence-only sexual education.

In hindsight, my main critique of this project is that I attempted to answer my research questions on too large of a scale. This is a complex and nuanced issue with more moving parts than I personally could control for with the time and resources that I had for my thesis. In order to adequately conduct a study for all fifty states I would need in-depth data on all of the federal sexual education funding that each state received and state-level sexual education curriculum for every state. The state-level information may not even be representative of the sexual education curriculum implemented in schools across an individual state since some states allow school districts to make curriculum decisions. An in-depth profile for every state would be necessary to adequately complete this research.

There are two additional changes that I would make if I were to continue this research. First, I would create treatment and control groups based off of states that had similar state-level sexual education curriculums prior to rejection. I used event studies to disqualify datasets that did not meet the core assumption needed for the difference-in-difference model. By creating treatment and control groups based off similar pre-treatment curriculums, I would increase the likelihood that the data would have similar trends prior to rejection and eliminate bias in my estimates. Based on the results of the event studies, a core issue in my study was the fact that many states were most likely selecting into treatment for similar reasons, creating bias in my estimates. A more careful selection of treatment and control groups would minimize this issue. Secondly, I would focus specifically on the states in the treatment group for my thesis that rejected

all federal abstinence-only grants, instead of only Title V. This would allow for more specific estimates of the effects of transitioning from abstinence-only to comprehensive sexual education.

This project was a good starting point for a study aiming to answer my research questions. The results of this study are not in anyway conclusive about the causal effects of rejecting federal funding for abstinence-only sexual education on teen health and behavioral outcomes. Instead, the results of this study can be used as guidelines for creating treatment and control groups that would allow for more conclusive results.

Conclusion

It is disappointing, but not surprising that this study had inconclusive results. Although the simplicity of the model used was helpful in pinpointing the specific effects that the rejection of Title V funding had on teen health and behavioral outcomes, it did not adequately account for the high volume of variables that effect these outcomes. Due to the large variability in sexual education curriculums across the country, further study on this topic would need to be scaled down to compare states with similar sexual education curriculums. A treatment group of states that rejected all federal grants for abstinence-only sexual education would also be a more effective method to estimate the effects of rejection on the outcome variables. Despite its inconclusive results, this study highlights the complexity of this topic, and the difficulty researchers face in finding causal effects between comprehensive sexual education and teen health and behavioral outcomes.

There is still a lot of research that needs to be done on this topic. Although many people may regard sexual education only as a very uncomfortable class they took from

their high school gym teacher, sexual education has the potential to positively impact the health and wellbeing of teenagers in the United States. A strong sexual education can mean be the difference between a girl becoming a mother at 16 or being able to finish their education without the financial, emotional, and physical stress of being a mother. There are teen moms who manage to finish their high school education and even go on to college, but that is not the norm. In a time in America where dropping out of high school almost always results in a life of poverty, teen pregnancy poses a high risk to the economic potential of young girls.

When making policy decisions on sexual education, this country is in a tug of war between what is best for the health and wellbeing of children and a moral agenda. Sexual education has become a polarizing political issue in the United States, when it should only be concerned with what curriculum is best for the health and wellbeing of the youth of America. Studying the effects of these programs will help lawmakers make more informed decisions about sexual education moving forward, and hopefully aid teenagers as they transition into healthy, sexually active adults.

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