NCSA 2024 Himes Undergraduate Student Paper Award Winner: The Effect of Sex Education on Teenage Birth Rates

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Abstract
This study examines the impact of sex education policies on teenage birth rates among females aged 15-19 in the United States. Teen motherhood is significantly more prevalent in the United States compared to other high-income countries (Mark and Wu, 2022). Using a quantitative analysis with data from Guttmacher, SIECUS, CDC, CNN, and Wisevoter, this research explores the effects of sex education policies, median household income, state political affiliation, high school graduation rates, and average household size on teen birth rates among females aged 15-19. The findings reveal that the presence of sex education in schools does not significantly affect teen birth rates, suggesting that sex education may play a lesser role than previously thought. Additionally, the type of sex education—whether abstinence-only or comprehensive—also shows no significant impact on teen birth rates. However, factors such as median household income, political affiliation, and high school graduation rates are statistically significant and influence teenage birth rates. These results suggest that policymakers should consider socioeconomic and educational factors when addressing teen birth rates. This study can help inform future research on factors that need to be considered to reduce teenage birth rates.

Keywords: Sex education, teen birth rates, demography, abstinence sex education, comprehensive sex education

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Introduction

In this research project, type of sex education programs will be analyzed to see how it may affect teenage birth rates in the United States. Teenagers in the United States are more likely to give birth than any other industrialized country (Kearney and Levine 2012). However, sex education policies vary by state because it is up to the state and local government to determine what sex education looks like and how it should be taught (Planned Parenthood 2023). Only twenty-eight states and the District of Columbia require sex education to be taught (Guttmacher 2023). There are two types of sex education taught in the US: abstinence-only sex education that promotes abstaining from sex until marriage and comprehensive sex education that includes information about contraception and reproductive health (Mark and Wu 2022). Broad research has shown that abstinence-only programs are ineffective at reducing teen birth rates (Santelli et al. 2017). Studies have shown that comprehensive sex education reduces the rates of sexual activity, sexual risk behaviors (unprotected intercourse), sexually transmitted diseases, and teenage pregnancy (Committee on Adolescent Healthcare 2020). My research looked at the relationship between sex education programs in schools and teenage birth rates (number of births per 1,000 females ages 15-19). Findings can influence policy decisions on whether sex education should be federally mandated across the United States. Next, I looked at how the type of sex education- either abstinence-only or comprehensive sex education- plays a role in teenage birth rates to see if there is a more effective type of sex education to implement across the US.

Research Questions

1. What is the impact of implementing sex education policies on teen birth rates?
2. How do birth rates differ from different types of sex education: abstinence-only sex education vs. comprehensive sex education?

Hypotheses

The research tested two hypotheses to see if sex education programs have an impact on teenage birth rates. The first hypothesis is that states that require sex education in schools will see lower teen birth rates compared to states that do not require sex education. The second hypothesis is that states that require comprehensive sex education in schools will see lower teen birth rates compared to states that require abstinence-only sex education.

Methodology

The data used for this research project was an original data set compiled from the Guttmacher, Siecus, CDC, CNN, and Wisevoter. With the data from Guttmacher, Siecus, and CDC I used data from 2022 because it was the most updated. The data from Wisevoter were from 2023. The data from CNN was in 2020 because I was looking at how states voted during the 2020 presidential election. I used Guttmacher to collect data on which states mandate sex education in schools in the US. Only twenty-eight states and the District of Columbia mandate sex education in schools. I looked at data from Siecus to determine, out of the states that mandate sex education, which states require comprehensive sex education and which states do not require it. States that do not require comprehensive sex education mainly teach abstinence-only sex education. Only California, Delaware, and Oregon required a comprehensive sex education. Through the CDC, I collected data on teenage birth rates which is the number of births per 1,000 females ages 15-19 for all fifty states and the District of Columbia. Then I used Wisevoter to collect data on median household income, high school graduation rate, and average household size for all fifty states and the District of Columbia. Lastly, I used CNN to see how states voted during the 2020 presidential election. I recoded the variables so that the number 0 represented Republicans and 1 represented Democrats.

For my first hypothesis, states that require sex education in schools will see lower teen birth rates compared to states that do not require sex education. My independent variable was a nominal variable called "sexedmandate" where 0 does not require sex education and 1 requires sex education. The independent variable had a sample size of 51, which included all fifty states and the District of Columbia. The dependent variable was an interval-ratio variable called "TBR" which gave me the number of births per 1,000 females ages 15-19 in all fifty states and the District of Columbia. The average number of births per 1,000 females ages 15-19 in the sample size was 14.27. Then I controlled for median household income (interval-ratio variable called "MHI"), high school graduation rates (an interval-ratio variable called "HSG"), average household size (an interval-ratio variable called "AHS"), and the state's political affiliation (a nominal variable called "SPA" based on how they voted during the 2020 presidential election). This hypothesis will be tested by using a multivariate regression.

For my second hypothesis, states that require comprehensive sex education in schools will see lower teen birth rates compared to states that require abstinence-only sex education, my independent variable was a nominal variable called "compsex" where 0 does not require comprehensive sex education (which means it requires abstinence-only sex education) and 1 require comprehensive sex education. The independent variable had a sample size of 29. The dependent variable was "TBR" which gave me the number of births per 1,000 females ages 15-19 had a sample size of 29. The average number of births per 1,000 females ages 15-19 in the sample size was 13.57931. This hypothesis will be tested using a two-tailed t-test to see if there is a statistical difference between the different types of sex education.

Results

The first hypothesis, which was states that require sex education in schools will see lower teen birth rates compared to states that do not require sex education, was analyzed using multivariate analysis. For the "sexedmandate" variable, twenty-two states (43.14%) do not mandate any type of sex education and twenty-eight states and the District of Columbia (56.86%) mandate some type of sex education (see Figure 1). States that did not mandate sex education received a value of 0, and states that mandated sex education received a value of 1.

For the "TBR" variable, which provided the teenage birth rate in all fifty states and the District of Columbia, the average was 14.27 births per 1,000 females ages 15-19. The minimum teenage birth rate is 5.4 births per 1,000 females ages 15-19, and the maximum is 26.5 births per 1,000 females ages 15-19. For the median household income "MHI", the average was $71,538.14. The minimum median household income was $46,637, and the maximum was $97,332. For the high school graduation rate (in percent) "HSG", the average graduation rate was 90.99608%. The minimum high school graduation rate was 84.45% and the maximum was 96.1%. For the variable average household size "AHS", the average household size was 2.538627. The minimum average household size was 2.28 and the maximum was 3.09. For the variable

political affiliation "SPA" is based on how states voted during the 2020 presidential election. The value of 1 means they voted Democrat, and 0 means they voted Republican. As reported in Figure 2, twenty-five states voted Republican (49.02%) and twenty-five states and the District of Columbia voted Democrat (50.98%).

Figure 1: Breakdown of State-Level Sex Education Mandates

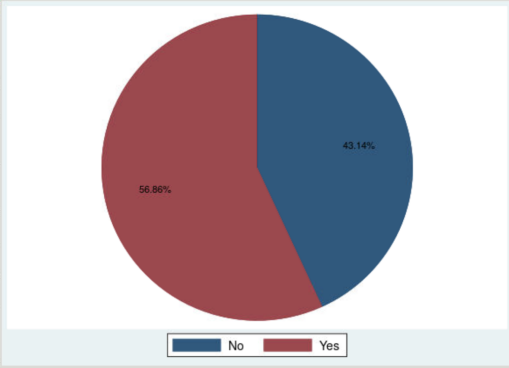

Figure 2: Breakdown of State Political Affiliation (SPA) in Last Presidential Election

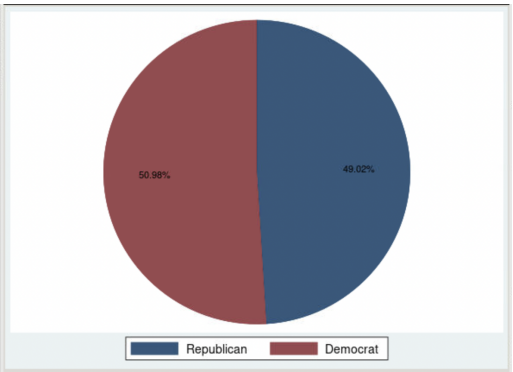

Table 1: Summary Statistics Table for Sex Education

Variables	(1) Observation	(2) Mean	(3) Standard Deviation	(4) Min	(5) Max
Sex Edu Mandate	51	.5686275	.500196	0	1
Teenage Birth Rates	51	14.26863	5.383957	5.4	26.5
Median Household Income	51	71538.14	11825.48	46637	97332
Political Affiliation	51	.5098039	.5048782	0	1
High School Graduation Rate	51	.9099608	.0270103	.8445	.961
Average Household Size	51	2.538627	.163475	2.28	3.09

A multivariate regression was run at the 0.05 alpha level to test the first hypothesis of whether states that require sex education in schools will see lower teen birth rates compared to states that do not require sex education. I chose to run a multivariate regression because I could see the relationship between the

independent (sexedmandate) and dependent variable (TBR) while holding other variables constant. After running a multivariate regression, the coefficient for "sexedmandate" was -1.146194. This means that states that require sex education see around 1 less teenage birth per 1,000 females ages 15-19. The p-value was 0.148 which is greater than the alpha level of 0.05. Therefore, we fail to reject the null hypothesis which indicates there is no difference in teenage birth rates in states with and without sex education. This means that there is no statistically significant relationship between sex education and teenage birth rates.

The coefficient for median household income was -0.000198. This means that an increase of $1 in median household income decreases teenage birth rates by 0.000198. The p-value was 0 which is less than the alpha level of 0.05. This means that the relationship is statistically significant at the 0.01 level. Median household income plays a role in teenage birth rates, and states that have a higher median household income are more likely to see lower teenage birth rates. The coefficient for political affiliation was -4.186741. This means that states that voted Democrat during the 2020 presidential election saw, on average, 4 fewer teenage births per 1,000 females ages 15-19. The p-value was 0 which is less than the alpha level of 0.05. This means that the relationship is statistically significant at the 0.01 level, and there is a relationship between political affiliation and teenage birth rates.

The coefficient for the high school graduation rate was -53.27942. This means that as high school graduation rate increases by 1%, teenage birth rates decrease by 53.28 births. The p-value was 0.015 which is less than the alpha level of 0.05. This means that the relationship is statistically significant at the 0.05 level. As the high school graduation rate increases, the teenage birth rate decreases. The coefficient for average household size was 1.366862. This means that as the average household size increased by 1, teenage birth rate went up by around 1. The p-value was 0.655 which is greater than the alpha level of 0.05. This means that the relationship is not statistically significant. From this multivariate regression, we can conclude that median household income, political affiliation, and high school graduation rate are statistically significant. The R-squared was 0.7676. This means the model explains 76.76% of the variability in teen birth rates. This indicates that this is a strong model.

Table 2: Multivariate Regression Table

Variables	(1) Policy on Teen Birth Rate
SexEdMan	-1.146194
	(0.778)
MedianHouseholdIncome	-.000198***
	(0.0000515)
PoliticalAffilationPresidenta	-4.186741***
	(0.9198771)
HighSchholGradRate	-53.27942**
	(21.15259)
Averagehouseholdsize	1.366862
	(3.042287)
Constant	76.23425**
	(22.49462)
Observations	51
R-squared	0.7676

Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

The second hypothesis, which was states that require comprehensive sex education in schools will see lower teen birth rates compared to states that require abstinence-only sex education, was analyzed using a two-tailed t-test. States that did not mandate sex education were dropped from the sample which left me with twenty-eight states and the District of Columbia. For the "compsex" variable, three states mandated comprehensive sex education which were California, Delaware, and Oregon (10.34%), and twenty-five states including the District of Columbia did not mandate comprehensive sex education (89.66%). They had abstinence-based sex education. States that did not mandate comprehensive sex received a value of 0, and states that mandated comprehensive education received a value of 1.

For the "TBR" variable, which gave me the number of births per 1,000 females ages 15-19 in twenty-eight states and the District of Columbia, the average was 13.57931 births per 1,000 females ages 15-19. The minimum teenage birth rate is 5.4 births per 1,000 females ages 15-19 and the maximum is 25.6 births per 1,000 females ages 15-19. For the median household income "MHI", the average was $71,666.86. The minimum median household income was $46,637, and the maximum median household income was $97,332. For the high school graduation rate (in percent) "HSG", the average graduation rate was 90.98103%. The minimum high school graduation rate was 84.45% and the maximum high school graduation rate was 94.55%. For the variable average household size "AHS", the average household size was 2.537241. The minimum average household size is 2.28 and the maximum average household size is 3.09. For the variable political affiliation "SPA" is based on how states voted during the 2020 presidential election. The value of 1 means they voted Democrat and 0 means they voted Republican. Thirteen states voted Republican and fifteen states including the District of Columbia (16 total) voted Democrat. The pie graph shows 55.17% of states and the District of Columbia voted Democrat and 44.83% of the states voted Republican

Figure 3: Percentage of States that Mandated Comprehensive Sex Education

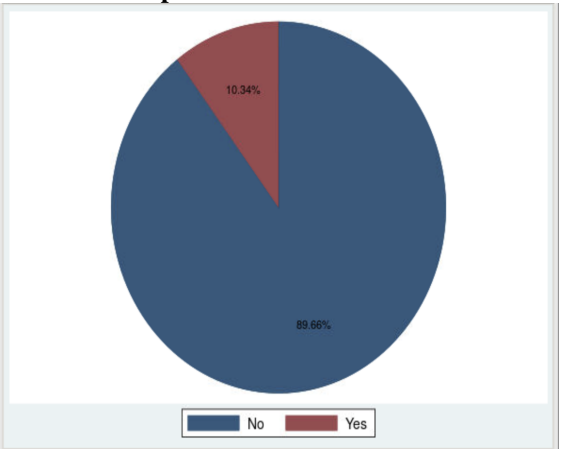

Figure 4: Political Affiliation of States with Mandated Sex Education

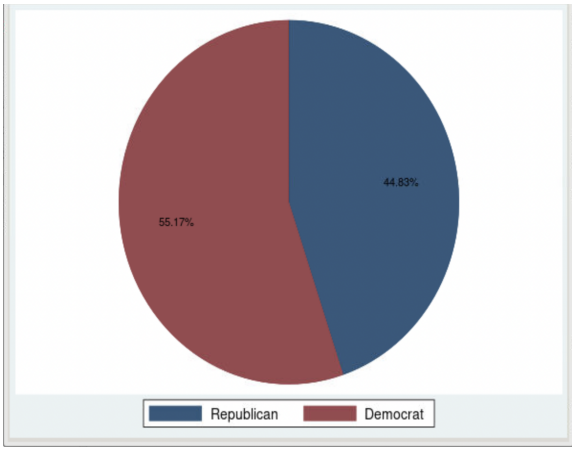

Table 3: Summary Statistics Table for Comprehensive Sex Education

Variables	(1) Observation	(2) Mean	(3) Standard Deviation	(4) Min	(5) Max
Comprehensive Sex Education	29	.1034483	.309934	0	1
Teenage Birth Rates	29	13.57931	5.091125	5.4	25.6
Median Household Income	29	71666.86	13460.25	46637	97332
Political Affiliation	29	.5517241	.5061202	0	1
High School Graduation Rate	29	.9098103	.0270115	.8445	.9455
Average Household Size	29	2.537241	.1944203	2.28	3.09

Table 4: T-test Table

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
0	26	13.88077	1.032697	5.26574	11.75389	16.00765
1	3	10.96667	1.271919	2.203028	5.494041	16.43929
combined	29	13.57931	.9453982	5.091125	11.64275	15.51587
diff		2.914103	3.111134		-3.469418	9.297623

diff = mean(0) - mean(1) t = 0.9367
Ho: diff = 0 degrees of freedom = 27

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.8214 Pr(|T| > |t|) = 0.3572 Pr(T > t) = 0.1786

A two-tailed t-test was run to test the second hypothesis of whether states that require comprehensive sex education in schools will see lower teen birth rates compared to states that require abstinence-only sex education. I chose to run a t-test because I could see if there was a significant difference between the means of these two groups – comprehensive sex education and abstinence-only sex education. After running a two-tailed t-test, I do not see statistical significance between comprehensive and abstinence-only sex education, so I fail to reject the null hypothesis which indicates there is no difference between the means of comprehensive sex education and abstinence-only sex education. When we look at the 95% confidence interval, we see that for abstinence-only sex education indicated by 0, the values are between 11.75389 and 16.00765. For comprehensive sex education indicated by 1, the 95% confidence interval is between 5.494041 and 16.43929. We see that the 95% confidence intervals overlap which means that there is no significant difference between comprehensive sex education and

abstinence-only sex education. A 95% CI means that if you were to run a repeated test, 95% of the time you would see the score within that range. When we look at the difference between sex education, we see that the difference is between -3.469418 and 9.297623. Since the difference does encompass 0, we see that there is no significant difference between comprehensive sex education and abstinence-only sex education. Lastly, when we look at the p-value of diff<0, this would mean states with a comprehensive sex education have a higher teen birth rate, we see that the p-value is 0.8214 which is greater than the alpha level of 0.05, which indicated that we failed to reject the null hypothesis which states no difference between sex education. When we look at the p-value of diff not equal to 0, we see the p-value is 0.3572 which is greater than the alpha level of 0.05. This means that we failed to reject the null hypothesis that the mean of comprehensive sex education equals the mean of abstinence-only sex education. If we look at the p-value, we see that for the difference between abstinence sex education and comprehensive being greater than 0 (diff>0), the p-value is 0.1786. Since the p-value is greater than our alpha level of 0.05, we fail to reject the null hypothesis. This means the type of sex education does not affect the teenage birth rate.

Conclusion

Overall, I did not find evidence to support either of my hypotheses. My first hypothesis was that states that require sex education in schools will see lower teen birth rates compared to states that do not require sex education. When I ran a multivariate regression, I found that the p-value was 0.148 which is greater than the alpha level of 0.05. This means that the results were not statistically significant, and I failed to reject the null hypothesis which states that there is no difference in teenage birth rates between states with and without sex education. Teenage birth rates have been on the decline since the 1990s (CDC, 2021). There have been national efforts to decrease teenage birth rates which may explain why sex education does not play as big of a role in decreasing teen birth rates.

However, from the multivariate regression, we find that median household income, political affiliation, and high school graduation rate are statistically significant and play a role in teenage birth rates. This suggests that policymakers may need to consider socioeconomic and educational factors when addressing teen birth rates. My second hypothesis was that states that require comprehensive sex education in schools will see lower teen birth rates compared to states that require abstinence-only sex education. After running a two-tailed t-test I found that the type of sex education was not statistically significant. This means that there were no statistical differences in teenage birth rates in states with comprehensive sex education versus states with abstinence-only sex education. Although I did not find support for my hypotheses, I was able to identify factors that play a role in teenage birth rates which can inform future research and policy to decrease teenage birth rates.

References

Centers for Disease Control. 2024. “About Teen Pregnancy.” Centers for Disease Control and Prevention. Retrieved January 24, 2025 (https://www.cdc.gov/reproductive-health/teen-pregnancy/?CDC_AAref_Val=https://www.cdc.gov/teenpregnancy/about/index.htm)

CNN. 2020. *2020 presidential election results*. https://www.cnn.com/election/2020/results/president

Committee on Adolescent Health Care. 2020. *Comprehensive Sexuality Education*. The American College of Obstetricians and Gynecologists. Retrieved on January 24, 2025 (https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2016/11/comprehensive-sexuality-education#:~:text=Studies%20have%20demonstrated%20that%20comprehensive,transmitted%20infections%2C%20and%20adolescent%20pregnancy)

Guttmacher. 2024. “Sex and HIV Education.” Guttmacher Institute. Retrieved January 24, 2025 (https://www.guttmacher.org/state-policy/explore/sex-and-hiv-education)

Kearney, Melissa S., and Phillip B. Levine. 2012. “Why is the Teen Birth Rate in the United States So High and Why Does It Matter?” *Journal of Economic Perspectives* 26(2):141-163.

Mark, Nicholas D. E. and Lawrence L. Wu. 2022. “More Comprehensive Sex Education Reduced Teen Births: Quasi-Experimental Evidence.” *Proceedings of the National Academy of Sciences* 119(8). https://doi.org/10.1073/pnas.2113144119

National Center for Health Statistics. 2022. “Stats of the State - Teen Birth Rates.” Centers for Disease Control and Prevention. Retrieved January 24, 2025 (https://www.cdc.gov/nchs/pressroom/sosmap/teen-births/teenbirths.htm)

Planned Parenthood. 2023. "Sex Education Laws and State Attacks." Planned Parenthood Action Fund. Retrieved on January 24, 2025 (https://www.plannedparenthoodaction.org/issues/sex-education/sex-education-laws-and-state-attacks#:~:text=Decisions%20about%20sex%20education%20are,should%20be%20taught%20in%20schools)

Santelli, John S., Leslie M. Kantor, Stephanie A. Grilo, Illene S. Speizer, Laura D. Lindberg, Jennifer Heitel, Ammy T. Schalet, Maureen E. Lyon, Amanda J. Mason-Jones, Terry McGovern, Craig J. Heck, Jennifer Rogers, and Marry A. Ott. 2017. "Abstinence-Only-Until-Marriage: An Updated Review of U.S. Policies and Programs and Their Impact." *Journal of Adolescent Health* 61(3):273-280.

SIECUS. 2022. *The Siecus State Profiles - The State of Sex Ed*. (https://siecus.org/state-profiles/)

Wisevoter. 2023a. *Median Household Income by State 2023*. (https://wisevoter.com/state-rankings/median-household-income-by-state/)

Wisevoter. 2023b. *Average Household Size by State 2023*. (https://wisevoter.com/state-rankings/average-household-size-by-state/)

Wisevoter. 2023c. *High School Graduation Rates by State 2023*. (https://wisevoter.com/state-rankings/high-school-graduation-rates-by-state/)

Author Biographies

Li Yin Chen received a bachelor's degree in sociology and economics from Davidson College. Her research interests include healthcare, housing, social inequities, gender, and identity.