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The Effectiveness of Sexual Education Programs on Teen Births Among Females With and Without a Family History of Teen Births

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The effectiveness of sexual education programs on teen births among females with and without a family history of teen births

A paper submitted in partial fulfillment of the requirements for the degree of

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Introduction

Adolescents (ages 10 to 19) and young adults (ages 20 to 24) make up 21% of the population of the United States. Therefore, the topic of adolescent health is an important focus in Healthy People 2020.[5] The HP 2020 initiative describes adolescent health as a fairly broad topical area that encompasses smaller subjects such as teen smoking, pregnancy, and suicide. Due to its recent decline, teen pregnancy is often overlooked as an epidemic problem in the United States. According to the CDC, "…the sexual and reproductive health of America's young persons remains an important public health concern: a substantial number of youth are affected, disparities exist, and earlier progress appears to be slowing and perhaps reversing. These patterns exist for a range of health outcomes (i.e., sexual risk behavior, pregnancy and births, STDs, HIV/AIDS, and sexual violence), highlighting the magnitude of the threat to young persons' sexual and reproductive health."[6(p13)]

In 2009 the U.S. birth rate for females aged 15-19 years was 39.1 births per 1,000 females.[2] Compared to the peak rate of 61.8 births per 1,000 females in 1991, the teen birth rate in 2009 was approximately 37% lower.[4] This significant change has likely been due to a steady decline in the proportion of sexually experienced teenagers—those who have ever had sex—and an increase in the proportion of teens who use contraception during intercourse.[4] Additionally, female teenagers are using and have more access to a wide variety of highly effective contraceptive methods.[4] Although these trends demonstrate a drop in the initiation of sexual activity and an increase in protective sexual behaviors, it should be noted that most of this progression occurred before 2007.[11] Data collected since then have shown no significant changes in these behaviors.

Despite the decreasing rates in recent years, the teen birth rate in the United States still remains as much as nine times higher as other developed countries.[9] Compared with the births of adult women, births to teenagers are at greater risk for low birth weight, preterm birth, and death in infancy. Teen childbearing is also associated with cyclic truancy and increased dropout rates for teen mothers. Children of teen mothers are more likely to have low school achievement, drop out of high school, and give birth themselves as teens.[9] Not only is there an individual economic burden associated with teenage pregnancy, but there is also an alarming national economic burden. In 2008 teen pregnancy cost taxpayers in the U.S. $10.9 billion dollars. According to The National Campaign to Prevent Teen and Unplanned Pregnancy, "Teen pregnancy and childbearing is closely linked to a host of other critical issues---educational attainment, poverty and income, overall child well-being, health issues, and others."[1(p1)]

Research has provided evidence of specific influences affecting adolescent pregnancy rates. Findings suggest that parent/child connectedness, parental supervision or regulation of children's activities, and parents' values against unprotected teen intercourse are all protective factors decreasing the risk of adolescent pregnancy. Risk factors for teen pregnancy include the following: residing in dangerous neighborhoods, lower socioeconomic status, living with a single parent, having sexually active or pregnant/parenting siblings, and being a victim of sexual abuse.[14] Several biological factors such as the timing of puberty, hormone levels, and genetics are also related to adolescent pregnancy risk.[13]

A family history of teen births is a strong predictor for increased risk among teenage girls as well. According to two studies examining teen birth trends among

nationally representative samples in the United States and Great Britain, the teenage birthrate of daughters of teenage mothers was more than twice that of daughters of women who were 20 or older at first birth.[12] Another study found that adolescents whose mothers gave birth at a young age were likely to also be involved in an early pregnancy, a finding that held true for both genders.[13] This link may exist due to the mother's unstable marital status, inept parenting techniques, or the socioeconomic hardship associated with being a teen mom. The relationship between mothers' and daughters' young ages at first birth is partially explained by teen mothers' limited education and potential lack of emphasis on their children's schooling.[12]

Due to the advanced costs of teenage births and the cyclical nature of teen parenting, it is important that evidence-based sexual education programs be implemented and evaluated—especially for high-risk teens. Clinical and program personnel who teach sex education should identify girls who are more vulnerable to risky sexual practices resulting in teen births. Prevention programs that target these youths should be implemented within comprehensive sex education.[12] After all, comprehensive sexual education programs have been associated with positive health outcomes among youth reducing rates of teen pregnancy, STIs, and HIV.[10] Moreover, comprehensive curricula have been correlated with positive behavior change including the delay of sexual initiation, reduction in frequency of sexual intercourse, reduction in the number of sexual partners, and an increase in the use of effective methods of contraception.[7]

Unfortunately, the position that sexual education plays in the initiation of sexual activity and risk of teen pregnancy is somewhat contentious in the United States among the population at large. However, comprehensive programs seem to be growing with

support from parents, community members, some faith-based institutions, and many professionals and professional organizations.[8] Based on a review of risk reduction programs in the U.S., comprehensive sex education has been associated with a decline in negative sexual behaviors and an increase in protective factors. Evidence for abstinence only education was found to be inconclusive with several outcome inconsistencies.[11] Results suggest that these comprehensive interventions provide broader benefits and are appropriate to youth ages 10-19 of all genders, races, and sexual experience, and in both school and community settings. However, it was noted that interventions may be more effective for boys than girls.[10] If this is true, then it is even more important that high risk females be targeted for comprehensive risk reduction programs.

Nonetheless, sexual risk behavior has been found to be driven strongly by parental influence in addition to—or possibly more than—curriculum content within comprehensive sex education.[3] Parents "provide structure (in the form of parental monitoring), support (through a positive parent–child relationship), and information (by communicating about sexual topics)."[13(p507)] Parents also serve as role models for their adolescent children in a multitude of ways, including sexual behaviors and attitudes. Still, little research has been done looking into parental modeling of sexual behavior and its predictive value remains uncertain.[13]

There is a gap in the sexual education literature in differentiating the effectiveness of sexual education specifically for girls with a family history of teen births. Not only can these girls be compared to those without a family history of teen births, but their data may be stratified within the group to look at differences between those with no sex education, abstinence only education, and the comprehensive programming. It is vital that

we determine how past family history of teen births moderates the effects of comprehensive sex education to ensure we aren't missing this group of high risk individuals and to better serve program planning and intervention efforts designed to delay or reduce pregnancy among this age group.

This study hypothesizes that a family history of teen births will change the effectiveness of sex education, decreasing program efficacy for these high-risk individuals. Alternatively, family history will play no part in the ability of comprehensive sex education to prevent teen birth outcomes. For the present study, data from the 2006-2010 National Survey of Family Growth (NSFG) were obtained to determine how family history of teen births tempers the efficacy of comprehensive sexual education on teen births.

Methods

Study design and sample

The Institutional Review Board at the University of Kentucky waived review of this study because of the use of publically available, de-identified secondary data. The NSFG is a longitudinal study designed and administered by the National Center for Health Statistics (NCHS), an agency of the U.S. Department of Health and Human Services, in collaboration with several other federal agencies. The NSFG has been conducted 7 times since 1973 and gathers information on families, marriage, divorce, women's health, men's health, pregnancy, child birth, sexual education, and contraceptive use. The survey results are used by the U.S. Department of Health and

Human Services and other research and policy organizations to plan health services and health education programs.

For the 2006-2010 NSFG, statistical design, interviewing, and data processing were conducted by the University of Michigan's Institute for Social Research (ISR) under a contract with the National Center for Health Statistics (NCHS). The 2006–2010 NSFG was the first time the NSFG used a continuous design with interviewing conducted 48 weeks per year over a 4-year period.

Data collection

Interviewing for the NSFG was conducted from June 2006 through June 2010. The national sample was drawn from 110 major areas, or primary sampling units (PSUs), and divided into four national subsamples. In-person interviews were conducted for one year in each of the 4 subsamples with 12,279 women aged 15-44 years and 10,403 men aged 15-44 years of age for a total sample size of 22,682. The interviews were conducted by trained female interviewers using laptop computers—a procedure called computer-assisted personal interviewing (CAPI). The interviews for women averaged 80 minutes; the interviews for men averaged 60 minutes. The response rate was 77% overall—78% for females, 75% for males, and 77% for male and female teenagers. Respondents were given an incentive of forty dollars. The 2006–2010 NSFG was based on a sampling plan that was intended to provide larger samples at a lower cost per interview. Black, Hispanic, and teen (aged 15–19) respondents were oversampled.

Measures

For this study, the inclusion criteria considered just female respondents. Because sex education questions were only asked of respondents younger than 25, the sample consisted of 4,382 participants ages 15-24. This study will investigate whether family history plays a role in moderating the effectiveness of comprehensive sex education on preventing teen births.

The independent variable is self-report on their past *Sex Education*. This is measured by the following questions: "Have you ever had any formal instruction at school, church, a community center or some other place about how to say no to sex?," "Have you ever had any formal instruction at school, church, a community center or some other place about methods of birth control?" These questions could be answered with "yes" or "no." Participants are then categorized as having no formal instruction ("no" to both questions), abstinence only "how to say no to sex" formal instruction ("yes" to the first question and "no" to the second question), and comprehensive formal instruction ("yes" to the second question or "yes" to both questions).

The outcome variable of teen births is measured by *Age at Pregnancy Outcome*. This variable will represent whether or not the female respondent had a birth at the age of 19 or younger. The NSFG recoded age at first birth into the following categories: <20 years, 20-24 years, 25-29 years, and 30-44 years. Those with births at less than 20 years of age are considered positive for having a teen birth outcome and those whose age at first birth was 20 years of age or older were considered to be negative for the teen birth outcome.

Participants will be divided into groups based on the moderating variable of whether or not they have a family history of teen births. *Age at mother figure's 1st birth* questions were asked to gather this information about the female's mother: "How old was she when she had her first child who was born alive?" This will be answered in numeric format. The survey then asked a second question broken into the following categories: "Was she under 18, 18 to 19, 20 to 24, or 25 or older?" The NSFG recoded these two questions into a singular variable with five categories: <20 years, 20-24 years, 25-30 years, over 30 years, and mother figure had no children. Similar to the teen birth outcome variable, participants will be considered to have a family history of teen birth if the age at mother figure's 1st birth is less than 20 years of age.

Analytic Plan

This study examined how family history of teen births moderates the efficacy of comprehensive sexual education on teen births. Chi-square tests were used to determine the association between correlate variables—formal sex education, a family history of teen births, race, total family income, and education—with the outcome of teen births on the entire sample. Two more chi-squares were performed—one for those who had family history of teen births and one for those who did not have a family history of teen births—to assess whether mother's age at first birth moderates the ability of formal sex education to prevent a teen birth. Lastly, logistic regression was used to determine the association between sex education and familial history with the outcome of a teen birth, adjusting for confounding variables. Statistical analyses were performed using IBM SPSS Statistics 21. Any cases with missing data on any variables were excluded.

Results

Baseline data indicate that most participants were white females (64.5%) and reported annual household incomes less than $15,000 (30.8%; Table 1). About half (45.4%) had less than high school education. Though surprising, this is actually most likely due to the fact that respondents were between the ages of 15-24 and had not completed their schooling at the time of the survey—not because the girls dropped out of school. Most participants had received a form of comprehensive sex education (73.3%), and only 372 (8.5%) recorded no formal sex education at all. Family history of a teen birth was apparent in about one third of cases (32.4%), measured by the age at mother figure's 1st birth occurring <20 years. Of the 4382 study participants, approximately 878 (20.0%) reported having a teen birth; consequently, 3504 (80.0%) participants did not report a birth before the age of 20.

Each of the variables was significantly associated in bivariate analyses with the outcome of a teen birth at P<.001 (Table 2a). Of the 878 females who experienced a teen birth, around half (51.7%) had a mother who had a child prior to the age of 20. As the age of the mother figure at 1st birth increased, the proportion of participants having a teen birth decreased. This inverse relationship also occurred for level of education and total family income. White females comprised 468 (53.3%) of those who had a teen birth. Most (74.3%) of the 878 respondents did receive some form of comprehensive sex education, although there were 5 cases missing within this variable for people who "didn't know."

A secondary, significant (P<.001) chi square analysis among participants who reported a family history of teen births revealed that about half (47.2%) of the girls with no formal sex education had a teen birth (Table 2b). Of the 243 respondents who received abstinence only education, around one fourth (24.7%) reported a birth before the age of 20. Most (72.7%) of the girls had comprehensive sex education, and 326 (31.6%) of these individuals reported a teen birth. There were 2 missing cases within this cohort who answered "don't know" in response to the sex education question.

Another filtered bivariate analysis for girls who did not report a family history of teen births illustrated that 49 (21.5%) of those who had no formal education also had a teen birth (Table 2c). Among the 548 who reported abstinence only education, 48 (8.8%) answered they had a birth prior to the age of 20. Again, most (73.8%) of the girls reported comprehensive sex education; of these participants, 325 (14.9%) had a teen birth. This analysis had 3 missing cases due to those who responded "don't know," and sex education was shown to be significant with teen births at P<.001.

Binary logistic regression was performed to assess the impact of all variables to simultaneously predict a teen birth (Table 3). The full model containing all predictors was statistically significant, X^2 (17, N=4377)=561.796, P<.001, indicating that the model was able to distinguish between respondents who did and did not have a teen birth. The model as a whole explained approximately 19% of the variance in teen birth outcomes and correctly classified 79.8% of cases. Race and formal sex education were uniquely significant where all categories P<.001. Compared to black females, the odds of reporting a teen birth for white (OR=.632; 95% CI=.528, .758) and other (OR=.558; 95% CI=.425, .732) race categories decreases. Receiving either abstinence only education (OR=.385;

95% CI=.280, .528) or comprehensive sex education (OR=.636; 95% CI=.494, .819) decreases your odds of having a teen birth compared with participants with no formal sex education.

Level of education was only significant (P<.001) when respondents received their high school diploma/GED or had a Bachelor's degree or higher compared to those with less than high school education. Results also showed that the odds of a female having a teen birth were 1.737 times higher for those receiving their diploma or GED than those who had less than high school education. Alternatively, a Bachelor's degree or higher (OR=.119; 95% CI=.052, .271) was a protective factor against teen births. Amongst total family income, all categories were significant (P<.001) besides those falling into the $15,000-24,999 bracket. A trend among income showed that as the income level increases (beginning at $25,000-34,999), the odds of a participant having a teen birth decrease compared to females within the less than $15,000 range.

The age at mother figure's 1st birth or family history showed a similar to trend to that of income, where one category (mother figure had no children) wasn't significant. All other categories were protective and statistically significant where P<.001. As the age at mother figure's 1st birth increases, the odds of a female reporting a teen birth decreases. The best representation of this is within the over 30 years (OR=.216; 95% CI=.145, .322) category, showing that females with these mothers are 78.4% less likely to report a teen birth than those whose mothers had a birth before the age of 20. All results reported are only valid in making comparisons if controlling for all other factors in the model.

Discussion

Despite the proven effectiveness of comprehensive sex education programs, it hasn't been fully understood whether or not the risk factor of prior family history of teen births has changed the efficacy of such programming efforts.[11] The process of reducing teen pregnancies and births has been an adolescent health objective for many years, making this issue a priority for youth.[6] If 9.4 billion dollars is the total cost to taxpayers associated with teen childbearing, then this is definitely a public health concern to be addressed.[1] Using empirically based data from both quantitative and qualitative studies is the most effective way to change this behavior and hopefully continue decreasing American teen birth rates.

This study does not provide any evidence showing there is a moderating relationship between sex education and a family history of teen births given the outcome of a girl giving birth before the age of 20. While the comparison of secondary chi-square results among those who did (Table 2b) and did not (Table 2c) report family history of teen births is undeniable, there technically isn't any moderation of the relationship. Within the sex education categories for both groups, no formal education had the largest proportion of teen births followed by comprehensive sex education then abstinence only. Within teen births for both groups, the largest proportion had comprehensive sex education followed by no formal education then abstinence only. This held true for both those with a family history and those without a family history. Therefore, results showed a statistically significant relationship between sex education and teen births regardless of whether you have a family history of teen births.

Despite the lack of moderation, the proportion of girls who reported a teen birth is still over twice as much in those with a family history versus those without a family history in both the no formal education category and the comprehensive sex education category. The contrast in the abstinence only education group is even greater, where the proportion is 3x higher for girls with a family history of teen births. Perhaps the difference is larger in this group because fewer girls who received abstinence only education also had a family history of teen births. Because bivariate analyses were used, it is hard to assess what type of relationship these variables may have with each other. This study definitely warrants further research in this area to conclude exactly what may be happening between sex education and family history of teen births, if anything. It could simply be that family history alone plays a more pivotal role in teen birth outcomes versus sex education. Regardless, comprehensive sex education is still an essential protective factor for teen births, while family history is powerfully predictive of them.

Past research has clearly shown the value of comprehensive sex education programs in decreasing teen birth rates.[10] However, my results showed abstinence only education to be more protective than the comprehensive counterpart (Table 3). This is not consistent with past data and could be due to chance, but the finding may have occurred simply because of slight sample variations within the sex education categories. Upon further analysis, 243 (30.7%) of females who reported abstinence only sex education also had a family history of teen births versus 1,031 (32.1%) in the comprehensive sex education category. These differences are minute but could have caused the varied results. This phenomenon could also be caused by some sort of response bias. Respondents may not have fully understood the questions regarding sex education on the

survey; therefore, females could have been placed in the wrong category resulting in nondifferential misclassification bias. Lastly, we do not know if the comprehensive programming these girls experienced was empirically based, proven to be effective, or maintained fidelity when implemented.

Family history of teen births proved to be on par with historical findings (Table 3). Daughters of teen mothers have been shown to be 3 times more likely to become teen moms themselves, and this relationships causes cyclical patterns that are difficult to break.[1] One theory that seems to support this possible relationship is Bandura's Social Learning Theory. This framework states that there is constant interaction between a person, their behaviors, and the environment.[15] Bandura coined this interaction "reciprocal determinism," and the theoretical model tries to explain how a person's knowledge and experiences play into their behaviors.[15] For instance, a female may have the education needed to prevent teen pregnancy; nevertheless, because her observations included the modeling of her mother's teen birth, she may disregard this knowledge. Despite this study's results, the exact linkage between sex education programming and these high risk girls has yet to be made. Moving forward, further studies should make efforts to determine what type of relationship exists between these two variables.

Strangely, logistic regression expressed that the odds of a female having a teen birth were 1.737 times higher for those receiving their diploma or GED than those who had less than high school education (Table 3). Because about half (45.4%) of the sample was comprised of girls reporting less than high school education, this finding may just be the result of younger girls who haven't had time to get pregnant in high school. Girls who have less than high school education probably haven't dropped out of high school, but

instead they are most likely still in school working towards graduation. Having a Bachelor's degree did seem to be a protective factor in preventing a teen birth, which has been historically correlated as well. This may indicate that those who have given birth as a teen do not continue to pursue or finish higher education because of the increased hardship of being a teenage parent.

The study showed evidence of the racial disparities existing within teen births as well (Table 3). White females in my sample were 36.8% less likely to report a teen birth than black females. Those who chose the "other" category were even more protected. Unfortunately, the survey did not break down this category, so the actual racial makeup of this group is unclear. These results somewhat mirror past research within the United States, despite needing a concise category for Hispanic youth. Using larger samples in past years, Hispanic and non-Hispanic black females aged 15–19 years have much higher pregnancy rates (132.8 and 128.0 per 1,000 population) than non-Hispanic white females (45.2 per 1,000 population).[6] In 2007, non-Hispanic black mothers were also more likely to have a low birth weight or preterm infant than mothers in other racial and ethnic groups. The southern states tend to have the greatest rates of negative sexual health outcomes, including early pregnancy.[6] Based on race and ethnicity along with socioeconomic factors, this geographical pattern probably reflects the composition of states' populations.

Even though the study contained no geographic information, the data presented on these racial disparities backs up previous research and clearly demonstrates the need for targeted pregnancy prevention programs. Currently, there are some sex education interventions made specifically for certain demographics but are not widely used.[11] Not

only should professionals take advantage of these specific opportunities, but public health officials need to intervene at multiple levels to make the best impact. Instead of only focusing on public policy regarding sex education, communities may seek to provide church or clinic based classes and counseling. All youths are supposed to attend school but providing other sources of support may be better for reaching parents. This methodology follows guidelines set forth by the Ecological Model, which has been proven to be efficacious for many public health efforts.

One advantage of this study was the use of the NSFG as a secondary data set. This is a CDC backed national questionnaire, and data collection is very methodical allowing for a small chance of selection bias. The national data set also provided a rather large sample to calculate my results, and some of the variables were already recoded to the study's needs. Answers to the questionnaires were gathered using trained personnel and ACASI, decreasing the likelihood of interview bias. Because only participants ages 15-24 were considered in this study, the problem of recall bias for certain questions is minimized.

An important limitation of this study is the grouping of participants to sex education categories. Respondents were placed into the abstinence only group based on an answer stating that they had received formal "how to say no to sex" education but did not receive any education based on contraceptive methods. Participants in the no formal sex education category answered no to both questions. As long as someone answered yes to the contraceptives question, she was placed in the comprehensive category. Unfortunately, this was the best recode formulation but may not rightly capture a person's true sex education status. In addition, girls answering the questions may have

been confused as to what they were being asked. Both of these scenarios would result in a nondifferential misclassification bias and may be why abstinence only proved more effective in this scenario.

This study is also limited in its results because it cannot draw a distinction between a teen pregnancy and a teen birth. The research question only looked at teen births, but there may be linkages between those who had teen pregnancies as well. Consequently, this data is much harder to collect and analyze because the outcome may not be a birth. Furthermore, the research presented only looked at a mother's history of teen births but not necessarily the outcomes after the child was born. For teen mothers who chose adoption, the children may not have been a part of the family so this birth history may not be as likely to repeat itself. Familial history of teen births can include siblings as well, and some data has shown sisters of teen mothers are more likely to have teen births than daughters of teen mothers. All of these limitations are practical considerations that went beyond the scope of practice for the investigator at this time.

The public health implications for teen parenting and births call for new ideas and programs. Because family history of teen births such a strong predictor for teenage females, a multi-level intervention reaching beyond empirically based school education classes should be implemented. Professionals should seek to help parents teach their children about the risks of sex and ways to protect themselves against unplanned or unwanted pregnancies. Conversations between parents and children surrounding sex may seem awkward, but parents should feel empowered to start and maintain this dialogue. Since lax parenting is associated with higher risk of teen pregnancy, parents should be aware of methods to help negotiate the tough teenage years. For families who already

have a parenting teen, support groups and counseling sessions may be offered. It's important that not only should the parenting teen feel connected and supported but also the family in its entirety. Other siblings should still be paid attention to even if things in the household have changed.

Because findings have shown that siblings' birth history may also have effects on their brothers and sisters, we should be stressing to our youth the importance of educating their siblings. Like their parents, older children are role models for the younger ones. This may be why familial history of teen births is such a strong predictor in teen birth outcomes. Regardless, these strategies could be applied within schools, clinics, community centers, etc. A focus on family history of adolescent births needs to be employed in preventing teenage pregnancy if further progress is to be made. This is not to say those with a family history of teen births should be separated from their peers, but that an honest conversation about this risk factor should be happening anywhere sex education is offered.

Apart from past studies, a suggested gap in the literature should aim to assess sibling attitudes within families who have a history of teen births. Do older sisters want their younger sisters to have kids with them? Do they support teen parenting or no? These are questions that may help determine pregnancy risk. A better understanding of why girls aren't using contraception despite not wanting a child is desperately needed as well. Perhaps a better approach to collecting this information would be to utilize focus groups with different samples of teenage girls in various geographic locations. The topic of teen pregnancy and births is somewhat sensitive, but perhaps now we need more in-depth answers to make more extreme progress. Lastly, future studies should look also at how

family history of teen birthing affects males in these families. Improvements in teen sex practices have stagnated, and public health officials need the teen birth rates to resume their past dissension.

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Biographical Sketch

This capstone has been prepared by Holly Poynter. In preparation for graduate school, Holly attended the University of Kentucky where she received her Bachelor's in Family Sciences. She just recently joined APHA and is conditionally certified as a CPH recipient. This certification will become complete once she graduates with her Master's in Public Health. Holly was also UKSPHA secretary for 2013. If you would like to contact her please use the following information.

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Conceptual Model

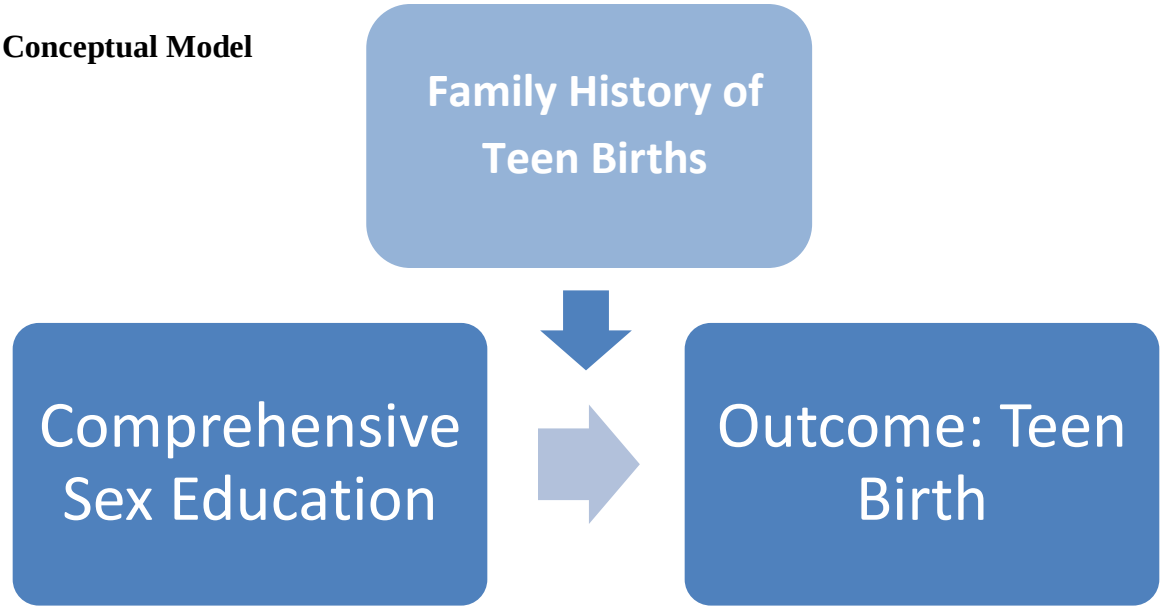

Table 1. Descriptive characteristics of 4382 participants

Variables	N (%)
Education	
Less than high school	1991 (45.4)
High school diploma or GED	1003 (22.9)
Some college but no degree	967 (22.1)
Associate degree in college/university	125 (2.9)
Bachelor's degree or higher	296 (6.8)
Race	
Black	1002 (22.9)
White	2827 (64.5)
Other	553 (12.6)
Age at mother figure's 1st birth	
< 20 years	1420 (32.4)
20-24 years	1507 (34.4)
25-30 years	923 (21.1)
Over 30 years	465 (10.6)
Mother figure had no children	67 (1.5)
Total family income	
Less than $15,000	1349 (30.8)
$15,000-24,999	588 (13.4)
$25,000-34,999	625 (14.3)
$35,000-49,999	615 (14.0)
$50,000-74,999	651 (14.9)
$75,000 or greater	554 (12.6)
Formal sex education	

No formal education	372 (8.5)
Abstinence only education	791 (18.1)
Comprehensive education	3214 (73.3)
Don't know	5 (0.1)
Teen birth (Age at pregnancy outcome <20)	
Yes	878 (20.0)
No	3504 (80.0)

Table 2a. Relationship between predictor and outcome variables using Chi square analysis among 4382 participants

	Teen birth (Age at pregnancy outcome <20 years)			
Age at mother figure's 1st birth	Yes (n=878)	No (n=3504)	**X^2 statistic**	**P value**
< 20 years	454 (51.7%)	966 (27.6%)	239.497	**.000**
20-24 years	284 (32.3%)	1223 (34.9%)		
25-30 years	93 (10.6%)	830 (23.7%)		
Over 30 years	30 (3.4%)	435 (12.4%)		
Mother figure had no children	17 (1.9%)	50 (1.4%)		
Education				
Less than high school	398 (45.3%)	1593 (45.5%)	129.059	**.000**
High school diploma or GED	298 (33.9%)	705 (20.1%)		
Some college but no degree	157 (17.9%)	810 (23.1%)		
Associate degree in college/university	19 (2.2%)	106 (3.0%)		
Bachelor's degree or higher	6 (0.7%)	290 (8.3%)		
Race				
Black	314 (35.8%)	688 (19.6%)	103.732	**.000**

White	468 (53.3%)	2359 (67.3%)		
Other	96 (10.9%)	457 (13.0%)		
Formal sex education (n=4377)				
No formal education	117 (13.4%)	255 (7.3%)	50.506	**.000**
Abstinence only education	108 (12.3%)	683 (19.5%)		
Comprehensive education	651 (74.3%)	2563 (73.2%)		
Total family income				
Less than $15,000	399 (45.4%)	950 (27.1%)	183.985	**.000**
$15,000-24,999	151 (17.2%)	437 (12.5%)		
$25,000-34,999	115 (13.1%)	510 (14.6%)		
$35,000-49,999	91 (10.4%)	524 (15.0%)		
$50,000-74,999	88 (10.0%)	563 (16.1%)		
$75,000 or greater	34 (3.9%)	520 (14.8%)		

Table 2b. Relationship between type of sex education and teen births using Chi square analysis among 1420 participants with a family history of teen births (Missing 2 cases for those who answered "don't know")

Formal sex education (n=1418)	**Teen birth (Age at pregnancy outcome <20 years)**		**X^2 statistic**	**P value**
	Yes	No		
No formal education (n=144)	68 (47.2%)	76 (52.8%)	21.362	**.000**
Abstinence only education (n=243)	60 (24.7%)	183 (75.3%)		
Comprehensive education (n=1031)	326 (31.6%)	705 (68.4%)		

Table 2c. Relationship between type of sex education and teen births using Chi square analysis among 2962 participants without a family history of teen births (Missing 3 cases for those who answered "don't know")

Formal sex education (n=2959)	**Teen birth (Age at pregnancy outcome <20 years)**		**X^2 statistic**	**P value**
	Yes	No		
No formal education (n=228)	49 (21.5%)	179 (78.5%)	24.015	**.000**
Abstinence only education (n=548)	48 (8.8%)	500 (91.2%)		
Comprehensive education (n=2183)	325 (14.9%)	1858 (85.1%)		

Table 3. Logistic regression predicting likelihood of reporting a teen birth

Variables	Odds Ratio	95% CI	P value
Formal sex education			
No formal education (Ref)	1.00		
Abstinence only education	.385	(.280, .528)	**.000**
Comprehensive education	.636	(.494, .819)	**.000**
Education			
Less than high school (Ref)	1.00		
High school diploma or GED	1.737	(1.442, 2.093)	**.000**
Some college but no degree	1.005	(.809, 1.250)	.961
Associate degree in college/university	1.012	(.599, 1.709)	.965
Bachelor's degree or higher	.119	(.052, .271)	**.000**
Total family income			
Less than $15,000 (Ref)	1.00		
$15,000-$24,999	.926	(.735, 1.167)	.517
$25,000-34,999	.597	(.468, .763)	**.000**
$35,000-49,999	.492	(.378, .640)	**.000**
$50,000-74,999	.461	(.354, .640)	**.000**
$75,000 or greater	.217	(.147, .319)	**.000**
Age at mother figure's 1st birth			
< 20 years (Ref)	1.00		
20-24 years	.585	(.488, .701)	**.000**
25-30 years	.342	(.265, .441)	**.000**
Over 30 years	.216	(.145, .322)	**.000**
Mother figure had no children	.906	(.500, 1.640)	.744
Race			
Black (Ref)	1.00		
White	.632	(.528, .758)	**.000**
Other	.558	(.425, .732)	**.000**
Constant	1.27		.095
R^2=0.19			

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