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**Know Before You Play: Associations Between Race, Education, and HIV Susceptibility**

By

Anfa Diiriye

A Thesis Submitted in Partial Fulfillment of the Requirements for

Master of Arts

In

Sociology

Department of Sociology and Corrections

Minnesota State University, Mankato

Mankato, Minnesota

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Know Before You Play: Associations Between Race, Education, and HIV Susceptibility

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The following members of the student's committee have examined this thesis.

\_\_\_\_\_ Professor Aaron Hoy, Ph.D.

\_\_\_\_\_ Professor Saiful Islam, Ph.D.

\_\_\_\_\_ Professor Eric Sprankle, Ph.D.

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## Table of Contents

ABSTRACT.....	iv
CHAPTER ONE: INTRODUCTION.....	1
CHAPTER TWO: LITERATURE REVIEW.....	4
HIV Prevalence.....	4
Susceptibility.....	5
Measures of Susceptibility.....	9
CHAPTER THREE: RESEARCH METHODS.....	12
Research Method.....	12
Sample and Hypotheses.....	12
Variables.....	13
Analytic Approach.....	14
Reliability.....	14
CHAPTER FOUR: ANALYSIS.....	15
Descriptive Tables.....	15
Binary Logistic and Multiple Regression Tables.....	18
CHAPTER FIVE: CONCLUSION.....	25
REFERENCES.....	28
APPENDIX A: VARIABLE CODES.....	33

## ABSTRACT

Black women are disproportionately affected by HIV in the United States. This paper analyzes the associations between race, education, and HIV susceptibility, furthering previous research to understand if educational attainment reduces HIV susceptibility and if reduction patterns are similar for Black and White women. The CDC's National Survey of Family Growth 2015-2017 was used to analyze associations using binary logistic and multiple regression models. HIV susceptibility was operationalized through four measures: condom use, having a partner with concurrent sexual relationships, having had an STD, and age at first sex. Black women were not found to be significantly more susceptible to HIV when compared to White women. Additionally, education was not found to have a different impact on the HIV susceptibility of Black or White women. Moreover, in comparison to those with either a high-school diploma or GED, having a college degree was found to mitigate some risky sexual behavior.

## CHAPTER ONE: INTRODUCTION

Human Immunodeficiency Virus (HIV) is a virus that attacks the body's immune system, our natural defense against illness. The virus attacks and destroys CD4 cells, which are white blood cells in the immune system. CD4 cells help the immune system fight off infections. If HIV is left untreated, the disease reduces the number of CD4 cells in the body, resulting in an increased likelihood of acquiring infections or infection-related cancers. With time, HIV attacks and destroys a sufficient amount of these CD4 cells resulting in the inability of the body to fight off infections and diseases (CDC 2017).

Since the start of the global HIV epidemic, more than seventy million people have been infected with HIV, resulting in thirty-five million deaths due to HIV (WHO 2017). Although there are treatments available to prolong the lives of those infected with HIV, there is currently no cure. Moreover, globally, women account for 70% of new infections (Unaids 2017). Out of those newly infected, Black women are disproportionately affected by the virus, comprising most new infections (CDC 2017; Unaids 2017). Aligning with global patterns, in the United States, Black women are infected with HIV at higher rates when compared to their different-race counterparts (McNair and Prather 2004).

These disproportionate rates of infection call attention to a need for women, and Black women in particular, to be at the forefront of HIV research. This is especially important because women's vulnerability is exacerbated biologically. "The physiology of the female genital tract makes women twice as likely to acquire HIV from men as vice versa. Among adolescent girls, this effect is even more pronounced" (Auerbach 2004:1). Therefore, during vaginal intercourse women are more susceptible to contracting HIV when compared to men. Women need to be not

only at the forefront for HIV research but also engaged in preventative measures needed to adequately address their heightened susceptibility.

Following the HIV epidemic, international and national researchers have studied the link between education and HIV. Beyond HIV awareness campaigns, as having mere knowledge of the virus does not reduce susceptibility, researchers have linked educational attainment with reduced HIV risk (Gregson et al. 2001). For example, a study by Painter et al. (2012) on sexually transmitted diseases (STD) and HIV vulnerability of Black women found college graduation as a protective factor against STD/HIV. However, other studies have challenged the association between education and HIV susceptibility, stating that the two variables are not statistically significant (Brent 2006). Given these conflicting findings, the efficacy of educational attainment in reducing HIV susceptibility needs to be more fully understood. As such, in this thesis I examine the associations between race, education, and HIV rates. In particular, I examine whether education results in lowered HIV-susceptibility. African American women's greater vulnerability to HIV makes the possible association between education and lowered HIV-susceptibility an especially important issue.

To better understand the relationship between education and HIV susceptibility, this study has analyzed the 2015-2017 data from Center for Disease Control and Prevention's (CDC) National Survey of Family Growth. I used binary logistic and multiple regression models using the Statistical Package for Social Sciences (SPSS) to answer the following research questions: Does education result in reduced HIV susceptibility? Does HIV susceptibility either increase or decrease based on educational attainment? Does HIV susceptibility vary based on race?

Although I have no firsthand experience with HIV, I am passionate about women's rights, health, and societal advancements. I believe allowing more women the opportunity to



receive an education is not only beneficial for improving HIV rates, but is also a gateway to a plethora of other societal advancements for women. This study is contributing to the research on factors influencing the HIV infection rates of Black women through analyzing the relationship between education and HIV. Moreover, this study has analyzed the impact of education on HIV susceptibility between two different race groups who have different rates of susceptibility: Black and White women in the United States.

## CHAPTER TWO: LITERATURE REVIEW

### HIV Prevalence

From the beginning of the Human Immunodeficiency Virus (HIV) epidemic, in many regions, women-- and particularly women of color—have been disproportionately affected by the virus. Worldwide, 36.9 million people have contracted HIV, including 9.2 million that do not know they are infected (UNICEF 2018). In addition, women account for more than half of people living with HIV globally (Avert 2019). In the United States alone, more than 1.2 million people are living with HIV, with roughly 13% unaware of their status, and approximately 40,000 new diagnoses each year (CDC 2017). Among those who have been diagnosed with HIV, 43% are Black, although Blacks make up 13% of the US population (CDC 2019). Moreover, among female diagnoses of HIV in the United States, 59% were Black, 20% were White, and 16% were Hispanic (amfAR 2019).

As apparent from their disproportionate HIV rates, Black women have been identified as the fastest growing group of individuals infected with HIV in the United States (McNair and Prather 2004). Although diagnoses declined 42% among Black women from 2005-2014, HIV remains in the top ten causes of death for Black women aged 15-59 (OWH 2019). Even with the decline of infection rates, Black women are still the fastest growing group to acquire HIV (Raiford, Wingood and Diclemente 2008). It is evident that primary health interventions by public health organizations have not been adequately successful in addressing the problem of HIV for Black women.

To understand the present-day makeup of HIV within the female Black community, it is important to historically identify when their vulnerability to HIV increased. The first cases of Acquired Immunodeficiency Syndrome (AIDS) did not occur in the United States until 1980

(CDC 2001). This means that these patients developed HIV prior, but it was left undiagnosed and untreated, as it can take years before HIV sufficiently weakens the immune system to develop AIDS. In addition, during this time, HIV predominantly affected gay men and intravenous drug users. It was not until 1983 that the US Centers for Disease Control and Prevention (CDC) documented the first two cases of AIDS in women, but by 1988, Black women accounted for half of all AIDS cases in the United States (AVERT 2010).

In these early years, heightened susceptibility of Black women came in part as a result of American media's portrayal of HIV as not only a disease of gay men, but White gay men. The inaccurate depiction of who contracts HIV might have heightened Black women's susceptibility, due to a lack of awareness stemming from misinformation. Since then, sociologists and other health researchers have examined various factors that increase, or decrease, susceptibility to HIV, including factors that are most relevant to Black women.

### Susceptibility

First and foremost, it is important to note that heterosexual sex is by far the most likely transmission route for Black women, with approximately 87% of HIV-positive Black women becoming infected in this way (CDC 2016). Due to this interactional aspect, evidence suggests that sexual health outcomes are not only dependent on an individual's behavior but also that of their partner (Chick, Adams and Koopman 2000; Ghani and Garnett 2000). Moreover, higher levels of STDs within the African American community further exacerbate their chances of contracting the virus (CDC 2019). This increased risk is because the same circumstances or behaviors that resulted in contracting an STD also put an individual at a greater risk for HIV (CDC 2019). Additionally, breaks or sores from STDs could facilitate the entrance of HIV into

the bloodstream. However, varying factors have also influenced, and continue to influence, HIV susceptibility for Black women.

A large body of research has identified some behavioral factors which contribute to Black women's susceptibility to HIV. For instance, having concurrent sexual relationships, incarceration, and drug use all to some degree increase susceptibility (Adimora et al. 2002; CDC 2009; Hodder et al. 2010). Regardless, participating in risky sexual behaviors is the foremost factor that elevates Black women's susceptibility. Risky sexual behaviors refer to acts that increase the chances of contracting HIV. These include, but are not limited to, inconsistent or non-existent condom usage, having multiple partners, partners that are older in age, transactional sex, and early sexual debut (Musawnkosi et al. 2018; Varga 2003).

Sociological studies have also researched the link between various socio-demographic factors and HIV. In particular, the link between educational attainment and HIV susceptibility has been the focus of considerable research to date. Some of this research shows that higher levels of educational attainment are associated with a reduced risk for acquiring HIV (Gregson et al. 2001; Michelo et al. 2006). Based on this research, the relationship between education and HIV has commonly been referred to as the "education vaccine" (Vandemoortele and Delamonica 2002). Education vaccine theory implies that, with increased information, knowledge, and awareness, the more educated and better-off members of society demonstrate faster behavioral changes compared to the less educated and poorer members. This results in delayed sexual debut, fewer sexual partners, increased condom use, and other actions that reduce risk for infection.

Building from this theory, Adamczyk and Greif (2011) assert that women's awareness and accurate knowledge, through education, contributes to safer sex practices. Resulting from their research, Adamczyk and Greif (2011) found that better educated women had a delayed age

of sexual debut, were more likely to know their partner, and demonstrated higher condom usage irrespective of their relationship status. In addition, other studies have found attending high school as a protective factor against HIV, by reducing rates of sexual experiences, lowering alcohol usage and contributing to an overall improvement of sexual behaviors (Fonner et al. 2014; Santelli et al. 2015). Furthermore, when higher education was controlled for other factors, such as home background, being in higher education were associated with increased condom use, particularly among Black women (Santelli et al. 2015). In addition, educated women were more likely to report not only using condoms with their partners, but also having their partners tested for HIV. The capability of requesting HIV testing from their sexual partners derives from education increasing the negotiation abilities of women.

Mirroring these findings, Hargreaves et al. (2008) examined the association between HIV infection and being in school and found that female students were less likely to report having more than two sexual partners during their lifetime, compared to non-students, and had a lowered frequency of sexual activity. Additionally, condom use at last sex was more commonly reported by students. Collected data also illustrated that students were less likely to have had a child, which can help strengthen the connection between school attendance and either condom use or abstinence.

On the other hand, some studies have challenged the association between education and HIV. For instance, some studies have asserted that knowledge has little impact on sexual behavior (Johnson, Rozmus, and Edmisson 1999). This assertion is corroborated by Johnson et al. (1994) finding that risky sexual behavior persisted irrespective of high knowledge on factors associated with HIV transmission. On a macro-level, findings from a cross-sectional study conducted in 31 countries found that education was not linked with reducing the prevalence of

HIV (Brent 2006). Rather, the impact of education on HIV was tied with other variables, such as income and religion. From Brent's (2006) findings, countries with higher-income rates had more infections, whereas countries with a large Muslim population had lower infection rates. Although Brent's (2006) findings do not apply at the micro-level, to individual susceptibility, they do raise questions about the significance of education in explaining HIV transmission.

As prior research does not allow for concrete conclusions as to the efficacy of education against HIV, it is important to further examine the association between education and HIV susceptibility. This study accomplishes this by analyzing the impact of education, in the form of educational attainment (i.e., degree completion), on HIV among two distinct racial groups, Black and White women. Black and White women were chosen as these two groups reside at differing ends of the HIV susceptibility spectrum.

To understand the circumstances under which HIV susceptibility is heightened, theoretical models have focused on behavior as an interactional process. More specifically, theories such as the theory of reasoned action are used to explain how behavior is influenced by an individual's environment and expected outcomes. Reasoned action theory suggests that "an individual's decision to engage in a particular behavior is based on the outcomes the individual expects will come as a result of performing the behavior" (Freberg 2016: 2). More specifically, according to this approach, behavior results from the interaction between attitudes and subjective norms, where attitudes are comprised of an individual's own thoughts about certain behaviors and subjective norms are comprised of social pressures that help to constrain behavior. When applied to sexual behavior, this would mean that personal attitudes held towards how to perform sex combine with perceptions of what is socially acceptable for men and women within their environment to influence individual behavior. The interaction between attitudes and norms can

also be referred to as consensual ideologies (Rosenthal and Levy 2010). Attitudes toward sexual behaviors as well as perceptions of what is socially normative are both shaped by education, among other agents of socialization. As such, it is important to understand the role that education may play in promoting or inhibiting sexual behaviors that are associated with HIV susceptibility and how education may have differing effects for Black and White women.

There has been research documenting an association between education and reduced HIV susceptibility for White women. A study on women's sexual communication and sexual risk, in which 79% of participants were White and 86% had some college education, found that those at greater HIV risk had the least education (Quina et al. 2000). This study also attributed increased risk to experiencing abuse and having low sexual power, which is attributed to the lowered ability to negotiate. However, further research is needed to understand how the effects of education on HIV susceptibility may vary among Black and White women. Thus, the purpose of this study is to document the association between educational attainment and HIV susceptibility. Specifically, I examine whether degree completion has an impact on HIV reduction, and whether the relationship is similar across different racial groups. Moreover, as behavior can be influenced by the environment, if White women have similar susceptibility reduction patterns as Black women, this would further corroborate the link between education and lower HIV susceptibility.

### Measures of Susceptibility

As so far discussed, certain sexual behaviors can work to increase the likelihood of contracting HIV. Therefore, it is important to not only identify these sexual behaviors but also link them to susceptibility. For this study, HIV susceptibility will be operationalized through four measures: condom use, having a partner with concurrent sexual relationships, having had an STD, and age at first sex.

First, correct condom use can protect against HIV and other STDs by providing a barrier that protects against fluids such as semen, vaginal fluids, and blood as these can pass on STDs and HIV (Avert 2019). Although the British Association for Sexual Health and HIV states that condoms, when used reliably and consistently, may be over 95% preventative, for the average consistent user, condom usage during vaginal sex is approximately 80% effective against preventing HIV transmission (CDC 2019; Pett 2019). Due to Black women contracting HIV predominantly through heterosexual sexual encounters, beyond abstaining from sex, using condoms is the next most effective preventative measure.

Second, concurrent sexual relationships elevate the risk for contracting HIV, as participating in concurrent sexual partnerships has been associated with increased risk of STD transmission (Adimorea, Schoenback and Martison 2001; Morris and Kretzschmar 1997). Researchers have connected the presence of concurrent sexual relationships with the spread of HIV in Sub-Saharan Africa and other regions with extensive heterosexual HIV transmission (Garnett and Johnson 1997; Hudson 1996). As heterosexual sexual encounters are how HIV is predominantly transmitted to Black women, having higher risk sexual partners also increases their own risk to contracting HIV.

Third, as previously stated, having an STD increases HIV susceptibility (CDC 2019). The association between having an STD and being more HIV susceptible is a result of similar risky sexual behaviors that can lead to contracting both STDs and HIV. Furthermore, STDs make individuals more vulnerable to HIV due to breaks and sores from STDs.

Lastly, having an earlier age at first sex can put an individual at risk for contracting HIV. This occurs because of early age at sexual debut being linked to longer exposure to sexual activity, which increases the accumulation of sexual partners (Snelling et al., 2007). The



accumulation of sexual partners increases the potential exposure to HIV. Meaning, the longer the time-frame an individual is participating in sexual activity, the higher the chances are that he or she will contract HIV. When there is an older age at first sex this shortens the exposure time to HIV.

## **CHAPTER THREE: RESEARCH METHODS**

Below, I report findings from my secondary-data analysis using the CDC's National Survey of Family Growth (NSFG) 2015-2017 dataset. The NSFG gathers information surrounding varying aspects of family life, including health and sexual behaviors. The NSFG is conducted through both voluntary self-administered questionnaires and in-person interviews, with persons aged 15-49, and has a response rate of approximately 69% (CDC 2019).

### Research Method

As mentioned, the NSFG is comprised of self-administered questionnaires and in-person interviews, otherwise known as surveys. There are various benefits to utilizing surveys, particularly for this type of research. A benefit is that surveys are well suited to collect individual-level data, especially pertaining to topics that are not typically directly observable, such as sexual behavior. Moreover, the general unobtrusive nature of surveys is ideal, given the intimate nature of my topic. Surveys provide enough confidentiality, when compared to focus groups for example, which should render more accurate answers from participants. Within the NSFG sensitive questions were asked in the self-administered questionnaires and not in-person interviews (CDC 2019). Additionally, since my unit of analysis is Black and White women residing in the United States, surveys provide the most feasible mode to garner a sufficient sample size across a large geographic area.

### Sample and Hypothesis

The unit of analysis is Black and White women residing in the United States, between the ages of 19 and 49. Although the dataset incorporates participants as young as 15 years old, generally, individuals graduate high-school between the ages of 17-18. Therefore, as the purpose of my study was to compare the effect of educational attainment on HIV susceptibility, it is

important that participants who have not completed their high school diplomas because of their age are not included in the study.

This research has a deductive approach with the primary goal being to further the research that has been previously completed in this area. To reiterate, my research is answering the following questions: Does education result in reduced HIV susceptibility? Does HIV susceptibility either increase or decrease based on educational attainment? Does HIV susceptibility vary based on race? Specifically, my hypotheses are as follows:

- 1) Educational attainment is negatively associated with all four measures of HIV susceptibility.
- 2) Black women are significantly more susceptible to HIV compared to White women.
- 3) There are no significant differences in the negative association between educational attainment and HIV susceptibility for Black and White women.

### Variables

In this study, the independent variables are race and education, the dependent variable is HIV susceptibility, and the control variables are marital status, age, and income. Race was categorized by Black/Other and White/Other. Education was measured through participant responses on high school diploma/GED and college completion. The dependent variables were chosen to illustrate risky sexual behavior that can elevate HIV susceptibility. HIV susceptibility variables were identified through previously conducted research within the area. HIV susceptibility variables include: condom usage, having an STD, age at sexual debut, and having sexual intercourse with a partner that also has other concurrent sexual partners. The control variable marital status has been categorized as participants who have never been married and

those married during the study. The control variable income has been separated into lower-income and median-income or higher categories.

### Analytic Approach

The data gathered from CDC's NSFG were analyzed through the Statistical Package for the Social Sciences (SPSS). Once processed, the data was run and analyzed through both binary logistic and multiple regression models. The purpose of regression testing is to identify relationships between variables, especially if the relationships are statistically significant. Moreover, regression analysis was also used to identify which variables do not have any statistically significant impact. The analysis was used to illustrate whether there exist statistically significant differences in the correlation between educational attainment and HIV susceptibility for Black and White women. Additionally, the analysis was used to identify any interaction effects between the control variables, age, marital status, and income with the dependent HIV susceptibility variables.

### Reliability

Representative reliability addresses whether my indicators are applicable to different groups (Neuman 2011). Within my research, I have compared my findings with research that has been previously conducted in this area using different data sets. Comparisons have not been constrained to research conducted within the United States, findings conducted within different populations have also been incorporated.

## CHAPTER 4: ANALYSIS

### Descriptive Tables Analyses

Descriptive Table 1 – All Variables Used Within Study

	N	Min	Max	Mean	Std. Dev.
<b>Independent Variables</b>					
Black	1355	-	-	-	-
White	2748	-	-	-	-
Diploma or GED	4892	.00	1	.8890	.31416
College Degree	3336	.00	1	.5647	.49586
<b>Control Variables</b>					
Age	4804	19	50	33.2712	8.66949
Married	5554	.00	1	.3291	.46994
Never Married	5554	.00	1	.5344	.49886
Lower Income	4760	.00	1	.5590	.49655
Middle Income and Higher	4760	.00	1	.4410	.49655
<b>Dependent Variables</b>					
Age at First Intercourse	4810	2	43	17.22	3.386
During Sexual Intercourse, Has Used Condoms Every Time in Last 12 Months	4047	.00	1	.1658	.37195
During Sexual Intercourse, Has Not Once Used Condoms in Last 12 Months	4047	.00	1	.4292	.49502
Male Partner Has Other Sexual Partners	4338	.00	1	.1238	.32938
Has Been Diagnosed With an STD	4843	.00	3	.1401	.40241

Descriptive Table 1 details the frequencies within the independent, control, and dependent variables. These frequencies can also be used to illustrate how similar the means of the sample population are with the general population. Please refer to Appendix A for a detailed list on how the variables were re-coded. The coming paragraphs describe the frequencies and, when applicable, proximity to general population trends.

Because this study analyzes how being either White or Black influences HIV susceptibility, it is important to know the sample sizes of both racial categories. From this dataset, there are 1355 Black participants, or 25% of sample population, and 2748 White participants, or 50% of sample population. Evidently, there are twice the number of White participants. When making comparisons between groups, this would not be the ideal racial distribution. However, there is a large enough Black sample size to be able to find patterns and hypotheses test.

Next, the impact of educational attainment was analyzed through having a high school diploma/GED or college degree. From the sample, 78% of participants had a high school diploma or GED. In the United States, approximately 90% of adults have a high school diploma or GED (Census 2017). Additionally, 34% of the sample population obtained a college degree. In the United States, approximately 35% of adults have a college degree (Census 2018). Since there is a large enough sample of participants with either a high school diploma/GED or college degree within the sample, it is possible to analyze the relationship between educational attainment and HIV susceptibility.

There was an even distribution of age within the sample, with a mean of 31 years old. Age of participants within sample ranged from 15-49 years old. However, participants 18 years and younger were omitted from this study. Additionally, 33% of participants within the sample were married, while 54% were never married. In the United States, approximately 50% of adults 18 years and older are married (Geiger and Livingston 2019).

In addition, 48% of participants within the sample reported having lower income, while 38% of participants reported making a median-income or higher. For the purposes of this study, making under \$25,000 annually was coded as lower income. In the United States, approximately

24% of individuals make under \$25,000 annually (Duffin 2019). As there is an equal distribution of income within the sample population, the impact of income on HIV susceptibility can be analyzed.

The mean age at first sex within the sample population was 17 years old, which is similar to the average U.S. age at first sex (Magnusson, Nield, and Lapane 2015). There was a large variance of age at sexual debut within the sample population, ranging from 2 years old to 43 years old. For participants who have had sexual intercourse, 76% made their sexual debut between 14-19 years of age. In the sample, the mean number of sexual partners was 5. This is lower than the average number of 7 sexual partners for women in the United States (Sutton 2019). Moreover, 10% of participants were with a male partner who had other sexual partners.

In addition, 12% of participants used condoms every time during sexual intercourse, and 42% used condoms none of the time. Lastly, in the sample, 4% have been diagnosed with Herpes, 10% have been diagnosed with genital warts, and 0.5% have been diagnosed with syphilis. The three STD types were re-coded into one trichotomous variable.

Descriptive Table 2 – Comparisons Between Black and White Participants

		Black (% within Blacks)	White (% within Whites)
Has High School Diploma/GED	Yes	87.4%	93.7%
	No	12.6%	6.3%
Has College Degree	Yes	45.5%	37.6%
	No	55.5%	62.4%

Descriptive Table 2 compares in-group frequencies amongst Black and White participants in terms of educational attainment. This is important as part of the purpose of this study is to assess how education may influence the sexual behaviors of both groups and make comparisons. From Descriptive Table 2, we find that 87% of Black and 93.7% of White participants have either a high school diploma or GED. Additionally, 45.5% of Black and 37.6%

of White participants have a college degree. Due to these not being overly skewed for either race, we can assess patterns and make cross-comparisons from the sample population.

### Regression Tables/Analyses

Binary Logistic Table 1 – Cross-comparisons between Black and White Participants

		B	S.E.	Wald	df	Sig.	Exp(B)	C.I. (95%) lower	C.I. (95%) upper
Used Condom Ever Time	Black (1) And Other (0)	-.199	.095	4.399	1	.036*	.819	.680	.987
	White (1) And Other (0)	-.369	.085	18.636	1	.000***	.692	.585	.818
Used Condom None of the Time	Black (1) And Other	-.357	.073	23.792	1	.000***	.700	.606	.808
	White (1) And Other	-.360	.064	31.804	1	.000***	.698	.616	.791
Male Partner Has Other Sexual Partners	Black (1) And Other	.579	.099	34.536	1	.000***	1.784	1.471	2.164
	White (1) And Other	-.020	.092	.048	1	.826	.980	.818	1.174

\*  $p \leq 0.05$  \*\*  $p \leq 0.01$  \*\*\*  $p \leq 0.001$

Tables 1 and 2 are binary logistic regressions. From Table 1, the results indicate that the predictors, Black and White, have a statistically significant relationship with consistent condom use and consistent no condom use. The relationships found for these variables also illustrate similar patterns between both groups of participants. For instance, there was a negative relationship found for Black and White participants regarding consistent condom use. For Black participants, the odds of using condoms consistently decreased by a factor of .819 than other racial groups. While for White participants, the odds of consistent condom use decreased by a factor of .692 than other racial groups. These results show that, when compared to White



participants, Black participants reported more consistent condom use due the greater decrease in odds for White participants. Regardless, in comparison to the sample population, both Black and White participants had lower reports of consistent condom use.

There was also a negative relationship found for both Black and White participants regarding consistent no condom use, although the relationship was slightly more negative for White participants. For Black participants, the odds of no condom use decreased by a factor of .700 than other racial groups. For White participants, the odds decreased by a factor of .698 than other racial groups. These results show that, although there was a slight increase for Black participants compared to White participants, the odds that either Black or White participants report not using condoms at all are generally the same.

Lastly, there was a positive relationship found for Black participants and having male partners who had other concurrent sexual partners. For Black participants, the odds of having a male partner with other sexual partners increased by a factor of 1.784 than other racial groups. Meaning, Black participants reported having male partners who also had other sexual partners at a higher rate. Although the model found a slight negative relationship for White participants, the finding was not statistically significant.

Binary Logistic Table 2 – Cross-comparisons between High School Diploma/GED and College Degree

		B	S.E.	Wald	df	Sig.	Exp(B)	C.I. (95%) lower	C.I. (95%) upper
Used Condom Ever Time	Diploma or GED	-.048	.142	.117	1	.732	.953	.722	1.257
	College Degree	-.270	.106	6.479	1	.011*	.764	.620	.940
Used Condom	Diploma or GED	-.101	.105	.917	1	.338	.904	.735	1.112

None of the Time									
	College Degree	-.320	.079	16.305	1	.000***	.726	.622	.848
Male Partner Has Other Sexual Partners	Diploma or GED	.203	.161	1.598	1	.206	1.225	.894	1.678
	College Degree	-.588	.115	26.111	1	.000***	.556	.443	.696

\*  $p \leq 0.05$  \*\*  $p \leq 0.01$  \*\*\*  $p \leq 0.001$

Table 2 has the same outcome variables as Table 1. However, the predictors have changed from race to educational attainment with this model comparing participants with either a high school diploma or GED to participants who do not. And similarly, this model compares participants who do not have a college degree to those who have a college degree. When compared with the previous table, this table did not render as many statistically significant relationships.

To start, from this model, there is a statistically significant negative relationship between having a college degree and consistent condom use. For those with college degrees, the odds of using condoms consistently decreased by a factor of .764. Meaning, when compared to non-degree holding participants, college graduates reported using condoms consistently at a lower rate. Although there was a slight negative relationship found between consistent condom use and having a high school diploma/GED, the finding was not statistically significant.

Next, there was also a statistically significant negative relationship between having a college degree and consistent no condom use. For those with college degrees, the odds of not using condoms at all during sex decreased by a factor of .764. Although there was a negative relationship found between having a high school diploma/GED and consistent no condom, the

finding was not statistically significant. The findings on condom use illustrate that education may not have a strong impact on consistent condom use.

Lastly, there was a statistically significant negative relationship between having a college degree and having a male partner who also had concurrent sexual partners. When compared to those without a college degree, the odds of participants with college degrees having a male partner who had concurrent sexual partners decreased by a factor of .556. Although the model found a positive relationship between having a high school diploma or GED and having a male partner with concurrent sexual partners, the association was not statistically significant.

Multiple Regression Table 3 – Age at First Intercourse

	Unstandardized B	Unstandardized Std. Error	Standardized Coefficients Beta	t	Sig.	95% C.I. Lower	95% C.I. Upper
Black	-.898	.120	-.113	-7.477	.000***	-1.134	-.663
White	-.282	.124	-.040	-2.269	.023*	-.526	-.038
Age	.031	.006	.077	5.206	.000***	.019	.043
Lower Income	-.836	.101	-.125	-8.311	.000***	-1.033	-.639
Middle Income and Higher	.836	.101	.125	8.311	.000***	.639	1.033
High School Diploma or GED	.978	.162	.090	6.042	.000***	.661	1.295
College Degree	1.596	.124	.225	12.909	.000***	1.354	1.839
Never Married	-.661	.125	-.093	-5.280	.000***	-.906	-.415
Married	1.037	.110	.148	9.444	.000***	.822	1.252

\*  $p \leq 0.05$  \*\*  $p \leq 0.01$  \*\*\*  $p \leq 0.001$

While the previous tables were binary logistic regressions, Tables 4 and 5 are multiple regression models. Model 4 assesses whether the predictive and control variables have

statistically significant relationships with age at first intercourse. From the results of the analysis I find that Black, White, lower-income, high school diploma/GED, college degree and never married have statistically significant negative relationships with the dependent variable. Age and median-income or higher have statistically significant positive relationships with the dependent variable.

For Black participants, the odds of being older in age at first sex decreased by a factor of -.113. For White participants, the odds decreased by a factor of -.040. Therefore, although both Black and White participants report lower ages at first intercourse compared to the sample population, Black participants reported even lower ages at first intercourse when compared with White participants.

Having either a high school diploma/GED or a college degree was found to have a statistically significant positive relationship. For high school diploma/GED, the odds of being older in age at first sex increased by a factor of .090. For college degree holders, the odds increased by a factor of .225. While both participants that have a high school diploma/GED or college degree reported older ages at first intercourse, when we compare both groups, those with college degrees reported having older ages at first intercourse.

From the control variables, when compared to participants with lower-incomes, for those with at least a median annual income the odds of having an older age at first sex increased by a factor of .125. Additionally, when compared with never-married participants, the odds of married participants having an older age at first increased by a factor of .148. According to this model, participants that either had higher incomes or were married also reported older ages at first sex.

Multiple Regression Table 4 – Diagnosed with STD

	Unstandardized B	Unstandardized Std. Error	Standardized Coefficients Beta	t	Sig.	95% C.I. Lower	95% C.I. Upper
Black	.000	.015	.000	-.011	.991	-.030	.029
White	.034	.016	.037	2.085	.037*	.002	.066
Age	.055	.001	.100	6.582	.000***	.003	.006
Lower Income	-.080	.012	-.096	-6.620	.000***	-.104	-.057
Middle Income and Higher	.080	.012	.096	6.620	.000***	.057	.104
High School Diploma or GED	.037	.021	.027	1.803	.071	-.003	.078
College Degree	.075	.016	.082	4.660	.000***	.044	.107
Never Married	-.012	.016	-.013	-.725	.469	-.044	.020
Married	-.075	.014	-.086	-5.403	.000***	-.103	-.048

\*  $p \leq 0.05$  \*\*  $p \leq 0.01$  \*\*\*  $p \leq 0.001$

Like table 4, table 5 uses the same predictor and control variables. However, this model assesses the relationship between those variables and the dependent diagnosed with STD variable. From the results of this model, the variables White, median-income or higher, and college degree have statistically significant positive relationships with being diagnosed with a STD. Lower-income and married were found to have statistically significant negative relationships.

For White participants, the odds of being diagnosed with an STD increased by a factor of .037. However, the model found neither a positive or negative relationship with Black participants. From this sample, although there was no found association between Black participants and having an STD diagnoses, White participants were more likely to report having an STD diagnoses.

The model found positive relationships between having a high school diploma/GED or college degree with being diagnosed with STDs. However, the only statistically significant association with the STD diagnoses variable was for those with college degrees. According to the results of the model, those with college degrees reported having STDs more frequently, in comparison to those without a degree. For those with college degrees, the odds of being diagnosed with a STD increased by a factor of .082.

From the control variables, having a lower annual income and being married had a statistically significant negative relationship with having an STD diagnoses. When compared with participants with median-income or higher, the odds of participants who had lower-incomes being diagnosed with a STD decreased by a factor of -.096. Additionally, when compared to never-married participants, the odds of married participants being diagnosed with an STD decreased by a factor of -.086.

## CHAPTER 5: CONCLUSION

This study assessed the associations between race, education, and HIV susceptibility. The importance of such an assessment resulted from the conflicting previous findings on the efficacy of education in reducing HIV rates. I used binary and multiple regression models to find statistically significant associations and to answer whether education reduced HIV susceptibility, if HIV susceptibility decreased based on higher educational attainment, if Black women were more susceptible to HIV, and to identify variations between Black and White participants within the study.

Although educational attainment was negatively associated with some of the HIV susceptibility measures, educational attainment was not negatively associated with all measures. Thus, I am rejecting my first hypothesis that educational attainment is negatively associated with all four measures of HIV susceptibility. Having an older age at first sex was the only statistically significant association found for those with either a high-school diploma or GED. Compared to participants without a high school diploma or GED, there was no statistically significant association that high school graduates used condoms more consistently, were less likely to have male partners who had concurrent sexual relationship, and had fewer STD diagnoses. However, there was statistically significant associations that, when compared to those without a college degree, college graduates had older ages at first sex, reported fewer male partners with concurrent sexual partners, and were less likely to not use condoms at all. Concurrently, there were statistically significant associations that, compared to non-degree holders, college graduates had more STD diagnoses and did not use condoms consistently. Thus, there is a stronger association that those with a college-level education have older ages at first sex and are in monogamous relationships.

For Black women, the only statistically significant finding to illustrate their raised HIV susceptibility, in comparison to White women, is their younger ages at first sex and being more likely to have a male partner with concurrent sexual partners. When compared to the sample population, White women were also more likely to report younger ages at first sex. However, unlike Black women, it was statistically significant that White women were diagnosed with a STD. Although in comparison to White women, Black women were more likely to report using condoms consistently, there were no significant differences between reported condom use amongst Black and White women. When compared to the sample population, both Black and White women were less likely to report consistent condom use. Hence, I am rejecting my second hypothesis that Black women are significantly more susceptible to HIV compared to White women.

Because of the similar level of educational attainment between Black and White women, joined with the finding that neither group is more susceptible to HIV when compared to the other, I am not rejecting my third hypothesis that there are no significant differences in the negative association between educational attainment and HIV susceptibility for Black and White women. Although education may mitigate some risky sexual behaviors, from my findings, education as a sole counteractive measure against HIV rates may not be successful. As previously mentioned, a key component to heterosexual women's sexual health is having partners that are at lower-risk and using condoms consistently. For Black women, although approximately 45% had a college degree, they were still more likely to report lower consistent condom use, had younger ages at first sex, and were about 1.8 times more likely to report having a male partner that has concurrent sexual relationships.



There were some limitations to this study, that have impacted the findings I was able to obtain. An important limitation was the use of secondary data. I had no control over how the research questions were formed and was constrained to the sample. In addition, there was an unequal distribution of White and Black participants, there were approximately twice as many white participants within the sample.

As there are gaps in the association between education and HIV susceptibility, an interesting link between education, negotiation abilities, and HIV susceptibility has been proposed by researchers to explain the sexual behaviors of women (Rosenthal and Levy 2010). For instance, femininity is a crucial concept in Black women's understanding of womanhood. Thus, to maintain their sense of femininity, the importance of maintaining gender roles can result in Black women allowing their partners greater control in the relationship, particularly in the context of intimate contact (Melton 2011). Black women may opt to give primary control over contraceptive and protective measures to their partners, risking not only the sexual health of Black women but also impacting their self-esteem and perception of self. Further research is needed to understand the degree to which education influences the negotiation abilities of women on their sexual behaviors.

About half of women in the study made low-income annually, the connection between resource control and HIV susceptibility is another area that could benefit from further research. Resource control includes access to well-paying jobs, education, health care, and institutional influence, which generally favors more men than women. Because of inequality in access to resources, women are often left economically dependent on male partners, making it challenging and sometimes even dangerous for women to negotiate condom use or discuss monogamy. Focusing on resource control addresses the ways that inequities increase HIV risk for women.

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## APPENDIX A: VARIABLE CODES

### INDEPENDENT VARIABLES

#### Race:

BlackandOther: 1 – Black; 0 – All other races

WhiteandOther: 1 – White; 0 – All other races

#### Education:

HIGED: 1 – High school Diploma or GED; 0 – None

HaveDegree: 1 – Has degree; 0 – None

### CONTROL VARIABLES

#### Income:

EARN\_Lower: 1 – Lower Income; 0 – Middle or Higher Income

EARN\_MiddleUp: 1 – Middle or Higher Income; 0 – Lower Income

#### Marital Status:

MarriedandOther\_R: 1 – Married; 0 – all other

NeverMarriedandOther\_R: 1 – Never married; 0 – all other

#### Age:

ParticipantAgeR: 19-49

### DEPENDENT VARIABLES

#### Condom Use:

Condom\_All: 1 – used condoms every time; 0 – did not use condoms every time

Condom\_None: 1 – reported no condom use; 0 – used condoms at least some of the time

#### Age at first intercourse:

Firstintercourse: 2-43

#### Presence of sexually transmitted diseases:

STD\_All: 0 – No STD; 1 – Has at least 1 STD; 2 – Has at least 2 types of STD; 3 – Has at least 3 types of STF

#### PartnerOther:

MultSexPart: 1 – partner had sex with others; 0 – partner did not have sex with others